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LITERATURE SEARCH, REVIEW, AND COMPILATION OF DATA FOR CHEMICAL AND RADIOCHEMICAL SENSORS

- TASK 1 REPORT -

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DISCLAIMER

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PREFACE

This literature search was conducted by William H. Roach, Advanced Sciences, Ins. (ASI), Principal Investigator, with assistance from Leo Rahal (ASI) and H. Milton Peek (Consultant). The work was performed under contract DE-AC05-87OR21706, Task 012.92, TTP No. OR-121112, with the Hazardous Waste Remedial Actions Program (HAZWRAP) of Martin Marietta Energy Systems, Inc. Frederick Heacker served as the HAZWRAP Project Manager for this task. The literature search was sponsored by Caroline Purdy, Office of Technology Development, Office of Environmental Restoration and Waste Management, Department of Energy Headquarters.

ABSTRACT

This report contains the results of an extensive literature search on sensors that are used or have applicability in environmental and waste management. While restricting the search to a relatively small part of the total chemistry spectrum, a sizable body of reference material is included. Results are presented in tabular form for general references obtained from data base searches, as narrative reviews of relevant chapters from proceedings, as book reviews, and as reviews of journal articles with particular relevance to the review. Four broad sensor types are covered: electrochemical processes, piezoelectric devices, fiber optics, and radiochemical processes. The topics of surface chemistry processes and biosensors are not treated separately because they often are an adjunct to one of the four sensors listed. About 1000 tabular entries are listed, including selected journal articles, reviews of conference/meeting proceedings, and books. Literature to about mid-1992 is covered.

1. INTRODUCTION

During the next several decades, the U.S. Department of Energy (DOE) is expected to spend tens of billions of dollars in the characterization, cleanup, and monitoring of DOE's current and former installations that have various degrees of soil and groundwater contamination made up of both hazardous and mixed wastes. Each of these phases will require site surveys to determine type and quantity of hazardous and mixed wastes: first, a survey to estimate the magnitude and cost of the cleanup effort, next, one to quantify the cleanup, and, finally, one to monitor the site after cleanup to ensure that the effort has been successful. It is generally recognized that these required survey and monitoring efforts cannot be performed using traditional chemistry methods based on laboratory evaluation of samples from the field—the number of samples required for a meaningful survey would require the capabilities of many more certified laboratories than now exist in the United States. For that reason, a tremendous push during the past decade or so has been made on research and development of sensors that can largely duplicate laboratory results in the field, have adequate sensitivity and some selectivity, are easy to use, and are inexpensive compared to laboratory instrumentation. Much of the research in the United States is being done at universities, the national laboratories, federally funded research organizations, and, possibly to a lesser extent, in industry. Foreign governments, particularly Japan, Germany, and the United Kingdom, are putting large sums of money into sensor research and development, expecting large payoffs.

Increased interest and funding levels in sensor research have led to a corresponding increase in reports in journals, books, and proceedings. It is not unusual to see an entire conference dedicated to a particular class of sensor (e.g., optical fibers) on a yearly basis. Almost every year comprehensive reviews of some aspect of chemical sensors, both in the United States and abroad, are published. In an attempt to assemble the mass of literature dealing only with chemical and radiochemical sensors that address the hazardous and mixed waste pollutants, the Office of Research and Development under the Deputy Assistant Secretary for Technology Development has contracted for a "comprehensive literature search to determine the availability and developmental status of sensors that address DOE needs (in the hazardous and mixed waste areas)." Initial emphasis is to be placed on optical fibers, piezoelectric devices, electrochemical processes, and radiochemical processes. Other processes to be considered are surface chemistries, biosensors, and separation processes. Task 1 is to provide that literature search. Following tasks include an evaluation of the referenced material to identify sensors that have immediate availability, those with short-term (1 to 2 years) availability, and those that may be available in 3 to 5 years. Where possible, these evaluations will include information on sensitivity, dynamic range, selectivity, and laboratory and field test results. Finally, a more detailed report will discuss, as completely as possible, each type of sensor, sensitivity, lower limit of detection, and the developmental agencies and principal investigators involved.

During the course of this literature search, it became evident that the search could continue for an indeterminate length of time because of the huge amount of material that has addressed the field of chemical sensors during the past several decades. Limiting the search to those sensors listed reduced the number of references cited, but did not reduce the time spent in the search by a proportionate amount because many of the references dealing with areas of interest were intermingled with references outside our scope of work, such as sensors for blood glucose or oxygen and other immunosensors. For that reason, the listing of references, books, and proceedings reviewed is far from exhaustive, but it does provide a representative sample of what has been and is being done in chemical sensor research.

Also during this work, it was found that thermal sensors should have been included in the study. Although the work on thermal sensors for chemical processes may not be as extensive as work on some of the other, there is a fair body of literature on the use of thermal sensors to obtain quantitative data on analyte concentrations. Because the temperature of a system is often taken for granted, an attitude of neglect for this important parameter has resulted. Any continuing literature search should include thermal sensors.

Biosensors and surface chemistries are not separate parts of this report because both are most often a part of one of the four sensors covered. That is, biological materials and other organics often are the coatings applied to one of the four to provide the reaction with the analyte detected by some measuring device. As a result, many of the references that discuss a particular sensor by necessity also discuss the coating that is an essential part of the sensor. In some cases, however, biosensors exist as separate entities, and they will be included in follow-on work to this task.

2. ELECTROCHEMICAL SENSORS

2.1 INTRODUCTION

Electrochemical sensors are divided into three categories: (1) sensors for ions, (2) sensors for gases, and (3) biosensors [Janata (1)]. Additionally, electrochemical sensors can be grouped by their method of measurement into potentiometric (measurement of voltage), amperometric (measurement of current), and conductimetric (measurement of conductivity). The subset of ion sensors can be further subdivided into ion-selective membranes, ion-selective electrodes with liquid internal contacts, and other potentiometric ion sensors where the internal contact is a solid material. Gas sensors are subdivided into solid-state cells, Severinghaus-type electrodes, and work function sensors. This report describes electrochemical sensors with particular emphasis on applications to environmental monitoring and detection. Biosensors and conductimetric sensors, as such, are not discussed.

2.2 POTENTIOMETRIC SENSORS

Potentiometric measurements are performed within the condition of zero current. Two types of electrochemical interface exist with regard to charge transfer: ideally polarized (purely capacitive) and nonpolarized. Additionally, with the advent of ISFETs the potential for using the gate insulator of these devices as the active electrochemical surface exists. At present no chemical sensors are using polarized interfaces.

An ion-selective membrane is the essential component of all potentiometric ion sensors. This membrane establishes the preference with which the sensor responds to the determinant (ion of interest) in the presence of a variety of other ionic components of the sample. Ion-selective membranes are usually considered in the arena of sensing in an aqueous environment. However, water is not the only usable medium in which these sensors can operate. Examples of successful application of ion-selective electrodes (ISE) in nonaqueous media and at high temperatures and pressures are prevalent. The use of any type of sensor for such applications is generally determined by its construction and by the constituent materials, rather than by restrictions on the principle of operation of the device.

Coated-wire electrodes are made of an internal wire coated with an ion-selective polymeric membrane. Alternative methods of attachment are pressing or gluing to the solid-state membrane, forming a compact and inexpensive ion sensor.

2.3 AMPEROMETRIC SENSORS

High-performance liquid chromatography (HPLC), especially liquid chromatography with electrochemical detection (LCED), is a powerful electroanalytical technique for conducting trace-level analysis. The amperometric detection scheme is the most widely used because it offers enhanced sensitivity, uses simple instrumentation, and yields considerable selectivity through the choice of applied potential [Bond (2), Bersier and Bersier (3)]. Among the amperometric detectors, thin-layer or wall-jet types are the most common. Glassy carbon (GC), platinum, and gold are the most widely used electrode materials in LCED determinations. The usual electrode size is in the macroscopic (millimeter) range.

Recently, an increased interest has been shown in the development of electrochemical detectors that use microstructural materials, particularly carbon fibers, as reported in Edmonds (4), lithographic films [Morita et al. (5)], sputtering [Wehmeyer et al. (6)], and host membranes [Penner and Martin (7), Wang and Zadeii (8)]. These microvoltammetric electrodes have many applications and currently represent one of the most active research areas in electrochemistry. The microelectrode is superior to large, commonly sized electrodes because of the enhanced nonlinear diffusion and low ohmic and capacitive drops they exhibit. The result is that the signal-to-noise (S/N) ratio is larger for microelectrodes than for larger electrodes. Additionally, as a result of their small area, microelectrodes are useful for flow-stream analysis in an amperometric mode.

For this group of sensors, the information is acquired from the current-concentration relationship. The two important aspects of this device are the origin of the signal and the selectivity. Optimization of these parameters is important to the efficient and accurate operation of the devices. The chemical transformation that occurs at the electrodes during the passage of current is determined by Faraday's law, by the mass transport equations (depending on the geometry of the electrode and the experimental arrangement), and by the current-voltage equation.

The general relationship describing the current i as a function of the applied voltage $(E - E_0)$ is:

$$i = nFAk_0\{C_o\exp[-\alpha nF(E - E_0)/RT] - C_r\exp[(1-\alpha)nF(E - E_0)/RT]\} , \qquad (1)$$

where C_o and C_r are the surface concentrations of the oxidized and reduced forms of the polarizer (respectively), α is the symmetry coefficient, A is the area of the electrode, k_0 is the so-called heterogeneous rate constant, n is the number of electrons per mole, F is the Faraday constant, R is the molar gas constant, and T is the temperature. There is no direct effect of the symmetry coefficient for electrochemical sensors (its value ranges between 0.3 and 0.7). The total current in Equation 1 can be attributed to two components, the cathodic component i_c and the anodic component i_a, given by:

$$i_c = nFAk_0C_o\exp[-\alpha nF(E - E_0)/RT] , \qquad (2)$$

$$\text{and } i_a = nFAk_0C_r\exp[(1-\alpha)nF(E - E_0)/RT] , \qquad (3)$$

$$\text{where } i = i_c - i_a . \qquad (4)$$

Examination of Equation 1 indicates that for an increasingly more negative potential applied to the electrode, the cathodic current increases exponentially, leveling off as it approaches the limiting plateau region where the mass transport of the oxidized species to the electrode surface limits the current. At the same time, the anodic current decreases. Additionally, in a symmetrical manner, the same argument exists for the increasingly positive potential at the working electrode where the dominant current is the anode current. In the region of the equilibrium potential, both cathodic and anodic currents contribute equally to the total current.

There are many other interesting characteristics of electrochemical sensors as can be seen from references such as the list found in Janata (1), from which this material was obtained. Relevant electrochemical sensor journal articles and books have been reviewed, and notes on some of these are included in this section.

Numerous articles have been published on methods for improvement and application of electrochemical sensors. A review of a selection appearing in the journal, *Electroanalysis*, follows.

Zhu and Curran (9) discuss the porous flow-through electrode of an electrochemical sensor and show that a critical dimension for the porous electrode is the pore diameter, the limiting current being inversely proportional to the two-thirds power of the pore radius. The versatility of the porous electrode is significant with regard to application to environmental sensing, and any progress in the development of this device would be important.

Buldini et al. (10) present information on the use of a voltammetric technique for the determination of trace metals, including manganese, nickel, and cobalt, in natural waters. The voltammetric technique provides a "viable alternative to atomic absorption spectrometry and neutron activation because of its inherent sensitivity, precision, reliability, multi-element and speciation capabilities, wide applicability and suitability for on-line measurements, speed, simplicity, and low cost." Another advantage of the voltammetric technique is the ability to "perform the preconcentration steps directly into the voltammetric cell without risk of sample contamination . . . and the possibility of in situ analyses and on-line (remote) monitoring and the speciation capabilities that in many cases permit investigators to establish the chemical form in which metals are present in the environment." The new voltammetric techniques (based on adsorption or catalytic effects) expand the scope of electrochemistry in the direction of numerous additional metals. The automated instrumentation is ideally suited for monitoring additional elements.

Postupolski and Golimowski (11) provide information on a technique for the simultaneous determination of antimony and bismuth from 0.5 *M* HCl solutions that contained 0.1 *M* hydrazine. The technique uses a hanging mercury electrode in differential pulse anodic stripping voltammetry with very slow potential scan rate and small pulse amplitude. These elements are a serious health threat, particularly at concentrations higher than those occurring naturally. The technique described has been field tested at several locations.

Zhi-liang (12) discusses a "novel and highly sensitive single-sweep oscillopolarographic method" for determining ultratrace amounts of ruthenium. The noble metals have found wide application to industry and laboratories, especially in the defense industry, the chemical industry, petroleum refineries, and electronic industries. The results obtained from experiments show that the method described has the advantage of high sensitivity, good selectivity, wide working range, accuracy, and simplicity. Additionally, this method is more sensitive than polarographic methods previously developed and referenced in this report. With regard to sensitivity, working range, and catalyst [As(III)] usage, the method outlined is preferable to the catalytic spectrometric and catalytic thermometric methods. It is one of the most sensitive catalytic kinetic methods for Ru at the present time.

Zadeii and Mitchell (13) present an electrochemical microband thin-layer flow cell detector for high-performance liquid chromatography incorporating a thin GC electrode. The microband thin-layer cell gives an improved S/N ratio at an applied potential of 0.6 V vs Ag/AgCl compared with a conventionally sized GC electrode. This electrode is structurally strong and easy to fabricate into an LCED cell configuration. The microband exhibits excellent S/N characteristics, long linear dynamic range, low detection limits, and flow-rate-independent response. Additionally, it has good temporal stability and can be used within 10 to 15 min after voltage is applied. The microband cell represents a very promising device that can be applied as a universal electrochemical detector for liquid chromatography.

Hernandez-Brito et al. (14) describe a computer-controlled electrochemical system for transient current measurements in the determination of heavy metals. The instrumentation developed by the authors is applicable to the majority of voltammetric methods used to determine organic compounds and heavy metals, including copper, lead, and cadmium. The system has an option to measure the current directly, allowing a determination of the real current obtained in a Faradaic process. This provides a method to establish the real kinetics of the reaction or the formation of chemical species on the mercury electrode. Most commercial instruments do not allow determination of the current circulating through the electrode. Additional advantages are the ability to carry out high-speed stripping measurements in a more versatile and powerful fashion than analog systems and investigate new methods and electrode processes.

Investigations of Ni and Co complexes have been performed by Kapetanovic et al. (15) through the use of polarographic methods. Although the application in this report is directed toward the medical arena, the basic procedure should be applicable to environmental cases as well.

Progress in the area of electroanalysis, and specifically electrochemical sensors, relies on the development of improvements in the technology of electrodes. In electrochemistry, the working electrode converts the coupled rates of interfacial electron transfer and mass transfer into an electric current. Tallman and Petersen (16) discuss recent research involving new composite electrode materials that offer significant advantages in electroanalysis. The composite electrode is defined as "a material consisting of at least one conductor phase comingled with at least one insulator phase." Generally, such a composite system is composed of only one conducting and one insulating phase. The authors present a complete discussion of these electrodes and conclude that "consolidated composites appear to offer more flexibility and control over surface morphology than do dispersed composites and are capable of generating substantial enhancements in current density, and, thus, the S/N ratio."

Improvements in stability, selectivity, and scope of electrochemical detectors, and the detection of electro-inactive substances are achieved through the use of chemically modified electrodes (CMEs) for liquid chromatography and flow-injection analysis [Wang et al. (17)]. The application of CMEs has resulted in significant success and extensive stimulated activity. Additional information on surface-modified, perm-selective coatings for amperometric detection is provided in Wang (18). Again, the conclusion reached is that sensors based on modified electrodes, although still in the early stages of their "life cycle," will provide the means to more powerful sensing probes. Commercialization of these probes is expected to take place in the near future, and application of modified electrodes in chemical sensing should increase at a rapid rate during the next several years.

The coated-wire electrode is one of the simplest electrochemical sensor types. These devices have particular application to the analysis of surfactants of various types. Extension to environmental applications, including detergents, cleaning, and washing powders, etc., is possible, as discussed in the overview of this area by Vytras (19).

Kalvoda (20) discusses the potential of the various electrochemical methods for monitoring pollution of the biosphere and for environmental control; details can be found in the monographs of Kalvoda and Parsons (21) and Kalvoda (22). Some of the recent electroanalytical techniques that can be used or adopted for environmental control are discussed in Wang (23). In conclusion, it appears that new chemical or biological recognition processes and advances in semiconductor technologies and microelectronics should result in the appearance of many exciting environmental applications for electroanalysis.

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2.5 BOOK REVIEW

Electrochemical Detectors, Fundamental Aspects and Analytical Applications, Ed by T. H. Ryan, Plenum Press, New York, 1981.

This book is a series of articles written by several authors addressing the application of electrochemical sensors and modifications incorporating improved electrode designs. The following article reviews were thought to be of potential interest in the DOE work.

New Electroanalytical Techniques Applied to Medicine and Biology, by W. J. Albery and B. G. D. Haggett, describes the development of new techniques for the determination of three different classes of compounds of interest to biologists and clinicians. Although not directed to the environmental area, this article has some merit in that it addresses some innovative electrode designs incorporating sandwich electrodes with a number of metalized membranes, therefore providing new possibilities for the construction of a single sensor for analyzing gas mixtures.

Voltammetric Detectors for HPLC and Other Analytical Flow-Through Systems, by A. Trojanek, provides a brief account of the properties, design, and construction of voltammetric flow-through detectors for HPLC and continuous flow analysis. The voltammetric detector represents the most important group of electrochemical detectors. Particular emphasis is placed on sensitivity of these devices and methods to improve their performance. Improvement in sensitivity is achieved through improved flow rate and increased area of the working electrode. Additionally, the fundamental quantity in useful sensitivity is the value of the S/N ratio, in which all of the changes of the output signal that do not carry information about the input function (concentration) are considered. The S/N ratio is improved by application of pulse and alternating current (AC) techniques. The author discusses the effects of dynamic range, stability and reproducibility, use of mercury electrodes, static mercury electrodes, solid electrodes, porous electrodes, tubular electrodes, rotating electrodes, and thin layer cells.

Some Applications of Electrochemical Oxidation as a Detection Technique in High Performance Liquid Chromatography, by A. J. Samuel and T. J. N. Webber, indicates that HPLC has been shown to be a powerful separation technique though its range of application is limited by the methods available for detecting the eluates. This paper describes the principal considerations for setting up an electrochemical detection system for HPLC, including the determination of electroactivity of organic compounds using a novel microscale voltammetric technique, the choice of mobile phase, and the selection of instrumental approaches for optimum performance. The application of electrochemical detection to several classes of less easily oxidized compounds, including sterols, nonionic surfactants, and organic acids, is illustrated.

Application of High Performance Liquid Chromatography With Electrochemical Detection in Clinical Chemistry, by D. A. Richards, discusses the value of electrochemical detection following HPLC and compares the value with that of the more widely used optical methods of detection. The advantages are discussed mostly with regard to clinical chemistry. However, discussions of equipment improvements, particularly pressure pumps, could be important to environmental applications.

Optimization of an Electrochemical Detector Using a Static Mercury Drop Electrode in High Performance Liquid Chromatography. Analysis of the Anticancer Agent Mitomycin C in Plasma, by W. J. van Oort, J. den Hartigh, and R. J. Driebergen, discusses an electrochemical detector using a static mercury drop electrode that has been optimized for combination with HPLC. Parameters like pump noise, oxygen in mobile phase and sample solution, nozzle, flow rate, and working potential in the direct current (DC) mode and in the differential pulse polarography (DPP) mode have been examined. The information provided is applicable to environmental detection.

Electrochemical Sensors and Detectors With Renewable Electrode Surfaces, by J. Tenygl, discusses the passivation of the surface of solid electrodes, which is one of the most serious problems occurring in the application of electrochemical methods. This report discusses the use of dropping mercury electrodes (DME) and the effort to develop an electrode with the features of a DME, but without the charging current, sensitivity to vibration and impurities, and the need to clean the mercury. The article discusses activation of the electrode surface, protection of the electrode from passivation, combination of several measuring techniques, and calibration and zeroing of the sensors. Activation of the working electrode is performed by the electrode being periodically disconnected from the measuring system and polarized by one or more cathodic and/or anodic pulses. The article reviews techniques to improve the efficiency of sensors and detectors through use of renewable surfaces. There are a large number of references relating to this area of design.

Voltammetry of Organic Molecules at Solid Electrodes, by J. Volke, concludes that it is possible, in spite of the unsuitability of nonmercury electrodes in most cathodic reductions, as compared to mercury, that a considerable number of organic substances can be oxidized at these electrodes and the resulting voltammetric curves can be used in quantitative analysis. The compounds of the following classes can thus be determined by anodic processes:

- aromatic hydrocarbons
- aliphatic and alicyclic hydrocarbons
- alkenes
- carboxylic acids
- aliphatic and benzyl amines
- aromatic amines
- aminophenols
- phenols, hydroquinones, and catechols
- aromatic ethers and esters
- alcohols
- sulfur-containing compounds (e.g., sulfides, disulfides)
- nitrogen- and sulfur-containing heterocyclic compounds

Tensammetry in Combination with Adsorptive Accumulation of Surface Active Compounds on the Electrode Surface, by R. Kalvoda, discusses the study of the adsorptive accumulation of surface active compounds on the electrode surface in polarographic stripping analysis, where, during the stripping process, the desorption peak is recorded using DPP. It is concluded that electrolysis at the interface between two immiscible electrolyte solutions offers attractive opportunities for exploitation in chemical analysis. The first attempts are promising, and future research, it is hoped, will reveal more of the charge transfer reactions of analytical interest.

3. FIBER-OPTIC BASED SENSORS

3.1 INTRODUCTION

The use of optical fibers for detector applications is almost as old as the introduction of optical fibers themselves. Their use in chemical sensing probably dates from the early 1970s, according to Wolfbeis (1), when they were specifically identified as sensors for oxygen and iodine. Since that time, the use of optical fibers as either the sensor itself or as part of a sensor system has expanded to the degree that entire conferences are held on the use of fibers in sensor systems. This review covers only a part of the totality of optical fibers as sensors, namely, their use in applications related to environmental work.

Optical fibers are classed as either single-mode or multimode. Single-mode fibers, in general, are of such small diameter, typically 3 to 5 μm, that only a single EM mode can propagate in the fiber. Multimode fibers are further classed as step-index or graded-index. Step-index fibers exhibit a certain refractive index in the core, or transmitting region, and a lower refractive index in the cladding region surrounding the core. Graded-index fibers have a variable refractive index in the core, the index changing from the core center to the core-cladding interface. The number of noninterfering modes that can be accommodated in multimode fibers depends on the numerical aperture, defined in the following, and the wavelength of the light. Parameters of importance in optical fibers, in addition to refractive indices, are numerical aperture (a measure of the angle of incidence that incoming light has for allowed transmission in the fiber), number of modes the fiber will transmit, and modal and chromatic dispersion.

In the field of chemical sensors, optical fibers are classified as extrinsic or intrinsic. In extrinsic applications, the fiber acts only as a light pipe, transmitting light from a source to some external medium, either a medium that contains the analyte or a material that responds in a specified way to an analyte. A corresponding signal generated by the analyte is transmitted back through the fiber to a detector system that interprets the signal as to the analyte's character. Intrinsic fibers are a part of the sensing mechanism, interacting with an analyte causing some optical change in the fiber itself or in a selective coating on the fiber. Thus, extrinsic fibers are not sensors in the strict sense, but are such an integral part of a sensing mechanism that they are included in the broad definition of sensors. Wolfbeis (1) defines a sensor as "a device capable of continuously and reversibly recording a physical parameter or the concentration of a chemical or biochemical species." Many sensors in the chemical field do not satisfy either or both of these criteria, particularly the latter. In this case, Wolfbeis suggests using the term "probe" rather than sensor, but that differentiation does not appear to have gained wide acceptance. Some of the parameters measured or applications using fibers as extrinsic or intrinsic sensors are listed in the following.

EXTRINSIC	INTRINSIC
Fluorescence	Fluorescence
Scattering, including Raman	Absorption
Absorption	Refractive index
Atomic emission	Transmission
Chemiluminescence	Chemiluminescence
Colorimetric	Colorimetric

In this review, only those applications of optical fibers to chemical sensors will be addressed, and not that completely. The use of optical fibers as temperature sensors, in particular, is not discussed in detail. Reference (1), in two volumes, edited by Wolfbeis, includes background and applications of optical fibers to many fields of chemistry, including environmental, and is recommended as an excellent reference. A complete review of both volumes is included in the following section.

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45. M. T. Wlodarczyk and D. J. Vickers, *SPIE*, 718 (1986).
46. O. S. Wolfbeis, *Fibre Optic Fluorosensors in Analytical and Clinical Chemistry, Molecular Luminescence Spectroscopy: Methods and Applications*, S. G. Schulman, ed., Vol. 2, Ch. 3., John Wiley and Sons, New York, 1988.
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3.2.2 Proceedings of Conferences and Symposia – Papers of Special Interest for This Report

Note: Most listings include a key word or phrase and the number of references cited.

1. *Fiber Optic and Laser Sensors IV*, SPIE, Vol. 718, R. DePaula and E. Udd, eds., September 1986.

   H. H. Miller and T. B. Hirschfeld, *Fiber Optic Chemical Sensors for Industrial and Process Control.*

   A paper on intrinsic fiber optical sensors, describing the technique of remote fiber fluorimetry. Development and use of sensors for redox potential, pH, oxygen, carbon dioxide, copper, nitrogen dioxide, hydrogen sulfide, uranyl ion, formaldehyde, ammonia, organochlorides, sodium ions, and potassium ions are described. 19 References.

2. *Chemical, Biochemical, and Environmental Applications of Fibers*, SPIE, Vol. 990, R. A. Lieberman and M. T. Wlodarczyk, eds., September 1988.

Extrinsic Fiber-Optic Sensors

a. N. R. Herron, D. W. Whitehead, and V. J. Miller, *Evolution of a Fiber-Optic Chemical Fluorescence Sensor for Monitoring Dissolved Volatiles.* / Fluorescence / 7 References.

Describes the development and testing of a nonreversible fluorescence sensor for chloroform. The reagent is contained in a cell at the distal end of the fiber, separated from the analyte (in water) by a suitable membrane.

b. W. Chudyk, K. Pohlig, N. Rico, and G. Johnson, *Ground Water Monitoring Using Laser Fluorescence and Fiber Optics.* / Fluorescence / 6 References.

The paper describes a field-deployable system using laser ultraviolet excitation of contaminated groundwater and filtering of the return fluorescence signal. Measurements of aromatic contaminants include benzene, ethylbenzene, toluene, and xylene fractions of gasoline. Sampled sites include gas stations and manufacturing companies.

c. J. B. Zung, R. L. Woodlee, M.-R. S. Fuh, and I. M. Warner, *Fiber Optic Based Multidimensional Fluorometer for Studies of Marine Pollutants.* / Fluorescence / 10 References.

Multidimensional fluorescence analysis is used to study the effect of marine pollutants on marine algae. Both excitation and emission wavelengths are varied in the experiments; results are analyzed as a function of both wavelengths.

d. J. W. Griffin, K. B. Olsen, B. S. Matson, and D. A. Nelson, *Fiber Optic Spectrochemical Emission Sensors.* / Molecular Dissociation, Atomic Emission / 14 References.

Radio-frequency and spark excitation of laboratory samples (e.g., chlorinated and fluorinated hydrocarbons) and spectral analysis of the return signals are discussed. Flame excitation, not examined experimentally, is also discussed.

e. K. Goswami, S. M. Klainer, and J. M. Tokar, *Fiber Optic Chemical Sensor for the Measurement of Partial Pressure of Oxygen.* / Fluorescence / 9 References.

The paper describes detection of oxygen in water by luminescence quenching of a fluorophore by oxygen penetrating through a membrane separating the fluorophore from the water. The fluorophore, membrane, and laboratory results are given. Reversibility is possible, but with a long response time.

f. A. Sharma and O. S. Wolfbeis, *Fiber Optic Fluorosensor for Sulfur Dioxide Based on Energy Transfer and Exciplex Quenching.* / Fluorescence / 12 References.

An optical fiber fluorosensor utilizing quenching of energy transfer between the donor (pyrene) and acceptor (perylene) by sulfur dioxide is described. Quenching of the pyrene fluorescence is identified as the mechanism that quenches the energy transfer from donor to acceptor. Concentrations of sulfur dioxide of less than 10 ppm can be detected.

Intrinsic Fiber Optic Sensors

g. B. B. P. Schaffar and O. S. Wolfbeis, *New Optical Chemical Sensors Based on the Langmuir-Blodgett Technique*. / Fluorescence / 12 References.

   Thin organic (Langmuir-Blodgett) films deposited on glass surfaces are used as fluorescent generators in response to various analytes. Results from ion selective optodes, oxygen sensors, pH sensors, halide sensors, and biosensors are discussed, as are the limitations and problems associated with this type of film.

h. L. C. Bobb, H. D. Krumboltz, and J. P. Davis, *Optical Fiber Refractometer*. / Refractive Index Change / 9 References.

   A step-index optical fiber, tapered to one-third of its original diameter, with its cladding partly removed in the tapered region, is used as an optical refractometer. Results are reported for immersion of the tapered section in liquids with refractive indices from 1.33 to 1.65.

i. M. D. DeGrandpre and L. W. Burgess, *All-Fiber Spectroscopic Probe Based on an Evanescent Wave Sensing Mechanism*. / Evanescent Wave / 9 References.

   Evanescent wave sensing for nonpolar solvents, using a polymer clad fused silica fiber as the sensor, is described. The sensor is sensitive to refractive index, length of fiber, and fiber bend radius. Polar solvents do not penetrate the polymer cladding, which acts as a selective membrane.

3. *Fiber Optic and Laser Sensors VII*, SPIE, Vol. 1169, E. Udd and R. DePaula, eds., September 1989.

   P. K. Soltani, C. Y. Wrigley, G. M. Storti, and R. E. Creager, *Fiber Optic Radiation Dosimetry*. / Radiation detection with phosphor and optical fiber / 12 References.

   This paper describes a radiation detector, primarily for gamma rays and X-rays, using a cerium-and samarium-doped SrS crystal attached to the distal end of an optical fiber. The crystal responds linearly to both gammas and X rays, although the X-ray absolute response depends on the X-ray excitation potential. The authors state that the dynamic range of the dosimeter is about six orders of magnitude. They discuss the theory, method of operation, and potential losses and give some experimental results for Co and Cs gamma-ray sources and for X-ray potentials from 50 to 300 kV.

4. *Chemical, Biochemical, and Environmental Fiber Sensors*, SPIE, Vol. 1172, R. A. Lieberman and M.T. Wlodarczyk, eds., September 1989.

Extrinsic Fiber Optic Sensors

a. S. J. Saggese, M. R. Shahriari, and G. H. Sigel, Jr., *Evaluation of an FTIR/Fluoride Optical Fiber System for Remote Sensing of Combustion Products.* / IR Spectrometry / 7 References.

A fluoride glass optical fiber and a Fourier Transform Infrared (FTIR) spectrometer were used to detect methane, carbon dioxide, and carbon monoxide in nitrogen. Detection limits in nitrogen were 0.2 vol % for methane, 0.05 vol % for carbon dioxide, and 0.3 vol % for carbon monoxide.

b. B. S. Matson and J. W. Griffin, *Infrared Fiber Optic Sensors for the Remote Detection of Hydrocarbons Operating in the 3.3 μm to 3.5 μm Region.* / Photoacoustic, Absorption / 14 References.

A ZrF optical fiber, operating in the infrared (IR) range between 3 and 3.5 μm, is used with three different sensors: a vapor absorption cell, a photoacoustic cell, and an evanescent field device, along with a gas analysis cell interfaced with a FTIR spectrometer. Representative detection limits are: 0.01% for hexane in the vapor absorption cell, 2300 ppm for hexane in the photoacoustic cell, 5% for methane in nitrogen with the evanescent wave device, and 0.1% hexane in air with the FTIR system.

c. M. L. Myrick and S. M. Angel, *Normal and Surface-Enhanced Raman Scattering with Optical Fibers.* / Scattering / 14 References.

The use of dual optical fibers for Raman spectroscopy is examined. Examples are shown for benzene and for pyridine, the latter using surface-enhanced Raman.

d. R. E. Synovec, C. N. Renn, and L. K. Moore, *Fiber Optic Absorbance and Fluorescence Measurements in High-Temperature Liquid Chromatography.* / Absorption, Fluorescence / 12 References.

The use of optical fibers with liquid chromatography (LC) is described. Operation of an LC at elevated temperatures improves performance, but frequently used instrumentation does not function well at the higher temperatures. Optical fibers are used to measure absorption or fluorescence of the LC output.

e. R. D. Driver, G. M. Leskowitz, and L. E. Curtiss, *Fiber Optic Chemical Sensing with Infrared-Transmitting Optical Fiber.* / IR Spectrometry / 11 References.

A FTIR spectrometer and IR optical fibers are used to obtain IR spectra for several liquids and a gas. Sensors were a liquid cell, an evanescent wave device, and a gas cell.

f. S. H. Lieberman, S. M. Inman, and G. A. Theriault, *Use of Time-Resolved Spectral Fluorometry for Improving Specificity of Fiber-Optic-Based Chemical Sensors.* / Fluorescence / 8 References.

Time-resolved fluorescence measurements are described for trace metals (Zn and Cd) in seawater and for polycyclic aromatic hydrocarbons. An organic indicator molecule is described that forms fluorescent complexes with the two metals.

g. J. W. Griffin, B. S. Matson, K. B. Olsen, and T. C. Kiefer, *Fiber Optic Spectrochemical Emission Sensors: A Detector for Chlorinated and Fluorinated Compounds.* / Molecular Dissociation, Atomic Emission / 3 References.

An RF-excited helium plasma is used to excite the sample gas, which is drawn into the plasma chamber. Tests were done with carbon tetrachloride in air. The interaction of the plasma with the sample causes molecular dissociation and atomic excitation of the chlorine. The optical emissions are transmitted over optical fibers to a silicon detector. Concentrations of 5 ppm are estimated as the lower detection limit.

h. S. M. Angel and M. N. Ridley, *Dual-Wavelength Absorption Optrode for Trace-Level Measurements of Trichloroethylene and Chloroform.* / Absorption / 11 References.

Trace levels of trichloroethylene and chloroform are detected using a liquid indicator that changes color in the presence of the analyte, absorbing strongly at 530 nm. The ratio of absorption at a reference wavelength of 610 nm (not absorbed by the indicator) to that at 530 nm provides a measure of analyte concentration. The indicator reagents are different for the two analytes. Determinations of either analyte to less than 10 ppb are expected.

i. W. Chudyk, K. Pohlig, L. Wolf, and R. Fordiani, *Field Determination of Ground-Water Contamination Using Laser Fluorescence and Fiber Optics.* / Fluorescence / 9 References.

Laser-induced fluorescence in contaminated groundwater is used for detection of aromatic solvents and several fractions of gasoline. A short (15-ns) laser pulse at 266 nm is used as the excitation, the resulting fluorescence being returned to a photomultiplier tube for detection and identification. The system has been field tested in more than 100 wells.

j. R. Niessner, W. Robers, and A. Krupp, *Fiber Optical Sensor System Using a Tunable Laser for Detection of PAHs on Particles and in Water.* / Fluorescence / 26 References.

Laser-induced fluorescence is used for detection of polycyclic aromatic hydrocarbons (PAHs) that are bound on particles resulting from combustion processes. Results are shown for solid-state PAHs, PAHs in water, monodisperse PAH-aerosols, and monodisperse NaCl particles with PAH coatings. A PAH detection limit of 1 ng/mL is stated.

k. A. Mohebati and T. A. King, *Fiber Optic Remote Gas Sensor with Diode-Laser FM Spectroscopy.* / Spectrometry / 4 References.

Frequency modulation of a diode laser is used as input to an absorption cell containing atmospheric pollutant gases. Theory of operation, experimental setup, and results with methane are shown. Absorption measurements in the range of 0.001% are quoted.

l. R. J. Berman and L. W. Burgess, *Renewable Reagent Fiber-Optic-Based Ammonia Sensor.* / Absorption / 2 References.

A fiber optic sensor for ammonia using a renewable reagent is described. Lower detection limit of 10 ppb is quoted.

m. K. Goswami, J. A. Kennedy, D. K. Dandge, and S. M. Klainer, *Fiber Optic Chemical Sensor for Carbon Dioxide Dissolved in Sea Water.* / Fluorescence / 7 References.

A fiber optical chemical sensor (FOCS) for detection of carbon dioxide dissolved in sea water is reported, using a cell at the distal end of the fiber, a carbon dioxide permeable membrane, and a suitable reagent in the cell. Carbon dioxide in the reagent changes the emission intensity of the reagent, yielding a measure of CO_2. The authors state this type of sensor may be used over a dynamic range of 0 to 600 ppm of dissolved carbon dioxide.

n. J. Polster, W. Hobel, A. Papperger, and H. Schmidt, *Fundamentals of Enzyme Substrate Determinations by Fiber Optics Spectroscopy.* / Reflectance / 12 References.

A discussion of the theory of enzyme substrates as detectors of specific materials is given, followed by a description of the use of enzyme coatings on the end of optical fibers for the detection of urea and penicillin-G.

Intrinsic Fiber Optic Sensors

o. D. A. Christensen, J. D. Andrade, J. Wang, J. T. Ives, and D. E. Yoshida, *Evanescent-Wave Coupling of Fluorescence into Guided Modes: FDTD Analysis.* / Fluorescence / 4 References.

This is a theoretical paper that describes the solution of Maxwell's equations to predict the amount of fluorescent signal coupled back into an excitation signal from a specific coating on an optical fiber. The fluorescence is produced by the action of the exciting wavelength evanescent wave on the fiber coating.

p. F. Kvasnik and A. D. McGrath, *Distributed Chemical Sensing Utilizing Evanescent-Wave Interactions.* / Scattering / 10 References.

Selective coatings at distributed places on long optical fibers, coupled with optical time domain reflectometry, are used not only to detect specific analytes via evanescent wave interactions, but also to determine the position along the fiber where the interaction occurs.

q. V. Ruddy, B. D. MacCraith, and J. A. Murphy, *Spectroscopy of Fluids Using Evanescent-Wave Absorption on Multimode Fiber.* / Absorption / 11 References.

A short paper investigating absorbance of methylene blue as a function of the length of fiber exposed to the reagent, using evanescent wave spectroscopy as the analytical method.

r. J. L. Oxenford, S. M. Klainer, T. M. Salinas, L. Todechiney, J. A. Kennedy, D. K. Dandge, and K. Goswami, *Development of a Fiber Optic Chemical Sensor for the Monitoring of Trichloroethylene in Drinking Water.* / Refractive Index / 3 References.

The development and laboratory testing of a reversible FOCS for specific detection of trichloroethylene (TCE) is reported. The detection method is based on the refractive index change of the fiber due to a coating on the un-clad fiber, the coating having affinity to TCE. Data are shown for TCE concentrations in water of 0, 100, 200, and 300 ppm.

s. D. K. Dandge, T. M. Salinas, S. M. Klainer, K. Goswami, and M. Butler, *Fiber Optic Chemical Sensor for Jet Fuel.* / Refractive Index / 3 References.

The paper describes a reversible optical fiber sensor specific to determination of jet fuel as vapor, liquid, or in a water emulsion. A portion of un-clad fiber is coated with a (proprietary) coating that has an index of refraction close to that of jet fuel. Exposure of the fiber to jet fuel will result in a loss of signal in the fiber, the loss being proportional to the jet fuel concentration. Experimental results are given.

t. Q. Zhou and G. H. Sigel, Jr., *Porous Polymer Optical Fiber for Carbon Monoxide Detection.* / Colorimetric / 11 References.

A porous polymer containing a carbon monoxide sensing reagent is formed into an optical fiber that is then coupled to a commercially available optical fiber. The sensor was tested for response to other gases and was found to be insensitive to hydrogen and gasoline vapor, but it reacted with hydrogen sulfide. It is nonreversible, and it could be used as a level monitor.

u. H. K. Hui, S. Divers, T. J. Lumsden, T. G. Wallner, and S. Weir, *Accurate, Low-Cost, Easily Manufacturable Oxygen Sensor.* / Technique, Fluorescence / 7 References.

The sensor described, which monitors oxygen partial pressure, is part of a blood monitoring system. An oxygen-sensitive fluorescent dye is applied to a portion of unclad fiber, the magnitude of the return fluorescent signal giving a measurement of blood oxygen levels.

v. G. Boisde, B. Biatry, B. Magny, B. Dureault, F. Blanc, and B. Sebille, *Comparisons Between Two Dye-Immobilization Techniques on Optrodes for the pH Measurement by Absorption and Reflectance.* / Absorption, Reflectance / 19 References.

The paper describes two methods for immobilization of dye on an optical fiber. Both methods use coatings on the fiber. One method depends on absorbance of the coating at the distal end of the fiber, the other on reflectance from the fiber end, modified by the coating on the core material.

w. S. H. Alabbas, D. C. Ashworth, and R. Narayanaswamy, *Design and Characterization Parameters of an Optical Fiber pH Sensor.* / Design / 11 References.

In this experimental study on the reproducibility of optical fiber sensors with the reagent placed on the fiber end, hemispherical and cylindrical end shapes were investigated, with the former exhibiting better reproducibility.

x. T. Vo-Dinh, T. G. Nolan, and Y. F. Cheng, *Fiber Optic Antibody-Antigen-Based Biosensor with Time-Resolved Detection.* / Fluorescence / 10 References.

The fluorescence response from a fiber optic antibody-antigen-based biosensor is phase-resolved to differentiate between two elements of benzo(a)pyrene, one of which is a carcinogen. Limit of detection is in the range of 10^{-18} moles.

5. *Chemical, Biochemical, and Environmental Fiber Sensors III*, SPIE, Vol. 1587, R.A. Lieberman, ed., September 1991.

Extrinsic Fiber Optic Sensors

a. U. Panne and R. Niessner, *Fiber Optical Sensor Based on Time-Resolved Laser-Induced Fluorescence for Detection of Polynuclear Aromatic Hydrocarbons.* / Fluorescence / 4 References.

The time decays of 10 PAH materials and expected detection limits for 13 are given. Excitation was at 337 nm, fluorescence observed through a monochromator onto a photomultiplier. Detection limits ranged from 0.006 to 0.338 mg/L.

b. J. M. Andrews and S. H. Lieberman, *Use of a Neural Network for the Analysis of Fluorescence Spectra from Mixtures of Polycyclic Aromatic Hydrocarbons.* / Fluorescence / 10 References.

The paper discusses the utility of neural networks for analysis of fluorescence spectra from multicomponent mixtures of PAHs. The network was trained on 104 spectra and then used to analyze both intensity vs emission and time resolved spectra from mixtures of PAHs that have similar spectra.

c. J. M. Henshaw and L. W. Burgess, *Evaluation of a Membrane Sampling Element for Use in Remote Optical Multivariate Chemical Analysis.* / Absorbance / 7 References.

The time required for different analytes to permeate a membrane and to develop a spectrum is examined as a possible way of differentiating analytes with similar spectra. Permeation rates can be controlled through membrane thickness and composition. Spectra of trichloroethylene, trichloroethane, and chloroform were taken.

d. O. S. Wolfbeis and H. Li, *LED-Compatible Fluorosensor for Ammonium Ion and its Application to Biosensing.* / Fluorescence / 18 References.

Ammonium-sensitive material and dye contained in a PVC membrane is discussed. Ammonium ion detection is accomplished through selective ion extraction into the membrane, proton release from the dye to the sample, and a resulting color change in the dye that is detected via fluorescence intensity change. The pH of the sample must be kept constant for reliable results. The sensor is reversible and has detection limits in the range 0.03 to 10 mM at near neutral pH, with about 1-min response time for a 2-mm membrane thickness.

e. M. D. DeGrandpre, *Renewable-Reagent Fiber Optic Sensor for Ocean pCO_2.* / Colorimetric / 12 References.

Color change in a renewable colorimetric pH indicator due to CO_2 diffusion across a gas-permeable membrane is used to detect gaseous CO_2 in ocean water. Sensitivities in the range from 300 to 800 ppm were measured, with sensitivity dependent on type of dye, dye concentration, and mass-transfer.

f. F. Baldini, M. Bacci, F. Cosi, A. Del Bianco, and A. Scheggi, *Transition Metal Complexes as Indicators for a Fiber Optic Oxygen Sensor.* / Absorption / 11 References.

Four organo-metallic compounds were tested for optimum oxygen detection, the compounds being contained in a Celgard membrane. Tested were Vaska's complex, Co(salen), Co(His)2, and several Mn compounds. The Co(His)2 was selected on the basis of ease of synthesis, good sensitivity (no values given), stability, and reversibility.

g. M. F. Sultan and M. J. O'Rourke, *Lens-Type Refractometer for On-Line Chemical Analysis.* / Refractive Index / 10 References.

An optically clear cylindrical tube through which a fluid sample flows is used as a lens refractometer, with light input/output via optical fibers. Change in the focal length of the lens is a measure of the refractive index of the sample. Results from methanol/gasoline mixtures are given.

h. S. M. Angel, T. M. Vess, and M. L. Myrick, *Simultaneous Multipoint Fiber Optic Raman Sampling for Chemical Process Control Using Diode Lasers and a CCD Detector.* / Raman Spectroscopy from Laser Backscatter / 13 References.

A diode-laser-based portable Raman spectrometer with a charge-coupled device as detector is used for simultaneous detection, using optical multiplexing, of several processes, including mixed waste monitoring.

i. W. Chudyk, C. Botteron, and K. Pohlig, *Vapor Phase Analysis of Aromatic Organic Compounds Using Laser-Induced Fluorescence and Fiber Optics.* / Fluorescence / 7 References.

A Nd:YAG laser, twice doubled in frequency, optical fibers, and a photomultiplier are used for detection of fluorescence from aromatic organics in the vapor phase. Phenol, toluene, and xylene have been tested, with phenol concentrations below 10 mg/L being detectable. For toluene and xylene, concentrations of about 1 mg/L are detectable.

j. H. O. Edwards and J. P. Dakin, *Measurements of Cross-Sensitivity to Contaminant Gases Using a Highly Selective, Optical-Fiber-Remoted Methane Sensor Based on Correlation Spectroscopy.* / Absorption / 5 References.

Correlation techniques are used to detect methane in the presence of other gases using two cells, one a sample cell containing the gas mixture and a reference, the other a pressure modulated cell of methane, the cells connected by optical fibers. Methane sensitivity of 50 ppm is reported.

k. P. F. Daley, B. W. Colston, Jr., S. B. Brown, K. Langry, and F. P. Milanovich, *Fiber Optic Sensor for Continuous Monitoring of Chlorinated Solvents in the Vadose Zone and in Groundwater: Field Test Results.* / Colorimetric / 4 References.

A chemical sensor for detection of TCE in groundwater uses pyridine with a small additive as a colorimetric device. The sensor is irreversible, but the design allows the reagent to be replaced. TCE sensitivity in the range of 50 ppb is reported. A degree of sensor selectivity to different contaminants can be obtained through changes in the reagent components and concentrations.

l. P. T. Varineau, R. W. Duesing, Jr., and L. E. Wangen, *Application of Time-Resolved Luminescence Spectroscopy to a Remote Uranyl Sensor.* / Luminescence / 17 References.

Detection of UO_2^{2+} in an aqueous sample is done using laser-induced, time-resolved luminescence spectroscopy. A flow-through cell containing phosphoric acid admits the uranyl ions through a Nafion membrane. The green luminescence is quantifiable; concentrations of uranyl ion in the range from 10^{-4} to 10^{-9}M can be measured. Time resolution improves sensitivity.

Intrinsic Fiber Optic Sensors

m. S. M. Angel, B. L. Anderson, and K. Langry, *Simple Reversible Fiber Optic Chemical Sensors Using Solvatochromic Dyes.* / Fluorescence / 11 References.

A solvatochromic dye, Nile Red, is used as the fluorescing coating on either the end of a clad optical fiber or on the side of an un-clad fiber for rapid, sensitive detection of analyte vapors. This paper reports on results from xylene and dichloromethane. Selectivity is not of prime importance in this sensor type. The side-coated fiber (evanescent wave detection) is one order of magnitude faster in response time than the end-coated fiber.

n. R. E. Kunz, *Totally Integrated Optical Measuring Sensors.* / Methodology / 28 References.

This paper discusses total optical systems, not just the sensor part. Modules incorporating every part of a total system (e.g., sensor, power supply, and tranduction device) are proposed. Applications to wavelength, amplitude, phase, and frequency measurements are given.

o. A. A. Boiarski, R. W. Ridgway, J. R. Busch, G. Turhan-Sayan, and L. S. Miller, *Integrated Optic Biosensor for Environmental Monitoring.* / Interferometry / 10 References.

A Mach-Zehnder interferometer is constructed on the surface of a planar waveguide with one arm of the interferometer being exposed to the pollutant and the other protected from the pollutant. Changes in the refractive index of the exposed arm due to interaction with the pollutant cause a phase difference between the laser light in the two arms, the phase difference being a measure of the pollutant concentration and identity. Sensitivities to concentrations as low as 20 to 50 ppm for toluene, benzene, and glycerin are possible with uncoated sensor arms. With more sophisticated signal processing, 1 to 10 ppm could be possible. Coating the exposed arm with a hydrophobic coating may increase the sensitivity to 1 to 10 ppb.

p. S. J. Choquette and M. L. Walker, *Radiation Dosimetry Using Planar Waveguide Sensors.* / Colorimetry / 14 References.

Three planar waveguides of different materials were fabricated on fused silica substrates and exposed to X-rays in the 25 to 100 kV range. The waveguides were interrogated by a He-Ne laser to determine the change in transmission due to the radiation.

q. E. M. Bowman and L. W. Burgess, *Optical and Piezoelectric Analysis of Polymer Films for Chemical Sensor Characterization.* / A comparison between optical fiber and piezoelectric sensors using the same coating. Optical fiber – Refractive Index Measurement; Piezoelectric sensor – Frequency Shift / 15 References.

A polymer is used as a film on a substrate to form a waveguide sensor, the polymer acting as both the waveguide and an interactive element with the sample. The same polymer is coated onto a Lamb wave device, providing the interaction with the sample. Response to the sample is an angle shift in the waveguide sensor and a frequency shift in the Lamb wave device.

r. M. A. Druy, P. J. Glatkowski, and W. A. Stevenson, *Evanescent-Wave Fiber Optic Remote Fourier Transform Infrared Spectroscopy.* / Evanescent-Wave Detection, IR Spectroscopy, IR Optical Fiber Information / 8 References.

The spectra of urea at three different concentrations in human plasma are obtained using evanescent wave sensors with IR optical fibers and an FTIR spectrometer.

s. G. Fischer, E. F. Carome, V. E. Kubulins, and L. W. Burgess, *Fiber Optic Hydrocarbon Sensor System.* / Transmittance / 0 References.

A simple optical fiber sensor for hydrocarbon detection is described, and results are shown for exposure to toluene and gasoline vapors. The sensor could serve as a total hydrocarbon sensor because the selectivity appears to be low. Absolute sensitivities are not given.

t. M. B. Tabacco, Q. Zhou, and B. N. Nelson, *Chemical Sensors for Environmental Monitoring.* / Evanescent-Wave Absorption / 12 References.

This paper gives an abbreviated discussion of sensors that have been or are being developed for environmental monitoring and describes an optical source and detector board used for evaluating optical fiber sensors.

u. B. D. MacCraith, V. Ruddy, and S. McCabe, *Suitability of Single-Mode Fluoride Fibers for Evanescent-Wave Sensing.* / Evanescent-Wave Absorption / 12 References.

The use of fluoride optical fibers for sensing fluid (isopropanol) concentration by evanescent wave absorption in the 3.3-μm region is reported. Improved sensor design is needed to achieve desired sensitivity.

v. G. Meltz, W. W. Morey, and J. R. Dunphy, *Fiber Bragg Grating Chemical Sensor.* / Fluorescence / 11 References.

Describes formation of a Bragg grating in germanium-doped silica fibers and the use of the grating for the excitation and collection of fluorescence. Multiple gratings can provide sensor capability for mixtures, optical time domain reflectometry providing signal separation.

3.2.3 Books of Particular Interest

1. *Fiber Optic Chemical Sensors and Biosensors, Vols. I and II*, O. S. Wolfbeis, ed., CRC Press, Boca Raton, 1991.

In these two volumes, Wolfbeis has chosen both general and specific reviews on the use of fiber optics as chemical sensors. Volume I includes some historical items on the use of optical fibers as sensors, optical fibers as extrinsic and intrinsic parts of a data acquisition system, electromagnetic theory as applied to optical fibers, instrumentation associated with fiber optic sensors, and some specific applications of fiber optics to chemical sensing problems. Volume II is more specific, covering particular applications of fiber optics to sensing schemes in general. Not all of the articles directly address environmental issues, although most of them could have direct application.

In Volume I, Wolfbeis provides the introductory paper, discussing optical sensors in general, as a dominant part of analytical science. The introduction of fiber optics, with their tremendous band width, immunity to electrical noise, and adaptation to spectrometry, opened up an entirely new field in optical sensing. The paper gives a short discussion of electromagnetic energy transmission, both ray tracing and modal, and defines fiber optic use as "extrinsic," where the fiber acts only as a light pipe, transmitting an optical signal to and from a sensing region, or "intrinsic," where the fiber is an integral part of the sensor. Finally, different fields of applications are discussed, including groundwater monitoring, pollution monitoring, process control, biomedical applications, biotechnology, titrimetry, and defense. (51 References).

Chapter 2 of Vol. I, also by Wolfbeis, describes the different spectroscopic techniques used in conjunction with fiber optics. Detection schemes depending on absorption, reflection, and luminescence are followed by sections on different spectrometric methods: infrared, Raman, evanescent wave (which involves not only the fiber core but also the cladding), surface phenomena, refractometry, interferometry, and photo-acoustic spectrometry. Discussions of other miscellaneous techniques conclude the article. (140 References).

Fiber optic sensing schemes, intrinsic and extrinsic, are the topics described by Wolfbeis in Chapter 3. Intrinsic schemes are further categorized as to plain fibers, whose optical properties are changed due to interaction with the sample (analyte), or to "indicator-mediated sensors," where the fiber is treated in some way such that an analyte interacting with the treatment process produces an optical signal that may be characteristic of the analyte. Examples of extrinsic fiber optic sensing are given, such as absorbance, fluorescence, and reflectance, each of which changes some characteristic of the optical signal, the fiber optic providing only the path for the interrogation and return or transmitted signal. Wolfbeis distinguishes between a "sensor" and a "probe," the former having the capability to "continuously and reversibly" indicate a desired diagnostic of the analyte. A probe is defined as a single-shot device that must be replaced once it has served its purpose as a detector of some analyte or process. This chapter also includes a section on biosensing, some parts of which have direct applicability to environmental issues. (134 References).

Chapter 4, by Oliver Parriaux, covers waveguide theory, wave propagation in different waveguide geometries, propagating modes in optical fibers, and how waveguides function in the transmission of light and in optical processing and data acquisition. The author has provided an excellent basis for the understanding and potential use of optical fibers as chemical sensors. (117 References).

Intrinsic fiber optic sensors are discussed in Chapter 5, by R.A. Lieberman. These include a sensor whose refractive index is modified due to interaction with the sample under investigation, essentially a core effect; sensors whose cladding characteristics are modified by the sample, changing the evanescent wave behavior at the core-cladding interface, the change being detectable spectroscopically; sensors with coatings designed to modify the optical characteristics of the fiber in a detectable way, the coating often designed to respond to a particular analyte; and sensors that depend on a sample interaction directly with the fiber optic core, termed "core-based intrinsic sensors." Included are discussions on transducers, sensor sensitivity and selectivity (specificity), and the effects of fiber geometrical shape and length on signal. (149 References).

Chapter 6 of Vol. I, by D.N. Modlin and F.P. Milanovich, is not devoted to sensors but to the topic of instrumentation for FOCS. They give a short description of fiber optic sensors, including types and operating principles, followed by the main body of the paper on instrumentation. Modeling of fiber optics sensor-based systems addresses light sources, detectors, noise generation, S/N ratios, total optical systems, and performance. That section is followed by a section on system components -- light sources (lasers and lamps), optical elements, and detectors -- listing what is available for different applications. The authors state that this chapter should provide the reader with "enough basic tools and information to embark on the analysis and successful development of fiber optic chemical sensor instrumentation." (66 References).

Chapter 7, "Sensor Chemistry," by E. Koller and O. Wolfbeis, covers the chemical procedures and materials often used in the fabrication of FOCSs. The chapter does not address FOCSs as tools for detection of certain analytes. Rather, it addresses the chemistry and materials used for pH, metals, and redox indicators, for potential-sensitive dyes, and for fluorescence applications. How these indicators are attached to the fiber and immobilized in place is followed by labeling techniques and protocols. This chapter, like Chapter 6 on instrumentation, is useful because it covers one more aspect of the design of a total FOCS system. (226 References).

Volume I concludes with Chapter 8, "Fiber Optic pH Sensors," by M.J.P. Leiner and O. Wolbeis. It covers the fundamentals of pH determination, in particular as related to fiber optical sensors, and discusses the effects of sample parameters on pH measurements. Immobilization of the sensor reagent, response times, stability, and reversibility of the sensor are all covered. Finally, different pH sensor designs, based on absorbance, reflectivity, fluorescence, and energy transfer, are discussed. (70 References).

Volume II continues in Chapters 9, 10, and 11, with the subject matter of Chapter 8, describing the use of optical fiber sensors for specific detection schemes. Chapter 9, "Optical Ion Sensing," by W. Seitz, covers cation and anion sensing methods. (38 References). Chapter 10, "Oxygen Sensors," by O. Wolfbeis, describes the general aspects of optical fibers with indicators as oxygen detectors and sensors that exhibit fluorescence, phosphorescence, or other characteristics in the presence of oxygen. (78 References). Chapter 11, "Gas Sensors," by O. Wolfbeis, reviews current work in the use of optical fibers for detection of many of the common gases. The gases covered are hydrogen, methane and related gases, carbon monoxide, carbon dioxide, ammonia, nitrogen oxides, hydrogen sulfide, sulfur dioxide, solvent vapors, humidity detection, and some miscellaneous gases. (97 References).

Chapters 12, 13, and 14 are application oriented, describing the use of fiber sensors in particular fields. Chapter 12, "Environmental Monitoring Applications of Fiber Optic

Chemical Sensors (FOCS)," by S. Klainer et al., discusses techniques for intrinsic fiber optic detector design, configuration, membranes and materials, calibration, and test. The chapter concludes with descriptions of several probes and sensors for detection of chloroform, hydrocarbons, gasoline, pH, CO_2, O_2, and others. (105 References). Chapter 13, "Optical Fibers in Titrimetry," by O. Wolfbeis, describes the use of optical fibers in several titrimetry methods: acid-base, argentometry, and complexometry. In one use, the fiber acts only as a light pipe, transporting a source signal to the sample solution and from the sample to a detector. In the other use, an indicator of some type is placed on the distal tip of the fiber, which is then dipped into the sample during titration. Color change or fluorescence from the indicator are two of the possible detection schemes. (21 References). Chapter 14, "Fiber Optic Chemical Sensors in Nuclear Plants," by G. Boisde et al., is of some interest in environmental applications because it gives some applications of optical fibers (a) in severe radiation environments, such as nuclear reactors, nuclear waste repositories, and control of processes involving radioactive materials and (b) in radiation monitoring in soils and waters, in general. (63 References).

The use of optical fibers in temperature measurement is covered in Chapter 15, "Fiber Optic Techniques for Temperature Sensing," by K. Grattan. Although not usually considered as the province of chemical sensors, thermometry is often a necessary part of analysis. The chapter covers both extrinsic and intrinsic devices as well as techniques and temperature ranges. (100 References).

Chapter 16, "Transducer-Based and Intrinsic Biosensors," by M. Arnold and J. Wangsa, and Chapter 17, "Fiberoptics Immunosensors," by T. Vo-Dinh et al., describe the use of biological materials on optical fibers. Transducer-based sensors use a biological material on the fiber that interacts with the analyte, producing some type of signal that is transported by the fiber to a detector of some kind. Intrinsic biosensors have a biological material on the fiber that, when it interacts with the analyte, alters some optical characteristic of the fiber. Several specific sensors are described for each sensor type. (61 References). Immunosensors (Chapter 17) are generally very sensitive and highly specific as a result of the antibody design of the biological coating on the fiber. Such an antibody will bind to very specific antigens in the analyte, giving these sensors their high degree of sensitivity and selectivity. Descriptions of antibody preparation, antibody-antigen interaction, and different types of antibodies and their preparation are followed by a section on different types of immunosensors (e.g., fluorescence, internal reflection, and evanescent field). (68 References).

Chapter 18, "Origin, Construction, and Performance of an In Vivo Oxygen Sensor," by J. Peterson and E. Stefansson, describes briefly the development of an oxygen sensor based on optical fibers. Chapter 19, "Biomedical Applications of Fiber Optic Chemical Sensors," by O. Wolfbeis, describes the use of optical fiber sensors to measure, monitor, and survey materials interior to a living body. Detectors for pH, pO_2, pCO_2, and blood gas are described. (82 References).

Chapter 20, "Chemiluminescence and Bioluminescence Based Optical Probes," by L. Blum and P. Coulet, continues the discussion on the use of biological materials on optical fibers, those that generate a type of luminescence when in contact with a specific analyte.

Tables listing the use of immobilized materials for chemi- and bio-luminescence and the supporting references are included. (55 References).

Volume II concludes with Chapter 21, "Fiber Optic Chemoreception," by U. Krull et al. The chapter discusses in some detail biological receptor systems (e.g., enzyme-substrate, antibody-antigen, lectin-saccharide, and molecular receptor-ligand) and their use and application with optical fibers. (79 References).

2. *Optical Fiber Sensors*, Ed by A.N. Chester, S. Martellucci, and A.M. Verga-Scheggi; NATO Advanced Study Institute Series E: Applied Science, Vol. 132, 1986; Martinus Nijhoff Publishers, Boston, 1987.

   A general text on optical fiber sensors. One chapter, "Guided Wave Chemical Sensors," by A.L. Harmer, has short, descriptive sections on spectrometers; absorption measurements, including gas monitors, remote absorption, and reflectance measurements; fluorescence, including Raman spectroscopy; oximetry (haemoglobin measurement) in vivo; scattering; refractive index and liquid level; pH sensing; fluorescent quenching techniques; immunological assay; evanescent wave spectroscopy; surface reaction measurements; surface plasmon resonance; and chemical sensing by physical measurement. None of the entries are in-depth, but they do provide an indication of what was of interest around 1986.

3. *Fiber Optic Sensors, Fundamentals and Applications*, D. A. Krohn, Inst. Soc. of America, Research Triangle Park, 1988.

   This text reviews fundamentals of fiber optics and discusses specific applications in its 12 chapters, one of which is on chemical analysis. Short, elementary descriptions are given on fluorescence, absorption, scattering, refractive index change, and interferometry.

4. PIEZOELECTRIC SENSORS

4.1 INTRODUCTION

According to Alder and McCallum (1), Coulomb was the first to conjecture the possible production of electricity by the application of pressure on a suitable material. However,

> "The credit of being first to observe the phenomenon of piezoelectricity falls to the Curie brothers, Pierre and Jacques, in 1880. They showed that when some crystals were compressed in particular directions an electric potential was produced between the deformed surfaces, this potential being proportional to the applied pressure. The converse effect, unforeseen by the Curies, was predicted by Lippmann. By the end of 1881, the Curies had verified the effect and showed that the piezoelectric coefficient of quartz had the same value for the direct and converse effects.
>
> "The piezoelectric effect arises when pressure on a dielectric material deforms the crystal lattice and causes a separation of the centres of gravity of oppositely charged species, which gives rise to a dipole moment in each molecule. . . . If electrodes are applied to the faces of a thin slab or rod of this material and an external current sensing circuit is connected, a current will be seen to flow through the external circuit when stress is applied to the crystal. Releasing the stress causes a transient current flow in the opposite direction. If the converse effect is used and an alternating potential difference is applied, mechanical oscillations occur within the crystal lattice. Stable oscillations only occur at the natural resonant frequency of the crystal and at that frequency the crystal presents a low impedance to the exciting voltage. If the crystal is incorporated into the feedback loop of an oscillating circuit, it becomes the frequency determining element of the circuit, as its Q (quality factor) is very high, typically several thousand."

Piezoelectric crystals have no center of symmetry – there are 21 such classes (2). Well-known examples, those that show strong piezoelectric effect, are quartz, lithium niobate, zinc oxide, tellurium oxide, and lithium tantalate; but quartz has been used most often in piezoelectric devices because of its low temperature coefficients.

It has been known since the early 1900s that changing the mass of the crystal changed its resonant frequency; the higher the mass, the lower the frequency. Theoretical work leading to the use of a quartz crystal as a quantitative measure of mass can be traced to Lord Rayleigh (3). But it was Sauerbrey (4 and 5) who first used this concept to show that a sensitive microbalance could be constructed. Sauerbrey's work included development of an expression relating the change in frequency to the mass added to the crystal surface. In particular, for an AT-cut quartz crystal vibrating in the thickness-shear mode,

$$\delta F = -2.3 \times 10^6 F^2(\delta m/A), \qquad (1)$$

where δF is the frequency change in Hz, F is the quartz crystal resonant frequency in MHz, δm is the added mass in grams, and A is the coated area in cm^2. This implies that to measure mass to within $\pm$ 0.3 ng/cm^2, the frequency shift need be measured to about 10^{-3} at a frequency near 7

MHz, with ±1°C temperature control. This can easily be done with a frequency counter that counts for 10 sec.

Sauerbrey's work is valid only when the added mass is "small." For larger mass changes, the acoustic impedances of the quartz and the added mass must be taken into account. As shown by Lu (6), an accurate expression is given by:

$$M = \tan^{-1}[Z \tan \pi F]/\pi Z(1 - F), \quad (2)$$

where $M = \rho_c t_c/\rho_q t_q$ is the normalized areal density, the subscript c referring to the added "coating" and the subscript q referring to the quartz, ρ is density, t is thickness, $F = (f_q - f_c)/f_q$ is the normalized frequency shift, and $Z = Z_q/Z_c$ is the acoustic impedance ratio, in which $Z_q = (\rho_q \mu_q)^{1/2}$ and $Z_c = (\rho_c \mu_c)^{1/2}$, where μ is shear modulus.

Lu (6) shows that Equation 2 is accurate for values of M in the range from 0 to 0.7 and for values of F from 0 to 0.5, which covers the range of interest.

The work of Sauerbrey (4,5), Lu (6), and others who have worked on the theory (7, 8, 9 and 10) serves as the foundation of the so-called bulk acoustic wave (BAW) sensor. But it is also possible to construct other types of devices that use piezoelectric transduction, depending on the details of the acoustic wave generation. Besides the BAW, the other principal type is called the surface acoustic wave (SAW) sensor because the waves are generated and travel in a thin film deposited on the surface of a piezoelectric substrate. However, other types of sensors have been and are being developed, notably the flexural plate-wave or Lamb-wave sensor (11), and the shear horizontal acoustic plate mode (SH APM) sensor (12).

The following sections describe work done with BAWs, SAWs, and the other types of sensors.

4.2 BAW SENSORS

King (13) was the pioneer in the applications of BAW sensors to detection of chemicals. His work led to the development of a commercial water vapor detector with good selectivity. The King BAW sensor operated at 9 MHz and had a sensitivity of about 500 Hz/μg. King's work also included applications as a gas chromatography detector as well as the study of sensitivities of several coatings to a variety of gases, including hydrocarbon derivatives, several polar molecules, and hydrogen sulphide.

A later development by Scheide and Taylor (14) was a BAW sensor for detection of mercury in air. The sensor operated at 9 MHz and used a gold coating. Linear response was obtained at mercury vapor concentrations as low as 0.1 ppb. When approximately 0.5μg of mercury had been "collected," corresponding to a frequency change of about 50 Hz, it was necessary to reactivate the surface using a heating-desorption cycle. The sensor showed good selectivity: of the seven chemicals tested, only water vapor at 100% relative humidity was a significant interference, and this could be removed by drying the sample before exposure to the sensor.

One of the earliest reviews of analytical chemistry applications of BAW sensors is that by Guilbault (15). This review summarizes uses of BAWs as detectors for gas chromatography as well as for detection of water vapor, sulphur dioxide, ammonia, hydrogen sulphide, hydrogen chloride (gas), various organophosphorous compounds – including chemical warfare agents and pesticides, aromatic and aliphatic hydrocarbons, toluene, mercury in air, mononitrotoluene (vapor from many explosives), and carbon monoxide. There is very little information on selectivity.

Illustrative of English work on sensor development, the first of two reviews by Alder and McCallum (1) summarizes work on BAWs up to about 1983. The review includes many topics:

- the theory of BAW sensors;
- the particular application called the quartz crystal microbalance (widely used to monitor coating thickness in metals and multilayer coating industries);
- adsorption, desorption, and decomposition research;
- detection of aerosols and suspended particles;
- applications in electrogravimetric research;
- use of BAWs as detectors for gas chromatography;
- the detection of various gases;
- bacterial and fungal growth;
- solution property measurement in organic solvents;
- trace metal studies; and
- thermal analysis.

There are 113 references given.

Papers by Kanazawa and Gordon (16 and 17) were among the first to report research on the theory and use of a BAW sensor in contact with a liquid. The principal result was to show that the density and viscosity of the liquid were important factors in determining the frequency shift.

Other reports of research on BAWs in liquids include 1986, 1991 (review with 92 references), 1992 papers by Thompson et al. (18 and 19) and a 1992 paper by Duncan-Hewitt and Thompson (20). The bulk of the papers is devoted to summaries of theoretical work, but there are reports of successful applications to liquid chromatography detection, determination of certain inorganic ions in aqueous solutions, and development of biosensors, especially in immunoassays. Quoting Thompson et al. (19),

> "It is evident from the progress reviewed in this article that the frequency response of the TSM (editorial note: TSM stands for thickness shear-mode, another name for BAW) device in liquids is governed by a number of factors. . . . Among these parameters, significant but hitherto unrecognized for the TSM sensor, is the role played by molecular slip and viscosity at the sensor-liquid interface."

And quoting Duncan-Hewitt and Thompson,

> "The practical implications of this result are (1) the TSM sensor response in liquids is a complicated function of both bulk and surface properties which may be difficult a priori to predict, that is, without extensive knowledge of the liquid and interfacial structures, and (2) TSM sensors, used judiciously in carefully prepared interfacial systems, may be sensitive probes of interfacial energetics. Until now these energetics have been

characterized primarily by wettability tests such as contact angle measurements which are difficult to interpret fundamentally."

The use of BAWs for chemical analyses are reviewed by Guilbault and Jordan (3) in a 1988 review. This paper includes 129 references along with summaries of work on:

- general experimental apparatus
- sorption detectors
- water vapor detectors
- gas and liquid chromatography detectors
- quartz crystal microbalances
- polymer research
- particulate mass concentration
- trace metal analysis (electrogravimetric assay of solutions)
- gas detection of acetoin, ammonia, aromatic hydrocarbons, carbon dioxide, carbon monoxide, formaldehyde, hydrocarbons and halogenated hydrocarbons, hydrogen, hydrogen chloride, hydrogen sulphide, mercury in air, trimethylamine, mononitrotoluene, nitrogen dioxide, organophosphorous compounds, ozone, phosgene, propylene glycol dinitrate, sulphur dioxide, toluene diisocyanate, and vinyl chloride
- solution measurements, including ammonia, cyanide ion, bacteria and fungal growth, density and viscosity, silver ion, iodide ion, and immunoassay in solution
- commercially available instrumentation, which includes instruments from DuPont Instruments, Wilmington, Delaware; Universal Sensors, Inc., New Orleans, La; and others described in references cited in the review.

The most recent British review paper is an update (with 137 references) by McCallum (21) of the earlier review paper by Alder and McCallum (1). This review is almost entirely devoted to work with BAWs, but there is mention of SAWs under the title "Alternative Crystal Designs." An extensive summary of work done on liquids and solutions is included. One new topic of special importance is the use of sensor arrays along with newly developed computer analysis techniques using statistical methods such as varimax rotation, pattern recognition, cluster analysis, and factor analysis. Commercially available systems described include those from:

- DuPont, Wilmington, Delaware
- Universal Sensors, Inc., Metairie, Louisiana
- Edwards High Vacuum, Crawley, United Kingdom
- Microsensor Systems, Fairfax, Virginia

Quoting from the paper's Conclusions section,

> "The limitations of piezoelectric crystals are well known and some work has appeared indicating ways to maximize the recovery of information from any sensor device, e.g., the use of sensor arrays together with chemometrics. The need for high selectivities using this approach appears to be a hindrance instead of a benefit as one is examining the pattern of sorption over the array and, hence, in addition to concentration data it may be possible to identify (certainly to class of compound and in some instances to a few materials) some of the species present. (Editorial note: this seems to be a puzzle; meaning unclear.)

"Most of the papers continue to report work carried out around ambient laboratory conditions (20 to 25C) with some optimized at a fixed temperature for the chemical system. It would be interesting to find a report of a sensor that has reasonable response characteristics over a range of 20C, for example, around ambient; but it is likely that at the lower temperatures problems could arise from the kinetics of the interaction between the coating and the 'atmospheric' contaminant. Certainly there are papers where a temperature program is used to maximize the response and minimize the time required for recovery. Indications of the reproducibility of both the coating method and the results obtained from the coated crystal(s) are now appearing in the literature.

"What of the future of piezoelectric devices (crystals and SAW sensors)? Certainly the potential is there. However, a practical device requires the careful specification of the sensor and the environment in which it will be used to allow it to be tailored to a particular need. . . ."

Two papers on the use of BAWs in environmental pollution problems are noteworthy. The first, by Mierzwinski and Witkiewicz (from the Institute of Chemistry, Military Technical Academy, Warsaw, Poland), (22) cites 89 references and summarizes a bit of practical work on the applications of piezoelectric detectors to environmental pollution.

Quoting the authors, "Attempts to apply piezoelectric detectors to measure environmental pollutants have been made for over 20 years. However, despite their many advantages these detectors have not found wide application. This is due to their faults and disadvantages. In the present survey both the advantages and disadvantages of piezoelectric detectors are discussed, so that the reader will gain a knowledge of their real value."

Quoting selectively,

"The weak dynamic characteristics, i.e., difficulties with recovery of piezoelectric detectors, seriously limit their practical applications. . . . The proper selection of the coating material is the most difficult problem to solve. Research has been undertaken to determine the usefulness of various substances for coating the resonators. The results are not unique, however. The coating material should be practically non-volatile, its properties should not change with time, it should be easy to apply to the resonator surface, and in the case of selective detectors, should interact only with the compound to be detected. Besides, the detector should be easily renovated, i.e., the vibration frequency of the resonator should return to its initial value after removing the cause of the change of frequency (i.e., the substance to be determined). It is very difficult and probably impossible to meet all these requirements. . . . This survey of the literature shows that among the numerous publications on the practical possibilities of utilizing piezoelectric detectors only a few are concerned with the design and testing of devices intended for a given purpose. This may seem astonishing, especially if we consider the data summarized . . . which show that the detectability shown by piezoelectric detectors is better than those obtained by other analytical methods. Other reasons exist, however, that limit the range of applications of these detectors. One is their low dynamics. The usually observed long responses and even longer recovery times of piezoelectric detectors hinder their use as measuring devices in cases where rapid information about the occurring hazards is crucial. There is a particularly pronounced inconsistency between the requirements regarding the selectivity and those regarding the dynamics of a detector that will fulfill both these requirements simultaneously, although, if attention is paid to only one of them, good results were obtained. . . . The presented review of applications and properties of the piezoelectric detectors allows us to cherish the hope that the disadvantages of these detectors will be minimized to a level that will allow their wide application in analytical chemistry and especially in the testing of atmospheric air pollution."

The other paper on piezoelectric and electrochemical sensing in environmental chemistry (23) devotes only a little space to piezoelectric sensors, most of the paper is about electrochemical techniques.

4.3 SAW SENSORS

Waves that occur on the surface of a solid were first described by Lord Rayleigh in 1885 (24). The work of White and Voltmer (25) in developing the interdigital transducer made the generation of surface waves in piezoelectric solids relatively simple. This development led to the pioneering work by Wohltjen and Dessy (26) and the first report of a SAW device for sensing chemical vapors. Wohltjen used both quartz and lithium niobate crystals, comparing their performance as a gas chromatograph detector when the crystal surface was coated with a sensitizing organic film. Early work by Bryant et al. (27) showed that a sulphur dioxide sensor could be made to detect less than 100 ppb, an order of magnitude greater sensitivity than achieved with a BAW sensor for sulphur dioxide.

There are several types of surface acoustic waves. However, for best performance of SAW sensors, experience has shown that it is essential to use the pure mode Rayleigh waves, which have the mechanical and electrical components in one plane, the so-called sagittal plane, which is normal to the substrate surface. SAW sensors also can be implemented in layered substrates, as noted below.

Quoting from the paper by Venema et al. (28) on the design of SAWs,

"In homogeneous substrates the phase velocity and the amplitude of a SAW are determined by the elastic, piezoelectric, dielectric, conductive properties and the mass of the substrates. If one of these material parameters can be properly modulated by the quantity to be measured, the effect of sensing is created. In layered substrates the physical properties per layer and the thicknesses of the layers determine the phase velocity and amplitude of the SAW. The modulation can be performed in the transducer and/or transmission region of a delay line or resonator.

"Two types of SAW devices in the configuration of a SAW oscillator have been shown to be useful for sensor applications: (a) The delay line [29]. This device . . . consists of two (uniform) interdigital transducers, one acting as an emitter of surface acoustic waves and the other as a detector of the waves. Since the transducers are located at some distance from each other, the device operates as a delay line. This device operates with travelling waves. (b) The resonator [29]. A SAW-emitting transducer is located between two acoustically reflecting mirrors (planar cavity). The distance between the mirrors allows the constructive interference of successive reflections to occur between them (standing waves). The resulting storage of energy is maximal for one frequency. The mirrors are made of an array of metal strips on, or grooves in, the substrate surface. Another transducer can be added to the cavity for the detection of the SAW signal.

"The interdigital transducer is a planar interweaved metal electrode structure whose adjacent electrodes are given equal but opposite potentials and which relies on the piezoelectric effect to couple directly electrical and mechanical energy.

"The spatially periodic electric interdigital field ultimately produces a corresponding periodic mechanical strain pattern, which gives rise to the surface acoustic wave, provided the surface is stress free. . . ."

Four papers containing significant information on the design of SAWs are the one by Venema et al. (29), an earlier one by Wohltjen (30), one by Nieuwenhuizen and Barendsz (31), and a recent one by D'Amico and Verona (32).

The D'Amico and Verona paper (32) also summarizes the different types of SAW sensors that have been developed during the last decade (up to 1989). The examples include sulphur dioxide, nitrogen dioxide, hydrogen sulphide, ammonia, carbon monoxide, water vapor, methane, hydrogen, and various organic vapors not specified. The piezoelectric materials used included quartz, lithium niobate, and a layered zinc oxide/silicon structure (zinc oxide is piezoelectric).

A review paper by Fox and Alder (33) concentrates on the use of SAWs for atmospheric gas monitoring, but also includes some discussion of BAWs. The paper summarizes developments in SAW technology (including work on piezoelectric materials not previously used for sensors, namely, lithium tantalate, tellurium oxide, and the molecule $Bi_{12}GeO_{20}$), the design of new structures, including those useful for liquids, work on the interactions involved in chemical selectivity, and new developments in theory. A large section is devoted to a summary of reported applications of SAWs to gas sensing. These include use of both lithium niobate and quartz to sense nitrogen dioxide, ammonia, carbon dioxide, carbon monoxide, oxygen, sulphur dioxide, water vapor, methane, toluene vapor, hydrogen sulphide, hydrogen, ethanol vapor, nitromethane, methanol, propanol, benzene, tetrachloromethane, 1,2-dichloroethane, iso-octane, and other organic vapors.

An important part of the paper is the discussion of the analysis techniques being studied for analysis of mixtures. Quoting from the review paper,

"These workers [editorial note: see Reference 34] set out to test the classification ability of multiple sensors coated with different materials by pattern recognition techniques using the discriminant generated in the earlier work [editorial note: see Reference 35] by employing those data as a prediction set. They also wished to investigate the clustering of sensor responses in a data set including both single vapours and mixtures. The experiments were carried out at 35 ± 2 C, and SAWs were tested in arrays of four connected to the vapour stream in series. . . . Each array was exposed to nine single vapours, each at four concentrations in quadruplicate. Binary mixtures in air were generated at a single combination of concentrations and the responses were measured in quadruplicate. . . .

"A large amount of data was collected and subjected to pattern recognition routines included in an ADAPT software system. Using as few as four sensors, these routines were readily able to distinguish between the target and interferent vapours when the SAWs were exposed to single vapours. When two component mixtures were included in the data set, eight sensors were required to obtain the best classification. Using the data as collected, all but three of the binary mixtures could be classified; however, all could be classified when correction factors were applied to the data. The workers concluded by predicting that SAW coatings, the responses of which are more consistent, reproducible and sensitive to target species, and ones that can form a set with more widely varying responses to key vapours, will enhance the information quality obtained. Temperature sensing and control would be advantageous for the improvement of performance and an inert reference on the SAWs desirable. . . . This study highlights the state of the art with chemical SAWs technology and also indicates the weak link in the sensing process. Selectivity of the coatings, coating reproducibility, temperature and synergistic effects are the limiting features . . ."

A final section compares SAWs and BAWs, noting that while SAWs were intrinsically more sensitive to mass changes than BAWs because they can be operated at 10 to 30 times higher frequencies, this advantage is not achieved because system noise and drift limit the sensitivity improvement to about an order of magnitude. A final point stressed is, "Humidity is one of the biggest problems facing most sensing devices. Water will absorb on almost any surface up to relatively high temperature and over a wide range of pressures and it is imperative that some compensation be made for water sorption."

More recent papers on SAWs include reports of further studies in the search for selective coatings for a variety of vapors (36 – a review paper with 95 references, 37, and 38) and a new high frequency SAW sensor for nitrogen dioxide (39).

4.4 OTHER TYPES

Four papers describe two other types of acoustic wave piezoelectric sensors: the plate-mode or Lamb-wave oscillator sensor, and the shear-horizontal acoustic plate-mode sensor (SH APM) for liquids. The Lamb-wave sensor is discussed in two papers, one by White et al. (40) and the other by Wenzel and White (11). The SH APM sensor work is in papers by Martin et al. (12) and Andle et al. (41).

The reader is referred to the papers for a detailed explanation of the mechanisms that generate Lamb-waves. For our purposes, it is useful to summarize the expected advantages of Lamb-wave sensors over their SAW counterparts. Quoting from White et al. (40),

"1) With a plate, acoustic energy is typically present at both surfaces. Thus one can enclose one side of the sensor to protect it from environmental attack while allowing wave interaction at the other surface. This is particularly attractive in vapor, chemical, and biological sensors, where sorption from a surrounding gas or fluid is evaluated from the velocity change [editorial note: or frequency shift] it produces [editorial note: see References 30 and 42]. 2) One should be able to launch and receive plate modes with electrode transducers on piezoelectric substrates (or on non-piezoelectric substrates having on them piezoelectric films), as with SAWs. One might expect that this transduction would be more efficient with plate modes than with SAWs because of the absence of underlying material to be moved by the transducers. 3) Similarly, because its thickness and mass per unit area are small compared with those of the SAW substrate, one might expect a thin plate-mode sensor to respond to comparable stimuli more sensitively than a SAW sensor operating at the same wavelength. 4) It is well-known that the phase velocity of the lowest order antisymmetric plate mode (A0) approaches zero as the plate thickness decreases. Consequently, an oscillator sensor employing this A0 mode could be made to operate, for a given wavelength, at a considerably lower frequency than a corresponding SAW or symmetric-mode oscillator sensor. The practical advantage here is to ease lithographic problems in making the transducers, and the difficulty of realizing the electronic amplifier. 5) Because the A0 mode may have a low velocity, A0-mode sensors may operate well while immersed in liquids. From Huygen's principle, if the velocity in the immersed plate is lower than the compressional wave velocity in the liquid, energy will not radiate from the plate into the liquid, and so attenuation should not be materially increased by the presence of the liquid. This could permit plate-mode devices to be used for detecting certain chemicals in solution or certain biological substances in serum [editorial note: see Reference 43]. 6) Because their phase velocities depend on plate thickness, plate modes are dispersive; whereas a SAW in a homogeneous semi-infinite medium is not. . . . this can be used to some advantage, though it also means that plate-mode sensors will be more affected than SAW sensors by variations in fabrication procedures. 7) Sensors employing thin plates may be particularly well adapted for applications where one wishes to heat the substrate electrically – for example, to promote desorption of sorbed species or to generate plate waves thermoelastically – because the plates may have a small heat capacity per unit area and may be thermally isolated from surrounding heat sinks. 8) Techniques for fabricating very thin silicon plates by etching are well developed [editorial note: see Reference 44]. The resultant plates may be somewhat fragile and difficult to handle during manufacture and use. Sensors employing thin plates may also be more affected than SAW sensors by changes of ambient pressure and by airborne sound, . . ."

The paper by Wenzel and White (11) describes more recent work from White's laboratory on a multisensor [multi – in the sense of multiple measurands, (e.g., force, pressure, mass, density, and thermal), Lamb-wave oscillator]. The work includes both theoretical modeling and confirming experiments. The confirming experiments were conducted using a layered sensor constructed from a silicon wafer on which are deposited layers of silicon nitride, aluminum, and zinc oxide. Quoting from the paper,

"The device is suited to use as a tool or testbed for studying certain chemical processes, such as etching of films deposited on the membrane, or exothermic or endothermic reactions in liquids that contact the sensor. Because the elastic interactions between a liquid and a low-velocity A0 mode can be purely reactive, only an evanescent disturbance is excited in the liquid. Accordingly, it appears that only very small liquid volumes need be used. We believe that many inexpensive quasi-digital sensors can be based on this simple structure. With it one could realize an accelerometer, barometer, thermometer, vapor or gas sensor, and so on. With the addition of suitable electrodes or a ferromagnetic film, it could sense electric and magnetic fields as well. Because of its sensitivity to many different measurands, for selective response it will be necessary to design the device properly for a given application, or to use one or more active and reference sensors together. It appears that information obtained from the different responses of the several propagating modes and operating wavelengths of the device can be used to obtain precise information about individual measurands."

Continuing to quote, "A Lamb-wave sensor shares with other acoustic sensors the problem of providing selective response. Conventional means for achieving selectivity with SAW sensors (such as a reference device and solubility-parameter matching in vapor sensors) could also be used with the Lamb-wave sensor. Moreover, some additional methods are available with these sensors. . . ."

Research on the SH APM sensor for measurements in liquids led Martin et al. (12) to conclude,

> "SH acoustic plate mode devices have been found to function efficiently in contact with liquids, providing a sensitive means to monitor conditions at the solid/liquid interface. The device can be instrumented as a sensor either in an oscillator circuit or by monitoring changes in APM amplitude and phase delay between input and output. A number of interactions occur between plate modes and solutions, including mass loading, viscous entrainment and acoustoelectric effects. By controlling other interactions, the mass sensitivity of the device enables it to function as a microbalance in a number of sensor applications. Specific chemical sensors can be constructed by derivatizing [editorial note: meaning chemically modifying] the device surface with ligands capable of binding species from solution."

The work of Andle et al. (41) on the SH APM sensor is devoted to sensing particular deoxyribonucleic acid (DNA) sequences. Quoting some of their conclusions, "The experiments clearly show that the APM biosensor is capable of detecting nanogram quantities of the specific DNA sequence, while ignoring larger quantities of another nonspecific DNA sequence. This level of sensitivity is at least competitive with the current technology without using radioisotopes, fluorescent labels, or enzyme amplification techniques."

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Books that Contain Significant Information about Piezoelectric Sensors

1. *Applications of Piezoelectric Quartz Crystal Microbalances*, C. Lu and A.W. Czanderna, eds., Volume 7 of Methods and Phenomena, Their Applications in Science and Technology, A.W. Czanderna, ed., Elsevier, New York, 1984.

   Chapter 1, *Introduction, History, Overview of Applications of Piezoelectric Quartz Crystal Microbalances* (QCM); 46 references.

   Chapter 2, *Theory and Practice of the Quartz Crystal Microbalance*, by C. Lu, discusses the detailed theory of the QCM, compares theory and experiment over a wide range of added masses and a wide range of operating frequencies; includes 46 references.

   Chapter 8, *Applications of Quartz Crystal Microbalances in Analytical Chemistry*, by G.G. Guilbault, describes the uses of QCMs (also called BAW sensors) as detectors for a) sorption of a variety of gases, b) water vapor, c) gas and liquid chromatography, d) air pollutants, and e) compounds in water. Other applications include microweighing, measurement of particulates in gases, electrogravimetric procedures for trace metal analysis, and film thickness and deposition rates. The final section discusses instruments that were commercially available in 1983/1984. There are 71 references cited.

2. *Sensors, A Comprehensive Survey*, W. Göpel, J. Hesse, and J.N. Zemel, eds.; *Volume 2, Chemical and Biochemical Sensors, Part I*, W. Göpel, T.A. Jones, M. Kleitz, J. Lundström, and T. Seiyama, eds.; VCH Verlaggesellschaft mbh, New York, 1989.

   The Table of Contents of this Volume is:

13. Mass-Sensitive Devices, M. S. Nieuwenhuizen, A. Venema, pp. 647-680; including 273 references

Clearly, it is section 13 that is of interest in piezoelectric sensors studies.

(Editorial note: Volume 3, Chemical and Biochemical Sensors, Part II, is advertised as including sections on biosensors, instrumentation, calibration of gas sensors, optochemical sensor applications to environmental problems, humidity control, biosensors for pesticides in water, respiration gas analysis, medical applications, solid-state electrochemical potentiometric sensors, and high-temperature sensor applications in glass melts. We have not yet found a copy of Volume 3. Some ads suggest it could have been published in 1991, but other information has the publication date as later – perhaps even 1993.)

5. RADIOCHEMICAL SENSORS

The application of radioactivity to chemical analysis has been an analytical method from the time that unique half-lives for various isotopes were recognized. The identification of the decay schemes for the naturally occurring radioactive heavy elements prepared the way for the use of decay techniques in chemical analysis. Tracer analysis followed with the discovery of induced radioactivity, as did the discovery and identification of isotopes of known elements and isotopes of elements new to the periodic table (e.g., plutonium). Furthermore, the identification and explanation of the fission process was accomplished through the work of radiochemists and physicists. In each of these, a combination of chemistry and applied techniques was used; this combination is now identified as radiochemistry.

Radiochemical sensors can be defined as devices that use the detection of atomic or nuclear reactions to identify chemical processes or constituents. As such, they do not differ from any sensor of radioactivity, only the application, perhaps, being different. In this section of the report, sensors of importance in chemical analysis are described, not the techniques used in radiochemistry. These sensors are used for sensing a radioactive decay product and generating a signal that provides information about some process of interest to the experimenter. With identical decay products, the sensor does not care how the product is generated, for example, as a result of a reaction in an accelerator or in the activation of a receptor in a chemical sample to be analyzed. Thus, the description of sensors will be nonspecific to any scientific field, but will concentrate on types, their operation or function, their sensitivities, and their roles as part of any overall detection system. For example, in neutron activation analysis, where the reaction product is a gamma ray (i.e., the (n,γ) reaction), the gamma-ray detector is an essential part.

It is believed that more than 90% of nuclear activation analyses are done using neutron activation of the target nucleus and analyzing the resultant gamma ray(s). Other types of activation analysis use photons or charged particles as the initiating event, but these will not be discussed further in this report. Reference is made to texts on the subject of nuclear activation analysis, such as the treatise by Elving et al. (1), for descriptions of counting techniques, detectors, and various activation processes.

Neutrons are preferred for activation because they do not carry an electric charge; thus, they can more easily interact with a given target nucleus. A variety of neutron sources are available, a nuclear reactor being the most commonly used because of the high neutron fluxes available and the generally easy access to irradiation ports. Accelerators are another source of neutrons, but they have generally given way to nuclear reactors. Examples are (a) $^{9}Be(d,n)^{10}Be$, using deuterons as the accelerated particle and yielding neutrons of about 5 MeV and (b) $^{3}H(d,n)\alpha$ using tritium as the target, producing neutrons of about 14 MeV. Typical neutron yields are perhaps 10^{8} to 10^{10} neutrons/sec/μA. Small, portable sources, using the (α,n) reaction, are used where high flux values are not needed or where portability is important. For example, alpha particles from the decay of ^{210}Po are used in the reaction $^{9}Be(\alpha,n)^{12}C$, yielding about 10^{6} neutrons/sec/Ci of polonium. Alphas from ^{241}Am, with Be as the target, will give neutron yields perhaps twice that from polonium. Finally, neutrons from spontaneously fissioning nuclides, generally trans-plutonium, are used to obtain yields several orders of magnitude greater than those from (α,n) reactions, per Curie of radioactive material. The most common of these sources is ^{252}Cf, which is primarily an alpha emitter, with fission accounting for about 3% of total decays. Neutron yield, per Curie of Cf, is about 4×10^9 per second.

Gamma rays emitted from a neutron-irradiated sample are detected by the gamma ray interacting with some material that emits a pulse of light (e.g., a scintillator), the light in turn being detected by a device such as a photomultiplier, which converts the light signal into an electrical signal. Detectors of importance in gamma-ray spectrometry are inorganic crystals, such as NaI, and solid state detectors, such as those fabricated from Si or Ge. Historically, NaI with trace amounts of thallium [Na(Tl), "thallium drifted"], has been the detector of choice. It can be fabricated in large sizes, has better light emission efficiency per gamma ray than any of the other solid detectors, and has linear response over a large energy range. A disadvantage is its high affinity to water absorption, which requires that the crystals be encapsulated. Energy resolution is not as good as that of the newer solid state detectors by one to two orders of magnitude. Of the solid state detectors, germanium has been the material of choice, with some silicon detectors also being used. Germanium doped with lithium [Ge(Li), "lithium drifted"] was the first widely used solid state detector. These detectors have excellent energy resolution, but they must be operated and maintained at liquid nitrogen temperature so as to reduce the thermal noise and prevent the lithium from drifting out of trapped sites, which occurs at room temperatures. With the advent of very pure Ge, intrinsic Ge detectors have largely replaced the Ge(Li) ones. Still operated at liquid nitrogen temperatures, the Ge devices can be stored at room temperatures without damage. What one gains in resolution using solid state detectors is somewhat offset by the necessity for cooling and by the decreased light efficiency to only about one-third that of Na(Tl). Other materials that have been used and show promise are crystalline bismuth germanate, $Bi_4Ge_3O_{12}$, and solid-state gallium arsenide (GaAs), cadmium telluride (CdTe), and mercuric iodide (HgI_2).

To identify specific gamma rays, hence material, from neutron irradiated samples, detectors must have adequate resolution (i.e., ability to separate gamma-rays with nearly the same energies). In addition, data reduction techniques must be able to identify, if necessary, the type of interaction the gamma ray had with the detector (e.g., photoelectric, Compton scattering, or pair production). The source (sample), detector, and associated electronics, together with an interactive computer system, constitutes an effective gamma ray spectrometer. Gamma rays of different energies are sorted by pulse height, which is determined by the magnitude of the light signal or current signal produced in the detector. A multichannel analyzer converts an analog signal from the detector into a digital signal (A/D converter) and stores it in one of the many energy channels available. Analyzers with 1024 channels are commonplace and units are available with greater than 16,000 channels. With resolution of the order of 1 keV or better (for gamma ray energies from about 100 keV to several MeV) and the use of an extensive library of gamma rays in memory, a large number of elements can be uniquely identified.

The treatise by Elving et al. (1) is recommended for an extended treatment of nuclear activation techniques in analytical chemistry.

References and Review Notes for Radiochemical Sensors

1. *Treatise on Analytical Chemistry, Part I, Theory and Practice*, Vol 14, Section K, *Nuclear Activation and Radioisotopic Methods of Analysis*, P.J. Elving, V. Krivan, and I.M. Kolthoff, eds., with 18 Contributing Editors, 2nd Edition, Interscience/John Wiley & Sons, New York, 1986.

This text of eight chapters, each chapter having a different author is a good reference for radiochemical sensing; it includes (a) a good introduction to radioactivity and analysis, (b) detection of different types of radiation, (c) radiotracer experiments with determination techniques, (d) radioimmunoassay, (e) trace element analysis with radiotracers, and (f) techniques of nuclear activation analysis, including not only neutron activation, but also photon, charged-particle, and radionuclide activation. The last chapter on applications of activation analysis, with seven sections, describes techniques and analysis in biological materials, geochemistry and cosmochemistry, art and archaeology, and environmental samples, and there is one section on charged particle activation analysis. Unfortunately, the section on environmental analysis is short (less than 20 pages) and has only one page that mentions waste analysis, other samples being atmospheric aerosols, coal, fly ash, other fuel types, and water samples. Nevertheless, the text is a valuable reference, for it describes the many types of sensors in use as of the mid-1980s as well as those that were coming on the market. It also discusses the applicability and limitations of activation techniques, valuable to those whose interests are in isotopic identification of black-box material.

Radioactivity in chemical analysis is, without question, the most sensitive of any technique, having the sensitivity (in principle) to detect a single decay event. In practice, this is usually not the case because of background events and the half-life of the material being counted. For a half-life of 1 sec, 14 atoms of a material will give a decay rate of 10/sec, an adequate signal for present detectors. Longer lived isotopes require larger numbers of atoms.

Neutron activation analysis, in particular, (n,γ) is the most commonly used analytical method. The text discusses the various neutron sources available, the spectrum from each, and their yields and uses. Gamma-ray detectors, from NaI through liquid scintillators and solid-state devices, are all covered. Multichannel analyzers, as gamma-ray spectrometers, are described. This is a mature field, with some new and potentially very useful new detectors being developed, particularly detectors that have good resolution and small size and operate at normal temperatures. Application to environmental chemical analysis will be mostly a matter of technique rather than availability of adequate sensors and support electronics.

2. E. Bujdoso, *J. Radioanal. Nucl. Chem.*, Articles, 97 381-398 (1986)

This article includes a broad coverage bibliography on analysis by absorption and scattering of radiation and contains more than 150 references, most with a brief abstract. Radiation types included are X-ray, neutron, alpha particle, electrons, protons, and even muons, with X-ray techniques dominating. Many of the references are to papers in languages other than English.

3. K. Masumoto and M. Yagi, *J. Radioanal. Nucl. Chem.*, Articles, 100 287-301 (1986)

Electron-beam-generated gamma-rays were used to produce gamma-ray-emitting isotopes from the (γ,n) reaction. Determinations were made of 13 elements in three environmentally interesting sediments.

4. R. Pietra, E. Sabbioni, M. Gallorini, and E. Orvini, *J. Radioanal. Nucl. Chem.*, Articles, 102 69-98 (1986)

Radiochemical separation procedures to identify trace metals using neutron activation analysis on environmental and biological samples are described.

5. N. L. Truglio and V. P. Guinn, *J. Radioanal. Nucl. Chem.*, Articles, 110 41-45 (1987).

A computer-based analysis of 13 biological and 8 environmental reference materials with short-lived induced activities is included.

6. W. D. James and J. A. Oyedele, *J. Radioanal. Nucl. Chem.*, Articles, 110 33-40 (1987).

This article describes the reactor pulse generation system and the sample transfer system used at the Texas A&M TRIGA reactor to produce 10 ms to 50 ms intense neutron pulses that are used in the identification of isotopes with short (e.g., < 1 sec) half-lives.

7. J. E. Milley and A. Chatt, *J. Radioanal. Nucl. Chem.*, Articles, 110 345-363 (1987).

This work discusses multielement determination in acid rain using neutron activation analysis techniques.

8. E. Sabbioni, R. Pietra, J. Edel, and L. Goetz, *J. Radioanal. Nucl. Chem.*, Articles, 112 109-117 (1987).

Research areas in neutron activation analysis are examined to show how this technique and the use of radiotracers can assist in solving trace metal toxicology problems in the environment.

9. W. D James, *J. Radioanal. Nucl. Chem.*, Articles, 112 361-373 (1987).

Short, 10- to 50-ms pulses of neutrons from the Texas A&M TRIGA reactor were used to irradiate a variety of samples. A rabbit transfer system to a gamma-ray spectrometer permitted data taking within 0.5 sec after irradiation. The method was tested to evaluate its ability to identify isotopes with short half-lives.

10. J. S. Petler, M. C. Underwood, and K. Randle, *J. Radioanal. Nucl. Chem.*, Articles, 113 383-390 (1987).

This work discusses the use of gamma-rays coming from 14 MeV neutron interaction with coal- and fluid-saturated rock to determine the major elements in coal and the lithology, porosity, oil, and water saturation in oil well logging.

11. E. Bujdoso, *J. Radioanal. Nucl. Chem.*, Articles, 158 215-238 (1992).

This work is stated to be a current bibliography on environmental radiochemistry and radioactivity, with most of the papers addressing some aspect of the Chernobyl nuclear accident. Many of the referenced papers were presented in a language other than English. However, the abstracts are generally given in both languages.

12. V. P. Guinn, *J. Radioanal. Nucl. Chem.*, Articles, 160 9-19 (1992).

This article includes a history of neutron activation analysis from the first application in 1936 to 1991, with discussion of the periods 1936 to 1944, 1944 to 1950, 1950 to 1960, 1960 to 1970, and 1970 to 1991.

13. M. De Bruin, *J. Radioanal. Nucl. Chem.*, Articles, 160 31-40 (1992).

A comparison of instrumental and radiochemical neutron activation analysis (NAA) with other spectrometric methods is included. Both NAA methods rated high in accuracy and sensitivity, but did not fare well in terms of turnaround time, accessibility, and cost.

14. H. Nitsche, R. C. Gatti, and Sh. C. Lee, *J. Radioanal. Nucl. Chem.*, Articles, 161 401-411 (1992).

This article discusses detection of ^{239}Pu to 10^{-10} M in aqueous samples, using L X-rays from U following alpha decay of the plutonium. Gamma-ray spectroscopy was used to correct for possible contributions from other radionuclides.

15. M. Pimpl, B. Yoo, and I. Yordanova, *J. Radioanal. Nucl. Chem.*, Articles, 161 437-441 (1992).

A radiochemical procedure for the extraction of uranium from nuclear facilities (or environmental samples) is described. After separation from the matrix, uranium is plated onto stainless steel discs and its activity measured by alpha spectrometry using surface barrier detectors. For 1000 minutes counting, the detection limit is stated to be 2 mBq per sample and nuclide of ^{234}U, ^{235}U, and ^{238}U.

16. C. L. Hollas, D. A. Close, and C. E. Moss, *Nucl. Inst. and Meth.*, B24/25 503-505 (1987).

This work investigates the gamma-ray spectra from the fission products of photofission to determine if photofission can identify shielded fissionable material. The probing gamma rays were produced by 10 MeV electrons. Isotopes investigated were ^{232}Th, ^{235}U, ^{238}U, and ^{239}Pu through 70 cm lead, using a high-resolution Ge detector.

17. K. Randle, *Nucl. Inst. and Meth.*, B24/25 1010-1013 (1987).

Fast neutron (14 MeV and 3 MeV) activation analysis is used to determine the major elements of coal and various oil- or water-bearing matrices. Irradiation, followed by sample removal and counting, and prompt gamma-ray analysis techniques are described.

18. G. F. Knoll, *Nucl. Inst. and Meth.*, B24/25 1021-1027 (1987).

A paper describes developments in charged-particle and gamma-ray detectors, circa 1987. Descriptions are given for bismuth germanate, barium fluoride, and cesium fluoride gamma-ray detectors; the use of photodiodes in place of photomultipliers; and passivated silicon detectors. A cyrogenic microcalorimeter is described, operating below 1 K, which can detect the temperature rise caused by the absorption of one photon.

19. W. D. Ehmann and D. E. Vance, *Crit. Rev. Anal. Chem.*, 20 405 (1989).

A review of advances in neutron activation analysis is included, and sensitivities reported (0.1 to 10^{-7} μg/g) for much of the periodic table and recent applications of different neutron activation analysis are reviewed.

20. B. Salbu, *Analyst*, 117 243-249 (1992).

This article is a lecture on nuclear analytical techniques in environmental research, particularly neutron activation analysis, radiotracers, and measurements of environmental radioactivity. Detection limits for elements in the entire periodic table, using NAA with separation techniques where necessary, are given for stated conditions of neutron flux and irradiation time. These range from 0.001 to 20 ng for radiochemical NAA.

21. S. A. E. Johansson, *Analyst*, 117 259-265 (1992).

State-of-the-art particle-induced X-ray emission techniques using protons and alpha particles for determination of trace elements in biology, medicine, geology, air pollution, and archaeology are reviewed. Detection limits of 0.1 to 1 ppm are quoted.

22. *Nuclear Environmental Chemical Analysis*, J. Tolgyessy and E.H. Klehr, Ellis Horwood Ltd., Chichester, West Sussex, England, 1987.

This text of nine chapters covers, in less than 200 pages, a very representative survey of nuclear chemical techniques applied to environmental sample analysis. The authors define nuclear analytical chemistry as "those analytical methods that use the nuclear characteristics of appropriate nuclides to gain qualitative and quantitative information about various substances and about our environment." Furthermore, "the common feature of all such methods is the detection and measurement of nuclear radiation and/or characteristic X-rays." The book is more devoted to measurement techniques than to sensors and instrumentation, but it is a good reference text for sample gathering, preparation, and analysis. Sensors and instrumentation are not discussed in detail, possibly due to the nature of the book and the fact that both sensors and instrumentation for radiation measurements are quite mature industries.

The first chapter of the book discusses the various kinds of chemical analysis available to the experimenter, including nuclear analytical techniques, and compares the several methods as to sensitivity, required analyte size, and data analysis. Chapter 2, on environmental sampling, concentrates on methods for taking and preserving samples in the atmosphere, water, and soils. Next, the authors tell how these samples should be prepared. Chapters 4 through 8 are devoted to analysis techniques, beginning with radioactive samples, natural and man-made; isotope dilution analysis; radio-reagent methods; activation analysis (the most commonly used technique); and nonactivation interaction analysis. Sensors, specifically, and instrumentation, in general, are not described in any detail. Mention is made of various detectors, such as NaI crystals, germanium, and silicon solid state devices. None of the newer solid state sensors, which reportedly can operate at room temperature with good resolution, are mentioned. Reference is made to the use of multichannel analyzers for identification of gamma rays in gamma-ray spectrometry. The last chapter (Chapter 9) is a listing of sources for the information given in the other chapters. Each chapter has an extensive listing of references.

Useful tables include allowable concentrations in water, detection limits of various analytical methods, comparison of instrumental analytical methods (e.g., various spectrometry methods, activation analysis, X-ray fluorescence), and a moderately complete listing of radionuclides obtained in (n,γ) reactions.

This is an easy book to read that contains a lot of useful information and is well presented. It would have been nice to have a chapter or two on sensors and associated analytical instrumentation.

23. *Data for Radioactive Waste Management and Nuclear Applications*, D. C. Stewart, John Wiley and Sons, New York, 1985.

This is truly a book of data and not applications. The book contains five parts: Part 1, Physical Data, which includes information on light and heavy nuclides, transuranic elements, radiometric properties, and neutron sources; Part 2, Chemical Data, listing elements, oxidation potentials, solubility, process chemicals; and Part 3, Radioactive Wastes, defining high-level liquid wastes, non-high-level wastes, packaged wastes, and repository data. Part 4, Data for Operations, very briefly covers shielding, health physics, radiation damage, criticality, and decontamination. Part 5, Miscellaneous Data, has information on radioactive decay, neutron activation, and conversions. This is possibly a useful reference for those needing numbers for field operations, but probably not for one working in the sensor area.

6. JOURNAL ARTICLE REVIEWS AND REFERENCES - GENERAL

6.1 REVIEWS

1. R. E. Clement, M. L. Langhorst, and G. A. Eiceman, *Anal. Chem.*, 63, 27OR-292R, (1991).

   A recent review entitled "Environmental Analysis," covering "developments in analytical chemistry as applied to environmental analysis for 1989-1990." The paper includes general reviews, applications to analysis of air, water, soils and sediments, biological samples, and miscellaneous topics. This is the first of what will probably be a periodic review of environmental analysis such as is done, for example, in radiochemistry and other specialized topics. The list of references, which is quite up to date, is arranged in the same manner as the subject headings. Although chemical sensors are not addressed as a separate topic, the review should be useful because of its broad coverage of environmental issues.

2. C. Nylander, *J. Phys. E: Sci. Instrum.*, 18 736-749 (1985).

   This review paper gives short descriptions, with some applications, of types of chemical sensors (gas, semiconductor, electrochemical, field effect, piezoelectric, optical, and others) and a short discussion on the utility of multisensors to obtain more information than from single sensors. A section on biological sensors discusses the human nervous system and how sensors attempt to model that system.

3. J. O. W. Norris, *Analyst*, 114 1359-1372 (1989).

   This article reviews the status and prospects for use of optical fiber in chemical analysis, late 1980s time frame. Norris lists advantages, disadvantages, and principles of fiber optics as sensors and describes some extrinsic and intrinsic sensor types and their applications. For a short review, he does a credible job in describing the use of optical fibers in many applications. The paper is useful as background material.

4. O. S. Wolfbeis, *Fresenius J. Anal. Chem.*, 337 522-527 (1990).

   In about five pages, Wolfbeis gives a survey of chemical sensors and suggests possible trends. Two pages list advantages and disadvantages of chemical sensors. The rest of the paper is a general review of electrochemical, optical, and biosensors, and some applications. He predicts that the largest field of application will be in the biomedical sciences, but he also includes groundwater monitoring, process control, and biotechnology.

5. J. M. Van Emon and V. Lopez-Avila, *Anal. Chem.*, 64 79A-88A (1992).

   The authors define immunoassays as "immunochemical detection methods based on a reaction between a target analyte and a specific antibody." Reference to applications and a listing of reported methods for environmental analysis are followed by sections on (a) antibodies and immunoassays for environmental analysis, (b) evaluation, (c) immunoaffinity techniques, (d) use in laboratories, and (e) future work.

6. D. R. Walt, *Chemistry & Industry*, 20 January 1992, 58-61.

A short paper discussing chemical sensors in general and their categorization into electrochemical, optical, thermal, or mass sensors, along with examples of applications.

7. J. W. Grate and M. H. Abraham, *Sensors Actuators*, B3 85-111 (1991).

A review paper on solubility interactions and the implications for design of chemically selective coatings for sensors.

8. J. Janata and A. Bezegh, *Anal. Chem.*, 60 62R-74R (1988), J. Janata, *Anal. Chem.*, 62 33R-44R (1990), and J. Janata, *Anal. Chem.*, 64 196R-219R (1992).

These articles are bi-annual reviews of chemical sensors. Each article includes books, reviews, journals, and proceedings entries. Large listings of references are included in each review.

9. W. D. Ehmann and S. W. Yates, *Anal. Chem.*, 60 42R-62R (1988), W. D. Ehmann, J. D. Robertson, and S. W. Yates, *Anal. Chem.*, 62 50R-70R (1990), and W. D. Ehmann, J. D. Robertson, and S. W. Yates, *Anal. Chem.*, 64 1R-22R (1992).

These articles are bi-annual reviews of nuclear and radiochemical analysis. Each article includes books, reviews, journals, and proceedings entries - lots of references.

10. R. Brina and A. G. Miller, *Anal. Chem.*, 64 1413-1418 (1992)

This paper covers the direct detection of trace levels of uranium by what the authors call laser-induced kinetic phosphorimetry. The claimed detection limit for uranyl ions in aqueous solution is 1 ng/L. Response is said to be linear up to concentrations of 5 mg/L. Pretreatment of bio-samples is needed only for measurements near the detection limit.

11. E. Zanzottera, *Crit. Rev. Anal. Chem.*, 21 279-319 (1990)

This article is an excellent review of lidar applications to determination of atmospheric pollutants and includes a detailed exposition of source properties, lidar transmission, signal strength, absorption, etc.

12. P. S. Vukusic, G. P. Bryan-Brown, and J. R. Sambles, *Sensors Actuators*, B8, 155-160 (1992)

This paper reports the use of a novel technique for sensing gases. The technique described is called "measurement of a resonance maximum on a weak background signal by means of surface plasmon resonance on gratings." Gases used in the experiments included propan-2-ol, monoethylene glycol, pentanol, and water vapor. The grating was formed on a 100 nm-thick Ag film.

13. C. A. Wade and I. Bennion, *Int'l. J. Optoelectronics*, 6 197-216 (1991)

This article provides a theoretical study of 2-band differential absorption for sensing of CH_4, CO, CO_2, O_2, NO_x, SO_x, H_2S, C_2H_2, C_2H_4, and others. The sensor design uses fiber optics and a scanning comb filter whose spacing matches the rotational lines in the absorption spectrum of the gas being sensed. Results given include sensitivities of 0.002% for methane, 0.005% for hydrogen sulfide, 0.02% for ethylene, 0.06% for acetylene, and 3.75% for carbon dioxide (measured for methane, calculated for others).

14. B. C. H. Turton, A. Mohebati, and T. A. King, *Int'l. J. Optoelectronics*, 6 217-226 (1991).

    Standard telecommunications laser diodes (emitting at 1.33 μm) and fiber optics cables were used in the development of two techniques for frequency scanning the laser diode. The two techniques, called direct and harmonic detection, have been applied to the detection of methane. The paper includes a discussion of the two scanning techniques along with analysis algorithms and calibration procedures used for methane.

15. J. Watson, *Sensors Actuators*, B8 173-177 (1992).

    An interesting paper on electrical characterization of solid-state gas sensors; it includes a discussion of the comparative value of resistance and conductance characterization, as well as ratios of electrical characteristics, and the best ways to define sensitivity.

16. W. Göpel, *Sensors Actuators*, 16 167-193 (1989)

    The article discusses Solid State Chemical Sensors and Atomistic Models and Research Trends. It would be useful for those just tackling the development of new gas sensors.

6.2 CHEMILUMINESCENCE BIBLIOGRAPHY

The listings in this section were obtained from the Perkin-Elmer Corp. They are included in this report for general reference; they have little to do with the four main types of sensors addressed in the bulk of the report.

Author(s)	Title	Citation
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F. J. Alvarez, N. J. Parekh, B. Matuszewski, R. S. Givens, T. Higuchi, R. L. Schowen	Multiple intermediates generate fluorphores derived light in the oxalate/peroxide chemiluminescent system	J Am Chem Soc 1986; 108: 6435-6437
N. S. Bayliss	The effect of the electrostatis polarization of the solvent on electronic absorption spectra in solution	J Chem Phys 1950; 18: 292-296

Author(s)	Title	Citation
J. W. Birks, ed.	Chemiluminescence and photochemical reaction detection in chromatography	VCH Publishers, New York, 1989: 13, 36
B. R. Branchini, J. D. Hermes, F. G. Salituro, N. J. Post, G. Claeson	Sensitive enzyme assays based on the production of chemiluminescence leaving groups	Anal Biochem 1981; 111: 87-96
T. G. Burdo, W. R. Seitz	Mechanism of cobalt catalysis of luminol chemiluminescence	Anal Chem 1975; 47: 1639-1643
J. L. Burguera, A. Townshend	Determination of ng/mL levels of sulphide by a chemiluminescence reaction	Talanta 1980; 27: 309-314
J. L. Burguera, M. Burguera, A. Townshend	Determination of zinc and cadmium by flow injection analysis	Anal Chim Acta 1981; 127: 199-201
J. L. Burguera, A. Townshend, S. Greenfield	Flow injection analysis for monitoring chemiluminescent reactions	Anal Chim Acta 1980; 114: 209-214
A. K. Campbell, A. B. Hallelt	Measurement of nitrate, intracellular calcium ions, and oxygen radicals in polymorphonuclear leucocyte erythrocyte host hybrids	J Physiol London 1983; 338: 537-550
C. L. R. Catherall, J. R. Palmer, R. B. Cundall	Chemiluminescence from reactions of bis)pentachlorophenyl) oxalate, hydrogen peroxide, and fluorescent compounds	Chem Soc Faraday Trans II 1984; 80: 823-836, 837-849
E. A. Chandross	A new chemiluminescent system	Tet. Lett. 1963; 761-765
M. M. Chang, T. Saji, A. J. Bard	Electrogenerated chemiluminescence 30; electrochemical oxidation of ions in the presence of luminescers in ACW solutions	J Am Chem Soc 1977; 99: 5399-5403

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R. D. Cox	Determination of nitrate and nitrite at the parts per billion level by chemiluminescence	Anal Chem 1980; 52: 332
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R. Delumya, A. V. Hartkopf	Metal catalysis of the luminol reaction in chromatographic solvent systems	Anal Chem 1976; 48: 1402
C. A. Dorschel, J. L. Ekmanis, H. E. Oberholtzer, F. V. Warren Jr., B. A. Bidlingmeyer	LC detectors	Anal Chem 1989; 61: 951A-968A
T. M. Freeman, W. R. Seitz	Oxygen probe based on tetrakis (alkylamino) ethylene chemiluminescence	Anal Chem 1981; 53: 98-102
W. Frei, H. Tanseu, U. A. Th. Brinkman	Post column reaction detectors for high performance liquid chromatography	Anal Chem 1985; 57: 1529A
U. Fritsche	Chemiluminescence method for the determination of nanogram amounts of highly toxic alkylphosphates	Anal Chim Acta 1980; 118: 179-183
R. S. Givens, R. L. Schowen	Chemiluminescence and photochemical reaction detection in chromatography	VCH Publishers Inc., New York: 1989

Author(s)	Title	Citation
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K. Honda, K. K. Miyaguchi	Evaluation of aryl oxides for chemiluminescence detection in high performance liquid chromatography	Anal Chim Acta 1985; 177: 111-120
K. Honda, K. Miyaguchi, H. Nishino, H. Tanaka, T. Yao, K. Imai	High performance liquid chromatography followed by peroxyoxalate chemiluminescence detection of acetylcholine and choline using immobilized enzymes	Anal Biochem 1986; 153: 50-53
K. Honda, J. Sekino, K. Imai	Bis (2,4-dinitrophenyl) oxalate as a chemiluminescence reagent in determination of fluorescent compounds by flow injection analysis	Anal Chem 1983; 55: 940-943
K. Imai, Y. Matsunga, Y. Tsukamoto	Application of bis(4-nitro-2-3,6,9 trioxo-decyloxycarbonyl)-phenyl) oxalate to post column chemiluminescence detection in high performance liquid chromatography	J Chrom 1987; 400: 169-176
K. Imai, K. Miyaguchi, K. Honda	High performance liquid chromatography chemiluminescence reaction detection system of fluorescent compounds using bis(2,3,6-trichlorophenyl) oxalate (TCPO) and hydrogen peroxide	Bioluminescence and Chemilumin-escence Instruments and Applications, Volume II, CRC Press, Boca Raton, 1985: 65-76
K. Imai, A. Nishitani, Y. Tsukamoto	Prediction of the detection ranges for high performance liquid chromatography peroxyoxalate chemiluminescent detection system of fluorescent compounds	Chromatographia 187; 24: 77-81

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N. Imaizumi, K. Hayakawa, M. Muyazakumin, K. Imai	Stability of bis(2,4,6-tri-chlorophenyl)oxalate in high performance liquid chromatography for chemiluminescence detection	Analyst 1989; 114: 161-164
R. N. Jannings, T. Capomacia	Solution kinetics of the degradation of the chemiluminescent reagent bis(2,4-dinitrophenyl)oxalate in water/acetronitrile	Anal Chim Acta 1988; 205: 207-213
H. Kaiser	Quantitation in elemental analysis	Anal Chem 1970; 42: 24A
H. Kawasaki, K. Sato, J. Ogawa, Y. Hasegawa, H. Yuki	Determination of inorganic phosphate by flow injection method with immobilized enzymes and chemiluminescence detection	Anal Biochem. 1989; 182: 366-370
L. L. Klopf, T. A. Nieman	Use of surfactants to improve analytical performance of lucigenin chemiluminescence	Anal Chem 1984; 56: 1539-1541
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P. Lechtken, N. J. Turro	Peroxyoxalate chemiluminescence chemiexcitation of high-energy excited states in acceptor molecules	Mol. Photochem. 1974; 6: 95-99
E. M. Lilius, S. A. Laakso	A sensitive lipoxygenase assay based on chemiluminescence	Anal Biochem 1982; 119: 135-141
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E. H. White, D. F. Roswell	Clinical and biochemical analysis 16	Marcel Dekker, New York, 1985: 215
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M. Yamada, S. Suzuki	Micellular enhanced chemiluminescence of 1-10 phenanthrolene for the determination of ultratraces of copper (II) by flow injection method	Anal Lett. 1984; 17: 251-263
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7. PROCEEDINGS - GENERAL

1. *PROCEEDINGS OF EUROSENSORS IV, PARTS I and II, Sensors Actuators*, B4, 1990, K.H. Hardtl (guest ed.).

   Proceedings of an annual conference on sensors and actuators. Contains papers, almost exclusively from outside the United States, on a broad spectrum of sensors and sensor-related topics. In the proceedings, topics covered are chemical sensors, sensor membranes, gas sensors, ISFETs and related sensors, thick-film sensors, humidity sensors, and biosensors. The coverage is across the entire field of chemical sensors, with a number of papers having application to environmental use of chemical sensors. Papers on each of the types of sensors considered in this report can be found at some place in these yearly proceedings.

2. *PROCEEDINGS OF EUROSENSORS V, PARTS I and II, Sensors Actuators*, B6 and B7, 1991, A. D'Amico (guest ed.).

   Part I contains sections on chemical, bio-, gas, physical, and ion sensors, plus sections on applications and ion sensor technology. Part II includes sections on biomedical, enzyme, Langmuir-Blodgett, plant-based, humidity, opto-chemical, solid state, ISFET, acoustic and ultrasonic, chlorine, hydrogen, and SnO_2 sensors, as well as sections on technology of biosensors, environmental applications, test and characterization, and technology of gas sensors. A considerable number of the papers have application to environmental concerns, but the section on environmental applications contains only four papers. Most of the papers are from authors outside the United States.

3. *PROCEEDINGS OF THE THIRD INTERNATIONAL MEETING ON CHEMICAL SENSORS, Sensors Actuators*, B5, 1990, C.-C. Liu and W.H. Ko (guest eds.).

   Approximately 50 papers, many of them having application to environmental monitoring. Included are papers on optical fibers, semiconductor devices for gas sensing, thin-film sensors, SAW devices, FETs, etc.

4. *SYMPOSIUM B, NEW MATERIALS, PHYSICS, AND TECHNOLOGIES for MICRONIC INTEGRATED SENSORS, EUROPEAN MATERIALS RESEARCH SOCIETY*, 1991 Spring meeting, Strasbourg, May 27-31, 1991. Sensors Actuators, B8, No. 3, 1992.

   One paper of possible interest is *Molecular materials for the transduction of chemical information by CHEMFETs*, by J.R. Haak, P.D. van der Waal, and D.N. Reinhoudt; also includes a discussion of ISFETs.

5. *EAST-WEST WORKSHOP on MICROELECTRONIC SENSORS, Sozopol, Bulgaria, May 7-9, 1991. Sensors Actuators*, B8, No. 1 (1992).

   One paper may be of interest: *Integrated opto-chemical sensors*, by P.V. Lambeck; pgs. 103-116.

8. BOOK REVIEWS - GENERAL

1. *Fundamentals and Applications of Chemical Sensors, ACS Symposium Series 309*, D. Schuetzle and R. Hammerle, eds., American Chemical Society, Washington, D.C. 1986.

   The book is divided into three major sections: gas sensors, environmental sensors, and biosensors. The papers in the gas sensor section are mostly directed toward the commercial and manufacturing areas, covering semiconductor devices (silicon based), solid electrolytes, and humidity sensors. Some of the techniques could apply to environmental problems, which are the subject of the four papers summarized below.

   a. J. Stetter, *Electrochemical Sensors, Sensor Arrays, and Computer Algorithms for Detection and Identification of Airborne Chemicals.*

      Discusses electrochemical sensors and arrays, suggesting that arrays of sensors with tailored responses, together with the use of computer algorithms, can increase the sensitivity and selectivity over what can be done with an individual sensor.

   b. N. Jarvis, J. Lint, A. Stone, and H. Wohltjen, *Amidoxime-Functionalized Coatings for Surface Acoustic Wave Detection of Simulant Vapors.*

      Discusses preparation and use of coatings for a surface acoustic wave sensor that would have chemical specificity and sensitivity for a particular agent. Results were not encouraging.

   c. J. Giuliani, N. Jarvis, and A. Snow, *Selective Response of Polymeric-Film-Coated Optical Waveguide Devices to Water and Toxic Volatile Compounds.*

      Includes investigation of polymeric coatings on a glass capillary tube optical waveguide for detection of specific vapors.

   d. I. Karube, *Microbial Sensors for Process and Environmental Control.*

      Covers use of microbial sensor in combination with electrochemistry for detection of toxic materials in waste waters. The section on biosensors is on techniques related to drug and medical issues.

   Most of the reports in this book were early efforts in the expanding field of chemical sensors and, as such, are useful for a developmental history. There have been considerable advances in every area covered in the environmental section during the past several years.

2. *Optoelectronics for Environmental Science*, S. Martellucci and A.N. Chester, eds., Proceedings of the 14th Course of the International School of Quantum Electronics on Optoelectronics for Environmental Science, September 1989, Erice, Italy; Plenum Press, New York, 1991.

This compendium of papers from the above school is divided into two major sections: in situ measurements and laboratory analytical techniques. The first section has 13 papers, 11 of which are on the use of lasers for detection of pollutants in the atmosphere or ocean or for monitoring atmospheric ozone. Thus, the papers are on techniques, rather than sensors. The remaining two papers on optical fiber use give only superficial discussions of types and their use as sensors. The section on laboratory analytical techniques, with 11 papers, is heavily weighted toward laser-based techniques. Nine of the papers are on laser spectrometry of some type or on the use of lasers in sample preparation. One paper is on interferometry and one is on adaptive optics. The papers address detection methods and techniques, not chemical sensors. Not a useful reference for chemical sensors.

3. *Monitoring Methods for Toxics in the Atmosphere*, W. L. Sielinski, Jr. and W. D. Dorko, eds.; Papers presented at the Conference on Recent Developments in Monitoring Methods for Toxics in the Atmosphere, American Society for Testing and Materials, STP 1052, 1990.

   A general coverage of atmospheric monitoring, including programs for specific sites in Denver and California, with sections on monitoring volatile organics, acid gases, and products from waste incineration. Coverage of sensors is minimal. One chapter on neutron activation analysis of particulates from incineration has some interest. Not a useful reference for chemical sensors.

4. *Detection and Measurement of Hazardous Gases*, C. F. Cullis and J. G. Firth, eds., Heinemann Educational Books, Inc., Exeter, 1981.

   This collection of seven papers is devoted to gases and their potential effect on humans and their environment. There are chapters on "History and Law," flammable gases and vapours, lack of oxygen, personnel monitoring, and sampling strategies. None of the chapters cover their subject in-depth, and none have more than a superficial coverage of sensors. The chapter on "Monitoring Toxic Gases in the Work Place" is good general reading. Not a useful chemical sensor reference.

5. *Chemical Sensing with Solid State Devices*, M. Madou and S. R. Morrison, Academic Press, San Diego, 1989.

   Three classes of solid sensors are emphasized: "Semiconductor sensors, where the species to be detected is adsorbed or absorbed and changes the electronic conductivity of the semiconductor; solid electrolyte devices for use in gas or liquid, where the species to be detected affects the Nernst potential or changes the ionic current through the solid; and ChemFETs, where the species to be detected affects the potential at the gate of a field-effect transistor." This book of 13 chapters provides a good background on the theory of solid-state devices used as sensors and discusses their use in gases and liquids. There are chapters on the uses of catalysis and membranes and on biosensors and their use with solid-state devices. A chapter on field effect transistors as chemical sensors is followed by chapters on silicon devices used in potentiometric and amperometric measurements. Thin-film gas sensors, solid electrolytes, semiconductor powders, and applications of solid-state sensors conclude the text. This book is recommended for good coverage of solid-state devices, both in understanding how they work and their uses in environmental areas.

6. *Instrumentation for Environmental Monitoring, Volume 2, Water*, Second Edition. Principal Authors: M. S. Quinby-Hunt, R. D. McLaughlin, and A. T. Quintanilha, Lawrence Berkeley Laboratory Environmental Instrumentation Survey; John Wiley and Sons, New York, 1986.

   The entire volume is devoted to the environmental aspects of materials in water and the methods of measuring same. Part I is about inorganics - salinity, metallic trace elements, nutrients, dissolved gases, inorganic disinfectants, and pH, acidity, and alkalinity. Part II, organics, covers carbon, synthetic organics, pesticides, halogenated hydrocarbons, phenolics and polynuclear aromatic hydrocarbons, and oil and greases. Part III, on biological constituents, includes biomass, coliform bacteria, and other microorganisms. Part IV deals with the physical characteristics of water, such as temperature, turbidity, color, taste, and odor, and residues such as asbestos and radiation sources. Each chapter describes the characteristics of the particular materials, their sources, controls, methods of measurement, and instrumentation. Short reviews of chemical sensor techniques used for detection and monitoring are given. The book covers a lot of material and is useful for a general survey of sensors and instrumentation. Two companion volumes (not available from the reference libraries we searched) address radiation and air.

7. *Principles of Chemical Sensors*, J. Janata, Plenum Press, New York, 1989.

   Janata's book places chemical sensors in four categories: thermal, mass, electrochemical, and optical. Following a general chapter on selectivity and a systems approach to measurement, there are four chapters on the categories just listed. Each chapter develops the theory of the sensor and presents specific applications. References are included at the end of each chapter.

   Thermal sensors - thermistors, pyroelectric devices, catalytic gas sensors - all depend on some transfer of heat as the measurement medium. Piezoelectric devices are mentioned in the section on pyroelectric sensors. In general, a coating responsive to heat provides the input to the sensing device.

   Piezoelectric and SAW sensors are covered in the mass sensor chapter. Coatings receptive to mass changes provide the input to the piezoelectric crystal, the measured response generally being a change in frequency of crystal oscillation. SAW sensors also are based on piezoelectric crystals with the addition of a surface transmitter/receiver set. An electrical input to the transmitter generates an acoustic wave that propagates along the crystal surface to the receiver, which transforms the acoustic signal back into an electrical signal. Coatings on the surface along which the acoustic wave propagates interact with the analyte, changing the propagation characteristics, hence the final electrical response. Janata discusses selective coatings in the last part of this chapter.

   In the section on electrochemical sensors, Janata discusses general theory and application with reasonably elaborate equations and graphs. These sensors are categorized as potentiometric, amperometric, and conductimetric. Within these major categories are subcategories based on types of interfaces, membranes, and electrodes.

   Theory and operation are presented in the form of equations and graphs representing performance parameters, physical processes, and applications. Topics covered under the category of potentiometric sensors include nonpolarized interface, ion-selective membrane, electrochemical cell, enzyme electrodes and enzyme transistors, and gas sensors. Topics covered under amperometric sensors include microelectrodes and gas electrodes. Conductimetric sensors are discussed under the subheadings of chemiresistors, semiconducting oxide sensors, conductimetric gas-membrane sensors, and dielectrometers.

Because electrochemical sensors are the largest and oldest group of chemical sensors, Janata has devoted about half (158 pages) of the four sensor chapters to the discussion of these devices.

The optical sensor chapter has a brief survey of optical spectroscopy, followed by a description of the operation of optical fibers and waveguides. The use of optical fibers as extrinsic or intrinsic sensors and as part of total detection systems concludes the chapter.

This is not an easy text to read. The development of the theory of operation of these sensors is often unclear because of incomplete explanation of equation elements, use of the same symbols for different parameters in the same development, and parameters used without definition. To one unfamiliar with the technology, this would be a difficult text from which to learn the principles of chemical sensors. However, even with the shortcomings, the text is valuable because of its broad coverage and general applications. References follow each chapter, and there are several appendices amplifying elements in the body of the book.

8. *Sensors – a Comprehensive Survey: Vol. 2, Part I, Chemical and Biochemical Sensors and Volume 3, Part II, Chemical and Biochemical Sensors*; W. Göpel, J. Hesse, J. N. Zemel (eds. for complete Survey). W. Göpel, T. A. Jones, M. Kleitz, J. Lundström, and T. Seiyama (eds. for Vols. 2 and 3); VCH Press, New York, 1991.

This impressive survey devotes two entire volumes to chemical and biochemical sensors. Definitions, examples, and historical information precedes in-depth coverage of a broad class of sensors and applications. Each of the sensor types addressed in this report are included in the survey. Of particular interest are chapters on electrochemical sensors and applications; solid-state electrochemical sensors; field effect (FET) sensors; fiber optic sensors; piezoelectric (mass sensitive) devices; a chapter devoted to environmental control; and a chapter on multicomponent analysis in chemical sensing. Volumes 2 and 3 comprise 26 chapters and more than a thousand pages. Recommended for its comprehensive coverage and recent date of publication.

9. *Chemical Sensors and Microinstrumentation*, R. Murray, R. Dessy, W. Heineman, J. Janata, and W. R. Seitz, (eds.) Amer. Chem. Soc. Symp. Series, American Chemical Society, Washington, D.C., 1988

This is a review text covering electrochemical sensors (seven chapters), mass and thermal microsensors (seven chapters), and fiber optic chemical sensors (nine chapters). The opening chapter gives a good overview of electrochemical sensors, piezoelectric materials, including mass sensitive devices, quartz microbalances, surface acoustic wave devices, and optical fiber sensors. Other sensors mentioned are thermal and lipid bilayers. The electrochemical section includes potentiometric and voltammetric applications, thin film applications, microelectrodes, and fiber optic electrodes. The section on mass and thermal applications has papers on the use of optical fibers for biosensors, surface acoustic wave devices, and quartz microbalances (piezoelectric applications). The nine chapters on optical fibers cover some techniques in fabricating such sensors, pH measurements, multidimensional sensors, antibody-based sensors, fluorescence, absorption, and biosensors.

10. *Chemical Sensor Technology, Volume 1*, T. Seiyama, ed., Kodansha Ltd., Tokyo and Elsevier, New York, 1988.

The leading chapter on the current state and future outlook of chemical sensors discusses current and expected future applications of sensors to detection processes. Passing reference is made to environmental applications. A brief description is given of a multidimensional sensor system and the use of pattern recognition to recover identification of, and quantitative information about, specific analytes. There is one chapter on optical chemical sensors (K. Nishizawa) that has abbreviated descriptions on optical fibers in general, guided-wave sensors, evanescent wave, and surface plasma applications. Though short, the descriptions are good.

11. *Chemical Sensor Technology, Volume 2*, T. Seiyama, ed., Elsevier, New York, 1989.

The second in what is promised to be an annually issued series (Vol. 1 reviewed just above). The first 12 chapters have to do with various types of gas sensors (e.g., a Pd-gate H_2 sensor, a thin-film semi-conductor sensor for hydrogen and CO in air, ozone detection by In_2O_3 thin film sensors); chapters 13 and 14 describe a new glucose sensor and an optical immunosensor; and the last two chapters (16 and 17) are about biosensors. Chapter 15, The Molecular Recognition Component of Chemical Sensor Selectivity, by M. Thompson et al., is perhaps the most interesting in the book.

12. *Current Advances in Sensors*, B. E. Jones, ed., Adam Hilger, Philadelphia, 1987.

A multi-chapter, multi-author compilation about sensors in the late 1980s. The first two chapters on advances in sensor technology and technologies of the future are of general interest. Only one chapter, Chemical and Biological Sensors, by C. Nylander, addresses sensors with direct application to environmental issues. The chapter is short (16 pages) but includes descriptive material on a number of different sensor types, some with applications. Some of the other chapters are of interest in their discussion of sensor design and applications, such as microelectronic sensor technology, sensor systems, optical fiber sensors for industry, optical fibre interferometers, acoustic techniques, and gas sensors. None of the chapters are long nor do they discuss their subjects in great detail, but they do give a good, broad description of the sensor field.

13. *Solid State Gas Sensors*, P. T. Moseley and B. C. Tofield, eds., Adam Hilger, Philadelphia, 1987

A book with 10 chapters and an interesting appendix on hazardous concentrations of various gases in air mixtures. The preface describes gas sensing equipment, old and new.

Chapter 1, by R.M.A. Kocache, is on applications of oxygen-ion-conducting solid electrolytes. The next chapter, by E. Jones, is a rare discussion of the pellistor catalytic gas detector, in which Jones may be THE world's expert. Titles and authors of the next several chapters are:

- Chapter 3, The Theory of Poisoning of Catalytic Flammable Gas Sensing Elements, by S.J. Gentry and P.T. Walsh
- Chapter 4, Characterization of Semiconductor Gas Sensors, by T.A. Jones
- Chapter 5, Conduction and Gas Response of Semiconductor Gas Sensors, by D.E. Williams
- Chapter 6, The Role of Precious Metal Catalysts, by J.O.W. Norris
- Chapter 7, Non-Nernstian Potential-generating Gas Sensors, by P.T. Moseley
- Chapter 8, Oxide Surfaces: The Basic Processes of Sensor Behavior, by A.M. Stoneham
- Chapter 9, Surface Analysis of Gas Sensor Materials, by J.C. Rivière

The final chapter has the interesting title "State of the Art and Future Prospects for Solid State Gas Sensors."

14. *Plasma Chromatography*, T. W. Carr, ed., Plenum Press, New York, 1984

This intriguing title caught the attention of one of the report's authors in a visit to the Stanford University Chemistry Library, and that led to an interesting fingering of enough pages to see that the subject is not particularly germane to the DOE's problems.

By way of explanation, plasma chromatography is also called ion-mobility spectroscopy. As explained in this book, the operation of a plasma chromatograph (or ion-mobility spectrometer) can be described as follows:

A sample – which is usually a gas containing organic compounds – is contacted with ions to convert each organic molecule to a very stable ion-molecule. These ion-molecules are then separated by a process of injection into a tube filled with a non-reactive gas through which the ions are drifted by means of a strong electric field. The ion-molecules arrive at a collector as ion peaks at times characteristic of their structure. Subsequently, the ion stream can be introduced into a mass spectrometer to determine ion masses.

Books Reviewed; Title Suggested Relevance, but Review Showed Irrelevance

1. *Aquatic Chemistry Concepts*, J. F. Pankow, Lewis Publishing, 1991. Nothing about sensors; all theory and modeling of chemistry of water.
2. *Chemicals in the Environment*, W. B. Neely, M. Dekker, New York, 1980. Mostly about air pollution, nothing about sensors.
3. *Chemodynamics; Environmental Movement of Chemicals in Air, Water, and Soil*, L. J. Thibodeaux, John Wiley & Sons, New York, 1979. Models of diffusion of chemicals, nothing about sensors.
4. *The Handbook of Environmental Chemistry*, O. Hutzinger, Springer Verlag, New York, 1980. Nothing about sensors.
5. *Pollution Evaluation; the Quantitative Aspects*, W. F. Pickering, M. Dekker, New York, 1977. Models, nothing about sensors.

6. *Analyses of Hazardous Substances in Air, Volume 1*, A. Kettrup, ed., VCH Verlagsgesellschaft mbH, Weinheim, Germany, 1991. Work of the Federal Republic of Germany's "Working Group 'Analytical Chemistry' of the FRG Commission of the Deutsche Forschungsgemeinschaft for the Investigation of Health Hazards of Chemical Compounds in the Work Area." Purely analytical chemistry; nothing about sensors.
7. *Environmental Inorganic Chemistry: Properties, Processes and Estimation Methods*, I. Bodek, W. J. Lyman, W. F. Reehl, and D. H. Rosenblatt, eds., Pergamon Press, New York, 1988. Nothing about sensors: compilation of information on physicochemical properties of environmentally important inorganic chemicals. Estimation in the title refers to ways of estimating the properties of inorganic chemicals - not to determinations of concentrations or to approximate analyses.

8. *The Wiley Series Advances in Environmental Science and Technology*, J. O. Nriagu and J. B. Sprague, eds., John Wiley & Sons, New York. Volume 19 – Cadmium in the Aquatic Environment, 1987 – 10 chapters; last one – Methods of Cadmium Detection (pgs. 231-263) – only one of possible interest; discusses methods of analysis, not sensors for use in analysis. Volume 20 – Chromium in the Natural and Human Environments, 1988; no mention of sensors or analysis or determination or anything related to those terms. Volume 17 – Toxic Metals in the Atmosphere, 1986 – mentions general methods of analysis only; nothing about sensors. Volume 24 – Gaseous Pollutants: Characterization and Cycling, 1992; 11 chapters, last one is Evaluation of Pollutants Relevant to Photochemical Smog; discusses analysis methods, but nothing on sensors.
9. *Environmental Radioanalysis*, by H. A. Das, A. Faanhof, and H. A. van der Sloot, Elsevier, New York, 1983. Volume 22 of the series Studies in Environmental Science. About activation analysis and radiotracer studies applied to smog; no other applications discussed.
10. *Detection in Analytical Chemistry: Importance, Theory and Practice*; Amer Chem Soc Sympos Series # 361, Amer Chem Soc, Wash DC, 1987. Nothing about sensors.
11. *Compilation of EPA's Sampling and Analysis Methods*, L. H. Keith, W. Mueller, and D. L. Smith, Lewis Publishing, Boca Raton, 1991.
12. *Environmental sampling and analysis; a practical guide*, L. H. Keith, Lewis Publishing, Chelsea, Michigan, 1992. All about planning sampling, validity of results, reporting results, etc; nothing about sensors.
13. *Handbook of Environmental Isotope Geochemistry*, P. Fritz and J. Ch. Fontes, Elsevier, New York, 1980.
14. *Principles of Environmental Sampling*, L. H. Keith, Amer Chem Soc, Washington, D.C., 1988.
15. *Analytical Techniques in Environmental Chemistry 2: Proceedings of the 2nd International Congress*, Barcelona, 1981, J. Albaiges, Pergamon, New York, 1982. Papers on specific analytical procedures, nothing about sensors.
16. *Chemicals in the Environment: Proceedings of the International Conference of 1-3 July 1986*, Lisbon, J. N. Lester, R. Perry, and R. M. Sterritt, Selper Ltd., Lonoon, 1986.
17. *Environmental Applications of Chemometrics*, J. J. Breen and P. E. Robinson, Amer Chem Soc, Washington, D.C., 1985. Applications of pattern recognition, cluster analysis, and factor analysis to analytical chemistry; not about sensors.
18. *Photochemistry of Environmental Aquatic Systems*, W. J. Cooper and R. G. Zika, Amer Chem Soc, Washington, D.C., 1987.

19. *Immunochemical Methods for Environmental Analysis*, J. M. van Emon and R. O. Mumma, eds., Amer Chem Soc, Washington, D.C., 1990. Devoted almost entirely to pesticide analyses; nothing about sensors.
20. *Fate of Chemicals in the Environment*, R. L. Swann and A. Eschenroeder, eds., Amer Chem Soc, Washington, D.C., 1983.
21. *Immunoassays for Trace Chemical Analysis*, M. Vanderlaan, L. H. Stanker, B. E. Watkins, and D. W. Roberts, eds., Amer Chem Soc, Washington, D.C., 1991. Environmental monitoring for regulated compounds, food monitoring for pesticides and mycotoxin residues, et sim; nothing about sensors.
22. *Chromatographic Analysis of the Environment*, R. L. Grob, ed., M. Dekker, New York, 1983. Methods for use of gas, liquid, thin layer, and paper chromatography to analyze air, water, soil, and waste: not about sensors used in the analyses.
23. *Wilson & Wilson's Comprehensive Analytical Chemistry*, G. Svehla, ed., Volume 13, Analysis of Complex Hydrocarbon Mixtures, Part A - Separation Methods; Part B - Group Analysis and Detailed Analysis, Elsevier, New York, 1982. Nothing about sensors used in analyses.
24. *Speciation of Fission and Activation Products in the Environment*, R. A. Bulman and J. R. Cooper, eds., Elsevier, Appl Sci Publishing, New York, 1985. Methods for studying speciation (complete molecular specification of all chemical compounds present), but nothing about sensors used in studies.
25. *Electrochemical Detectors, Fundamental Aspects and Analytical Applications*, T. H. Ryan, ed., Plenum Press, New York, 1984; Proceedings of a Symposium Sponsored by the Analytical and Faraday Division of the Royal Society of Chemistry, September 15-16, 1981, London. Not about sensors; almost entirely applications of electrochemical detectors for biological and medical problems, especially as used in high-performance liquid chromatography.

9. REFERENCES FROM CHEMICAL ABSTRACTS/STN

The STN International Scientific and Technical Information Network[1] was used to search for references pertinent to this review. This search, which encompassed a 20-year period, focused on the Chemical Abstracts (CA) Database of STN. Using an array of linked keywords associated with chemical sensors, detectors, analysis, environmental, and waste, there were 950 answers.

These abstracts were sorted and provided as input to the PC data base program called Q&A (v. 4.0). The Q&A structure includes the Chemical Abstracts accession number (the column headed CA No.), the author (2nd column), the title of the reference (Col. 3), an extensive list of keywords (Col. 4), the journal or report or book cited (Col. 5), the sensor type – either as mentioned in the reference or deduced by this report's authors (Col. 6), and other information for identifying the cited reference.

Seven different types of sensors were selected for use in Col. 6; these are the four types that are the principal focus of this report (electrochemical, fiber optics, piezoelectric, and radiochemical), plus three others – chromatography, spectrometry, and "general." The general category was adopted to denote less specific types of sensors.

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[1] STN International, 2540 Olentangy River Road, P.O. Box 3012, Columbus, OH 43210-0012

CA NO.	AUTHOR	TITLE	KEYWORDS	CITATION	SOURCE TYPE	OTHER
117(14):143153a	Park, Young Jae; Yoo, Hee Soo; Lee, Nam Soo	Atomic emission detector for gas chromatography using cylindrical microwave cavity.	atomic, emission, detector, gas, chromatography, cylindrical, microwave, cavity, spectrochemical, analysis, plasma, detection, chromatographs, detectors, spectrometric, carbon, tetrachloride, ethanol, methanol, chloroform, propanol, dichloromethane	Bull. Korean Chem. Soc., 13(4), 349-51 (Eng) 1992	CHROMATOGRAPHY	CODEN: BKCSDE ISSN: 0253-2964.
117(14):143078e	Aue, Walter A.; Millier, Brian; Sun, Xun Yun	Flame photometric detection of some transition metals. II. Enhancement of selectivity.	flame, photometric, detection, metals, analysis, volatile, organometallic, photometry, gas, chromatography, organometallics, spectrochemical, chromatographs, analog, computer, chromatograms, detector, iron, manganese, nickel, osmium, rhenium, ruthenium, chromium, cobalt, naphthalene, ferrocene, dodecane, dibenzyl, ether, indole, nickelocene, osmocene, cobaltocene, ruthenocene, methylcyclopentadienylmanganese, tricarbonyl, dirhenium, decacarbonyl	Can. J. Chem., 70(4), 1143-55 (Eng) 1992	SPECTROMETRY	CODEN: CJCHAG ISSN: 0008-4042
117(14):143077d	Sun, Xun Yun; Millier, Brian; Aue, Walter A.	Flame photometric detection of some transition metals. I. Calibrations and spectra	flame, photometric, detection, metals, spectra, analysis, volatile, organometallic, photometry, gas, chromatography, metal, spectrometry, spectrochemical, chromium, dirhenium, decacarbonyl, chemiluminescent, naphthalene, dodecane, dibenzyl, ether, nickelocene, dicyclopentadienylcobalt, molybdenum, spectrum, nickel, rhenium, cobalt	Can. J. Chem., 70(4), 1129-42 (Eng) 1992.	SPECTROMETRY	CODEN: CJCHAG ISSN: 0008-4042
117(14):142417t	Ye, Aimin; Xu, Mangqu; Wang, Fendi; Wang, Zer; Liu, Yun; Jan, Qunkan	A study on microwave induced plasma ionization detector for gas chromatograph.	microwave, plasma, ionization, detector, gas, chromatograph, chromatographs, detectors, ether, analysis, benzene, monochloromethane, carbon, disulfide, monochlorobenzene, dioxide, water, oxygen	Chem. Res. Chin. Univ., 7(4), 243-8 (Eng) 1991	CHROMATOGRAPHY	CODEN: CRCUED
117(24):235539d	Hess, F. X.; Glick, J. H.; McKamy, J. N.; Garrett, R. G.; Rundo, P. A.; Sheppard, G. A.; Wene, T. R.; Miller, M. C.	Holdup measurements of plutonium in glove box exhausts.	plutonium, glove, exhausts, rocky, flats, health, physics, exhaust, nuclear, fissile, radioactive, wastes, gamma	Proc. Int. Conf. Facil. Oper.-Safeguards Interface, 4th, Meeting Date 1991, 277-82. Am. Nucl. Soc.: La Grange Park, Ill. (Eng) 1991.	RADIOCHEMICAL	CODEN: 58STAK
117(10):117384a	Czolk, R.; Reichert, J.; Ache, H. J.	Optical sensor for determination of heavy metal ions.	optical, sensor, metal, ions, germany, sensors, immobilized, porphyrins, cadmium, water, analysis, tetraphenylporphyrin	Altlastensanierung 90, Int. KfK/TNO Kongr., 3rd, Meeting Date 1990, Volume 1, 535-40. Edited by: Arendt, Friedrich; Hinsenveld, M.; Van den Brink, W. J. Bundesminist. Forsch. Technol.: Bonn, Germany. (Ger) 1991.	SPECTROMETRY	CODEN: 57ZMAG
117(10):103262a	Fabricius, N.; Gauglitz, G.; Ingenhoff, J.	A gas sensor based on an integrated optical Mach-Zehnder interferometer.	gas, sensor, integrated, optical, zehnder, interferometer, germany, hydrocarbons, analysis, detection, lamps, xenon, interferometers, chromatographs, detectors, sensors, perchloroethylene	Sens. Actuators, B, B7(1-3), 672-6 (Eng) 1992.	SPECTROMETRY	CODEN: SABCEB ISSN: 0925-4005
117(10):103079w	Smith, Clare M. M.; Michel, Robbin; Littlejohn, David; Perkins, Charles	Light sources, spectrometers and detectors for continuum source atomic absorption spectrometry.	light, spectrometers, detectors, atomic, absorption, spectrometry, metals, analysis, optical, diode, electric, lamps, xenon, spectrochemical, electrothermal, lamp, detector, manganese, molybdenum, cadmium, chromium, copper	Anal. Proc. (London), 29(6), 262-4 (Eng) 1992.	SPECTROMETRY	CODEN: ANPRDI ISSN: 0144-557X.
117(10):95992v	Yamamoto, Masahiro; Tanaka, Shigeru; Hashimoto, Yoshikazu	Selective determination of trace arsenic and antimony species in natural waters by gas chromatography with a photoionization detector.	arsenic, antimony, waters, gas, chromatography, photoionization, detector, water, analysis, detection	Appl. Organomet. Chem., 6(4), 351-6 (Eng) 1992	CHROMATOGRAPHY	CODEN: AOCHEX ISSN: 0268-2605

CA NO.	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
117(8):62769j	Fitaura, Yoko; Sanayoshi, Hideji; Wada, Tomio	Spectral sensors containing pyridiniophenolate derivatives.	spectral, sensors, pyridiniophenolate, hygrometers, pyridiniophenoxide, alcohols, analysis, amides, carbonyl, carboxylic, acids, detection, spectrochemical, moisture, carbonyl, esters, ethanol, acetone	Jpn. Kokai Tokkyo Koho JP 04035758 A2 24 Feb 1992 Heisei, 4 pp. (Japan).	SPECTROMETRY	CODEN: JKXXAF, CLASS: ICM: G01N031-22 ICS: G01N021-25, G01N021-29; G01N021-41; G01N031-00; G01N031-22. APPLICATION: JP 90-140108 29 Jun 1990.
117(8):62493j	Csolk, A.; Reichert, J.; Ache, H. J.	An optical sensor for the detection of heavy metal ions.	optical, sensor, detection, metal, ions, germany, elements, analysis, metals, sensors, optrodes, mercury, cadmium, sulfonatophenyl, porphyrin, immobilized	Sens. Actuators, B, B7(1-3), 540-3 (Eng) 1992.	SPECTROMETRY	CODEN: SABCEB, ISSN: 0925-4005
117(8):78376d	Rytich, H.; Klotz, W. D.; Simon, G. G.	New evaluation methods for plutonium assay by passive neutron interrogation of barrels with heavy and heterogeneous waste.	plutonium, passive, neutron, barrels, heterogeneous, waste, germany, concrete, vermiculite, wastes, radioactive, radiation, detectors, alpha, particle, emitters, analysis, dioxide, americium, californium, polyethylene	Kernforschungszent. Karlsruhe, (Ber.) KfK, KfK 4999, 48 pp. (Ger) 1992.	RADIOCHEMICAL	CODEN: KKBKAY ISSN: 0303-4003.
117(8):74071d	Daley, P. F.; Colston, B. W., Jr.; Brown, S. B.; Langry, K.; Milanovich, F. P.	Fiber optic sensor for continuous monitoring of chlorinated solvents in groundwater: field test results.	fiber, optic, sensor, chlorinated, solvents, vadose, groundwater, lawrence, sensors, solvent, trichloroethylene, analysis, detection, water	Proc. SPIE-Int. Soc. Opt. Eng., 1587(Chem., Biochem., Environ. Fiber Sens. 3), 270-82 (Eng) 1992.	FIBER OPTIC	CODEN: PSISDG ISSN: 0277-786X.
117(6):61948c	Chudyk, Wayne; Betteron, Carol; Pohlig, Kenneth	Vapor-phase analysis of aromatic organic compounds using laser-induced fluorescence and fiber optics.	vapor, analysis, aromatic, organic, laser, fluorescence, fiber, optics, spectrometry, spectrochemical, fluorometric, water, ground, benzene, ethylbenzene, toluene	Proc. SPIE-Int. Soc. Opt. Eng., 1587(Chem., Biochem., Environ. Fiber Sens. 3), 242-9 (Eng) 1992.	FIBER-OPTIC	CODEN: PSISDG ISSN: 0277-786X.
117(4):61937a	Tabacco, Marybeth; Zhou, Quan; Nelson, Bruce	Chemical sensors for environmental monitoring	chemical, sensors, environmental, fiber, humidity, aromatic, hydrocarbons, analysis, detection, environment, optic, groundwater, air, optrodes, ethylene, hydrazine, carbon, monoxide, ammonia, water	Proc. SPIE-Int. Soc. Opt. Eng., 1587(Chem., Biochem., Environ. Fiber Sens. 3), 271-7 (Eng) 1992	FIBER-OPTIC	CODEN: PSISDG ISSN: 0277-786X
117(6):55580p	Griffin, Jeffrey W.; Olsen, Khris B.	Fiber optics spectrochemical emission sensors for chemical analysis of waters.	fiber, optics, spectrochemical, emission, sensors, chemical, analysis, waters, wastes, optic, ground, waveguides, optical, vadose, water, spectrometry	U.S. US 5085499 A 4 Feb 1992, 24 pp. (Eng).	FIBER-OPTIC	CODEN: USXXAM, CLASS: ICM: G01N021-67. ICS: G01N021-59, G01N021-49, NCL: 356311000. APPLICATION: US 88-13 2 Sep 1988.
117(8):382784	Terrettaz, Samuel; Vogel, Horst; Graetzel, Michael	Calcium(2+)-sensitive monolayer electrodes.	calcium, sensitive, monolayer, electrodes, membranes, phospholipid, ionophore, mixed, silicon, potassium, chloride, lithium, magnesium, electrolyte, admittance, analysis, detection, electrode, tetradecylcrown, silane, group, dioxide, water, insulated, chromium, gold, vapor	J. Electroanal. Chem., 326(1-2), 161-76 (Eng) 1992.	ELECTROCHEMICAL	CODEN: JECHES
117(4):25273a	Kostov, Y.	Immobilized bromophenol blue as sensing element in optical pH sensor.	immobilized, bromophenol, sensing, element, optical, sensor, sensors, ethanol, methanol, analysis, chloroform, butanol, dichloroethane, coagulant, hydrogen, ion, diacetylcellulose, membrane, spectra, immobilization	Sens. Actuators, B, B8(1), 99-104 (Eng) 1992.	SPECTROMETRY	CODEN: SABCEB, ISSN: 0925-4005
117(4):33390p	Phillippaerts, J.; Vanhoof, C.; Vanaken, E. F.	Wastewater analysis by purge and trap capillary GC-FTIR spectrometry.	wastewater, analysis, trap, capillary, spectrometry, isopropanol, acetone, butanol, propanol, butanone, ethyl, hexanol, isopropylacetate, heptanol, propylacetate, isobutylacetate, ethoxyethanol, butoxyethanol, butoxyethylacetate, butoxyethoxy, ethylacetate, heptanone, amylacetate, gas, spectrometric, detector, water, waste	Talanta, 39(6), 681-5 (Eng) 1992.	SPECTROMETRY	CODEN: TLNTA2 ISSN: 0039-9140

CA NO.	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
117(4):33261e	Zimmermann, E.; Baerch, J.; Rehm, M. J.	Distribution behavior of organic substances in water/silicone polymer systems.	organic, water, silicone, polymer, germany, partition, siloxane, fiber, optic, sensors, evanescent, absorbance, detection, propanol, analysis, chloroform, trichloroethylene, toluene, chlorobenzene, polymers	Kernforschungszent. Karlsruhe, (Ber.) KFK, KFK 4967, 63 pp. (Ger) 1991.	FIBER-OPTIC	CODEN: KKNKAY. ISSN: 0303-4003.
117(4):33279k	Satchwill, Trevor; Hargesheimer, Erika E.	Volatile hydrocarbons in distribution systems	volatile, hydrocarbons, water, wastewater, drinking, gas, photoionization, detector, dynamic, headspace, benzene, analysis, xylene, ethylbenzene, toluene	Proc. Annu. Conv.-West. Can. Water Wastewater Assoc., 42, 55-67 (Eng) 1990.	GENERAL	CODEN: PCWAEH
117(4):33274e	Bezarski, A. R.; Ridgway, R. W.; Busch, J. B.; Turhan-Sayan, G.; Miller, L. S.	Integrated optic biosensor for environmental monitoring.	integrated, optic, biosensor, environmental, fiber, sensors, optical, pollutant, water, benzene, analysis, toluene	Proc. SPIE-Int. Soc. Opt. Eng., 1587(Chem., Biochem., Environ. Fiber Sens. 3), 114-26 (Eng) 1992.	SPECTROMETRY	CODEN: PSISDG ISSN: 0277-786X
117(4):32725v	Fischer, George; Carome, Edward F.; Kubulins, Vilnis E.; Burgess, Lloyd W.	Fiber-optic hydrocarbon sensor system.	fiber, optic, hydrocarbon, sensor, gasoline, hydrocarbons, analysis, air, sensors, gas, toluene	Proc. SPIE-Int. Soc. Opt. Eng., 1587(Chem., Biochem., Environ. Fiber Sens. 3), 218-70 (Eng) 1992.	FIBER-OPTIC	CODEN: PSISDG. ISSN: 0277-786X
117(4):32724q	Edwards, Henry O.; Dakin, John P.	Measurements of cross-sensitivity to contaminant gases using a highly-selective optical-fiber-remoted methane sensor based on correlation spectroscopy.	cross, sensitivity, gases, optical, fiber, methane, sensor, spectroscopy, air, analysis, sensors, gas, optic, ethanol, methanol, ethene, dichloromethane	Proc. SPIE-Int. Soc. Opt. Eng., 1587(Chem., Biochem., Environ. Fiber Sens. 3), 250-7 (Eng) 1992.	FIBER-OPTIC	CODEN: PSISDG. ISSN: 0277-786X
117(4):32723p	Angel, S. M.; Anderson, B. L.; Langry, K.	Simple reversible fiber-optic chemical sensors using solvatochromic dyes.	fiber, optic, chemical, sensors, solvatochromic, dyes, lawrence, air, analysis, dichloromethane, xylene	Proc. SPIE-Int. Soc. Opt. Eng., 1587(Chem., Biochem., Environ. Fiber Sens. 3), 86-95 (Eng) 1992.	FIBER-OPTIC	CODEN: PSISDG. ISSN: 0277-786X.
117(3):19803a	Wilken, R. D.	Mercury analysis: a special example of species analysis.	mercury, analysis, germany, environmental, geological, sediments, soil, methylmercury, chloride, dimethylmercury, carbotrap, adsorption, water, photometric, detection	Fresenius' J. Anal. Chem., 342(10), 795-801 (Eng) 1992.	SPECTROMETRY	CODEN: FJACEV. ISSN: 0937-0633.
117(2):19584r	Lopez-Avila, Viorica; Benedicto, Janet; Baldin, Eli; Bechert, Werner F.	Analysis for compounds of environmental concern: II. Diphenyl ethers.	analysis, environmental, ethers, sawdust, soil, halogenated, nitrated, ether, gas, tubular, chromatography, analytical, chlorophenyl, nitrophenyl, fused, silica, decafluorobiphenyl, decachlorobiphenyl, dichlorodiphenyl, chlorodiphenyl, dibromodiphenyl, wastes, chlorinated, surrogate	J. High Resolut. Chromatogr., 15(3), 140-4 (Eng) 1992.	RADIOCHEMICAL	CODEN: JHRCE7 ISSN: 0935-6304
117(2):19576e	Angel, S. Michael; Vess, Thomas M.; Myrick, Michael L.	Simultaneous multi-point fiber-optic Raman sampling for chemical process control using diode lasers and a CCD detector.	fiber, optic, chemical, diode, lasers, detector, lawrence, epoxy, resins, preparation, curing, spectrometer, laser, radioactive, wastes, excitation, distillation, spectrometers	Proc. SPIE-Int. Soc. Opt. Eng., 1587(Chem., Biochem., Environ. Fiber Sens. 3), 219-31 (Eng) 1992.	FIBER-OPTIC	CODEN: PSISDG ISSN: 0277-786X.
117(2):19573v	Menahem, John M.; Burgess, Lloyd W.	Evaluation of a membrane sampling element for use in remote optical multivariate chemical analysis.	membrane, element, optical, multivariate, chemical, analysis, fiber, fibers, sensor, chlorinated, hydrocarbon, membranes, teflon, sensors, hydrocarbons, chloroform, trichloroethane, trichloroethylene, detection	Proc. SPIE-Int. Soc. Opt. Eng., 1587(Chem., Biochem., Environ. Fiber Sens. 3), 39-47 (Eng) 1992.	SPECTROMETRY	CODEN: PSISDG. ISSN: 0277-786X
117(2):19372d	Lerchi, Markus; Bakker, Eric; Rusterholz, Bruno; Simon, Wilhelm	Lead-selective bulk optodes based on neutral ionophores with subnanomolar detection limits.	bulk, optodes, neutral, ionophores, subnanomolar, detection, environmental, analysis, optode, chromoionophore, ionophore, lipophilic, anionic, membrane, polyvinyl, chloride	Anal. Chem., 64(14), 1534-40 (Eng) 1992.	ELECTROCHEMICAL	CODEN: ANCHAM. ISSN: 0003-2700. OTHER SOURCES: CJACS

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117(3):15741a	Das, S. K.; Kadam, T. P.; Gopalan, B.; Chakraborty, P. P.; Iyer, R. K.	Concentration of strontium-90 and cesium-137 in gaseous effluents.	strontium, cesium, gaseous, nuclear, reactors, radioactive, wastes, reactor, xenon, analysis, krypton	Nucl. Instrum. Methods Phys. Res., Sect. A, A314(3), 561-3 (Eng) 1992.	RADIOCHEMICAL	CODEN: NIMAER ISSN: 0168-9002.
117(3):13692m	Suzuki, Tadashi; Kimura, Maree	Manufacture of perovskite sensor devices for exhaust gas for selective detection of nitrogen monoxide.	perovskite, sensor, exhaust, gas, detection, nitrogen, monoxide, catalysts, catalysis, mixed, oxide, waste, nitric, acid, nitrates, acetates, cobalt, lanthanum, strontium, nonstoichiometric, manganese, catalyst, palladium, platinum, rhodium, oxides, analysis, gases, copper, nitrate	Jpn. Kokai Tokkyo Koho JP 03200048 A2 2 Sep 1991 Heisei, 5 pp. (Japan).	ELECTROCHEMICAL	CODEN: JKXXAF. CLASS: ICM: G01N027-12. ICS: H01C007-00. APPLICATION: JP 89-340852 28 Dec 1989
116(26):269184p	Arthur, R. J.	Calibration and operation of the PNL Barrel Assayer.	barrel, energy, radioelements, analysis, radioactive, waste, wastes, radionuclide, radiation, detectors, gamma, ray, germanium, detector	Report, PNL-7738; Order No. DE91016053. 39 pp. Avail. NTIS From: Energy Res. Abstr. 1991, 16(19), Abstr. No. 28806 (Eng) 1991.	RADIOCHEMICAL	
116(26):261403f	Cone, L.; Logan, T.; Rollins, R.	Hydrocarbon continuous monitoring systems for hazardous waste incinerator emissions measurement.	hydrocarbon, hazardous, waste, incinerator, emissions, air, pollution, hydrocarbons, incineration, heated, unheated, analysis, wastes, flame, gases	Report, EPA/600/D-91/134; Order No. PB91-213561. 33 pp. Avail. NTIS From: Gov. Rep. Announce. In (U. S.) 1991, 91(20), Abstr. No. 156,401 (Eng) 1991.	SPECTROMETRY	
116(26):260445f	Bickford, D. F.	Waste glass structures, basicity, and sensors for glass quality monitoring.	waste, glass, sensors, river, dynamics, nuclear, electrochem, vitrified, wastes, radioactive, vitrification, oxide, sensor	Ceram. Trans., 23(Nucl. Waste Manage. 4), 607-20 (Eng) 1991.	ELECTROCHEMICAL	CODEN: CETREM. ISSN: 1042-1122
115(24):267427h	Osakai, Toshiyuki; Katano, Hajime; Maeno, Yoshiyuki; Senda, Atsuyoshi	Electrochemical formation of heteropolymolybdate anions at the oil/water interface and its application to several sensors.	electrochemical, heteropolymolybdate, anions, oil, water, sensors, acids, molybdophosphates, voltammetric, sensing, phosphates, electrodes, phosphate, nitrobenzene, analysis, sensor, tetrapentylammonium, heteromolybdate, molybdate, ion	Anal. Sci., 7(Suppl., Proc. Int. Congr. Anal. Sci., 1991, Pt. 2), 1657-8 (Eng) 1991.	ELECTROCHEMICAL	CODEN: ANSCEN. ISSN: 0910-6340.
116(22):227093u	Wygnond, Stephen J.; Kallury, Krishna M. R.; Thompson, T Michael	Characterization of the polypyrrole film-piezoelectric sensor combination.	polypyrrole, piezoelectric, sensor, sensors, acoustic, wave, crystal, electrode, scanning, electronmicroscopy, polymerization, pyrrole, water, methanol, analysis, toluene, ammonia, detection, coated	Talanta, 39(4), 449-56 (Eng) 1992.	PIEZOELECTRIC	CODEN: TLNTA2. ISSN: 0039-9140
116(22):223478a	Findlay, D. J. S.; Green, T. H.; Holesworth, T. V.; Staniforth, D.; Strachan, N. R.; Hine, M. G.; Forrest, K. R.; Rogers, J. D.	Radioactive waste package assay facility. Volume 1. Application of assay technology. Characterization of radioactive waste forms. Series of final reports (1985-89). No. 40.	radioactive, waste, green, harwell, wastes, actinides, fission, cemented, nondestructive, gamma, ray, cement, radiation, detectors, integrated, accelerators, neutron, uranium, analysis, plutonium, cesium, cobalt, tin, strontium, cerium, yttrium, mercury, mixed, radionuclide	Comm. Eur. Communities, [Rep.] EUR, EUR 13070/1, 170 pp. (Eng) 1991.	RADIOCHEMICAL	CODEN: CECED9. ISSN: 0303-755X
116(22):223465v	Bailey, M.; Bunce, L. J.; Findlay, D. J. S.; Jolly, J. E.; Parsons, T. V.; Sene, M. R.; Swinhoe, M. T.	Radioactive waste package assay facility. Volume 2. Investigation of active neutron gamma interrogation. Task 3. Characterization of radioactive waste forms. A series of final reports (1985-89). No. 40.	radioactive, waste, neutron, gamma, harwell, wastes, actinides, fission, ray, cemented, nondestructive, concrete, borated, cement, accelerators, radiation, detectors, proportional, helium, detection, uranium, analysis, water, dipotassium, monohydrogen, phosphate, boron, trifluoride, thermal, flux, beryllium, energy, spectra, photoneutron, californium	Comm. Eur. Communities, [Rep.] EUR, EUR 13070/2, 233 pp. (Eng) 1991.	RADIOCHEMICAL	CODEN: CECED9 ISSN: 0303-755X
116(22):220448q	Della Betta, Ralph O.; Reed, Daniel L.; Schubert, Priscilla	Nitrogen oxides sensor assembly for analysis of flowing gases such as air.	nitrogen, oxides, sensor, analysis, flowing, gases, air, catalytic, mineral, wool, impregnated, glass, fibers, nickel, oxide, tungsten, vanadium, iron, copper, manganese, molybdenum, rubidium, ruthenium, chromium, cobalt, catalyst, cyanuric, acid	PCT Int. Appl. WO 9119975 A1 26 Dec 1991, 24 pp	GENERAL	DESIGNATED STATES: W: AU, BR, JP, KR; RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, NL, SE (Eng). CODEN: PIXXD2. CLASS: ICM: G01N033-00. ICS: G01N025-20; G01N027-00; G01N031-00; F23N007-00; B01J019-00 APPLICATION: WO 91-US4177 12 Jun 1991; PRIORITY: US 90-536080 12 Jun 1990.

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116(20):207116b	Campbell, Erin R ; Richter, Bruce E.	Thermionic ionization detection for supercritical fluid chromatography	thermionic, ionization, detection, supercritical, fluid, chromatography, salt, pesticides, analysis, soil, chromatographs, detectors, nitrogen, phosphorus, paraoxon, fenthion, polypropylene, parathion, malathion, phosmet, methoxyl, pesticide, dodecane	LC-GC, 10(1), 40, 42, 44-5 (Eng) 1992	CHROMATOGRAPHY	CODEN: LCGCET ISSN: 0888-9090
116(20):202996d	Pedersen, B ; Mage, W ; Mason, J. A	Neutron multiple correlation analysis method applied to the assay of radioactive waste	neutron, multiple, analysis, radioactive, waste, wastes, plutonium, radiation, detectors	Comm. Eur. Communities, [Rep.] EUR, EUR 13686, Proc. Symp. Safeguards Nucl. Mater. Manage., 13th, 1991, 467-72 (Eng) 1991	RADIOCHEMICAL	CODEN: CECED9 ISSN: 0303-7584
116(19):190618s	Kaneko, E ; Yotsuyanagi, T	HPLC (high performance liquid chromatography)-spectrophotometric detection system for trace metal ions fundamentals and applications	liquid, chromatography, spectrophotometric, detection, metal, ions, blood, analysis, aluminum, humans, pH, spectrophotometry, dihydroxyazobenzene, pyrocatechol, spectrochemical, metals, dental, alzheimer's, disease, humans, dialysis, photometric, elements, detector, iron, cobalt, vanadium, serum	Biomed. Res. Trace Elem., 1(2), 221-2 (Japan) 1990	SPECTROMETRY	CODEN: BRTEE5 ISSN: 0916-717X
116(18):186849a	Li, Wenchong; Qian, Haowen; Huang, Linhui; Zhang, Jianguo; Li, Qingyuan; Zhang, Zhenxia	Analytical application of photodiode array spectroscopy (PDA) in ICP-AES II. Analytical performance application of the PDA spectrometer.	analytical, photodiode, spectroscopy, spectrometer, optical, detectors, inductively, plasma, emission, spectrometers, spectrochemical, analysis, detection, aluminum, iron, manganese, potassium, praseodymium, sodium, titanium, barium, cobalt, copper, gallium, yttrium, zinc, spectrometry	Guangpuxue Yu Guangpu Fenxi, 11(6), 32-6 (Ch) 1991	SPECTROMETRY	CODEN: GYGFED
116(18):181759a	Bourne, Gary L ; Moskowitz, David M ; Bly, Walter E.; Tepple, Dale C ; Grafwallner, Ervin G.; Wickham, Ralph L ; Holtrod, Herman E ; Baker, John D	Tritium monitor and collection system	tritium, energy, computer, waste, gas, radioactive, wastes, gaseous, removal, zirconium, alloy, gases	U.S. US 5080693 A 14 Jan 1992, 12 pp (Eng)	RADIOCHEMICAL	CODEN: USXXAM CLASS: ICM B01D053 00 NCL: 055078000 APPLICATION: US 91-674961 26 Mar 1991
116(18):183133a	Nakamura, Yukio; Takiue, Makoto; Natake, Takeshi; Fujii, Haruo	Liquid scintillation analysis for pure beta-emitter mixtures by least squares method. Applied radioassay for radioactive waste solution and organic liquid waste	liquid, scintillation, analysis, beta, emitter, mixtures, least, radioassay, radioactive, waste, solution, organic, radioisotopes, wastes, radiation, detectors, particle, tritium, calcium, phosphorus, carbon	Radioisotopes, 40(12), 486-92 (Japan) 1991	RADIOCHEMICAL	CODEN: RAISAB ISSN: 0033-8303
116(18):180770e	Huber, Stefan; Frimmel, F. H	A liquid chromatographic system with multidetection for the direct determination of hydrophilic organic compounds in natural waters	liquid, chromatographic, multidetection, hydrophilic, organic, waters, germany, analysis, water, hydrophilic, carbon, nitrogen	Fresenius' J. Anal. Chem., 342(1-2), 198-200 (Eng) 1992		CODEN: FJACES ISSN: 0937-0633
116(17):169995v	Parsa, Bahman	A sequential radiochemical procedure for isotopic analysis of uranium and thorium in soil	radiochemical, isotopic, analysis, uranium, thorium, soil, energy, isotopes, soils, radium, biological, polonium, actinium	J. Radioanal. Nucl. Chem., 157(1), 65-73 (Eng) 1992	RADIOCHEMICAL	CODEN: JRNCDM ISSN: 0236-5731
116(16):165390d	Lucas, Henry F ; Markun, Frank	The determination of radium-226 and radium-228 in water and solids by the least squares gamma spectrometric method	radium, water, solids, least, gamma, spectrometric, analytical, isotopes, environmental, spectrometry, analysis, geological, sediments, plants, sludges, soil, waste, isotope, adsorbent, adsorption, potassium, ray, spectrum, actinium, radon	J. Environ. Radioact., Volume Date 1992, 15(1), 1-18 (Eng) 1991	SPECTROMETRY	CODEN: JERAEE ISSN: 0265-931X
116(16):158458d	Beeraj?, J ; Gordon, J. W ; Ache, H. J	A fiber optic evanescent field absorption sensor for monitoring organic contaminants in water	fiber, optic, evanescent, absorption, sensor, organic, water, germany, sensors, analysis, chlorinated, chloroform, methylene, chloride, trichloroethene	Fresenius' J. Anal. Chem., 342(4-5), 394-400 (Eng) 1992	FIBER-OPTIC	CODEN: FJACES ISSN: 0937-0633
116(16):158204c	Zahar?, O. F. G ; Tanaka?, B	A gamma-ray scanning device for the metrology of heavy radioactive waste containers	gamma, ray, scanning, metrology, radioactive, waste, wastes, spectrometry, radium, cesium, cobalt, germanium, radiation, detectors	Nucl. Instrum. Methods Phys. Res., Sect. A, A312(1-2), 273-7 (Eng) 1992	[illegible]	CODEN: NIMAER ISSN: 0168-9002

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116(12):120093t	Dowling, Thomas M.; Seeley, Jeffrey A.; Feuerbacher, Helmut; Uden, Peter C.	Microwave-induced plasma-atomic emission detection for organometallic gas and supercritical-fluid chromatography. Sample handling and instrument comparisons.	microwave, plasma, atomic, emission, detection, organometallic, gas, supercritical, fluid, chromatography, chromatographs, detectors, flow, torch, spectrometric, torches, water, analyses, alkyltin, sea, solid, hydrogenation, spectrometry, tin, selenium, sensitivity, chloride, tripropyl, sensitive, decamethyltetrasiloxane, dichlorooctamethyltetrasiloxane	ACS Symp. Ser., 479(Elem.-Specific Chromatogr. Detect.), Ed. Dalton, Spectro 90-104 (Eng) 1992	CHROMATOGRAPHY	CODEN: ACSMC8 ISSN: 0097-6156
116(12):119845h	Baker, M. D.; Senaratne, Chandana	Trace analyses in solution using zeolite-modified electrodes.	analysis, solution, zeolite, electrodes, alkali, metals, zeolites, amperometry, cations, water, lithium, potassium, sodium	Anal. Chem., 64(6), 697-700 (Eng) 1992	ELECTROCHEMICAL	CODEN: ANCHAM ISSN: 0003-2700 OTHER SOURCES: CJACS
114(12):119835a	Locke, D. J.; Harris, J. R.; Forch, B. E.; Miziolek, A. W.	Laser microplasma-gas chromatography detector. 2. Detection of species-specific fragment emission.	laser, microplasma, gas, chromatography, detector, detection, emission, ground, perfluorocarbons, hydrocarbons, analysis, chromatographs, detectors, carbon, tetrachloride, dioxide, monoxide	Report, BRL-TR-3163; Order No. AD-A230 373, 25 pp. Avail. NTIS From: Gov. Rep. Announce. Index (U. S.) 1991, 91(9), Abstr. No. 121,740 (Eng) 1990	CHROMATOGRAPHY	
116(11):105087n	Beauchemin, Diane; Kisiel-Thwaite, R. E.; VanLoon, G. W.; Hay, G. W.	Determination of metal-organic associations in soil leachates by inductively coupled plasma-mass spectrometry.	metal, organic, soil, leachates, inductively, plasma, spectrometry, geol, mineral, elements, leaching, humus, soils, acid, rain, forest, litter, horizon, analysis, metals, aluminum, iron, lanthanum, manganese, nickel, cadmium, copper, zinc	Chem. Geol., 95(1-2), 187-98 (Eng) 1992	SPECTROMETRY	CODEN: CHGEAD ISSN: 0009-2541
114(10):93493q	Haruyama, M.; Gotoh, M.; Kawakura, T.; Takase, H.	Nondestructive detection method of trace amount of fissile materials by using a neutron generator.	nondestructive, detection, fissile, neutron, energy, radioactive, wastes, nuclear, transuranium, elements, radiation, detectors, plutonium, analysis	KEK Proc., 1(Radiat. Detect. Their Uses), 125-34 (Eng) 1991.	RADIOCHEMICAL	CODEN: KEPREF
114(10):90318c	Stockwell, P. B.; Kahl, P.; Pattrath, M.	Monitoring elemental mercury in an urban environment.	elemental, mercury, urban, environment, air, analysis, fluorescence, gold, impregnated, sand, trapping, adsorbent	Process Control Qual., 1(4), 251-8 (Eng) 1991	SPECTROMETRY	CODEN: PCQUEJ
116(9):77820e	Chandrasena, N.; Hall, E. D.; Small, G. H.	High-performance liquid chromatographic column-switching technique for the determination of intermediates of anaerobic degradation of toluene in ground water microcosm	liquid, chromatographic, anaerobic, toluene, ground, water, microcosm, ecology, ecosystem, groundwater, metabolites, chromatography, bacteria, acid, analysis, phenol, cresol	J. Chromatogr., 587(2), 185-91 (Eng) 1991.	CHROMATOGRAPHY	CODEN: JOCRAM ISSN: 0021-9673
116(8):753326	Brown, Garrett N.; Birks, John W.; Koval, Carl A.	Development and characterization of a titanium dioxide-based semiconductor photoelectrochemical detector.	titanium, dioxide, semiconductor, photoelectrochemical, detector, aldehydes, analysis, amines, detection, flow, injection, photoelectrochem, chromatography, liquid, chromatographs, detectors, phenols, dihydric, electrolytic, tetrabutylammonium, tetrafluoroborate, electrolyte, analytes, acetonitrile, solvent, galactose, alpha, naphthol, quinoline, methylhydroquinone, acetanilide, acetaminophen, pentanone, chlorophenol, diethylamine, butanediol, pyridine, anthranilic, acid, aminoacetanilide, hydroxybenzaldehyde, propionaldehyde, dibenzofuran, acetate, phenetidine, iodobenzene, hydroxybenzyl, alcohol, diphenylfuran, diphenylisobenzofuran, ethoxybenzylidene, butylaniline, electrodes	Anal. Chem., 64(4), 427-34 (Eng) 1992.	ELECTROCHEMICAL	CODEN: ANCHAM ISSN: 0003-2700 OTHER SOURCES: CJACS
114(6):74946y	Wolfbeis, Otto S.	Introduction to fiber optic chemical sensors and biosensors.	fiber, optic, chemical, sensors, biosensors	Fiber Opt. Chem. Sens. Biosens., Volume 1, 1-23. Edited by: Wolfbeis, Otto S. CRC: Boca Raton, Fla. (Eng) 1991	FIBER-OPTIC	CODEN: 57HJAV

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114(8):61969b	Crum, S	Electron paramagnetic resonance as a method of investigating nuclear materials	electron, paramagnetic, resonance, nuclear, radioactive, wastes, radiation, detectors, thermoluminescent, uranium, isotopes, abundance, analysis, water	Rev Roum Phys, 36(10), 887-25 (Eng) 1991	RADIOCHEMICAL	CODEN: RRPQA9 ISSN 0035-4090
116(8):65599w	Nonoguchi, Minoru; Fukuda, Munehiro; Wakata, Shoji	Soil gas survey by adsorption thermal desorption/GC/PID	soil, gas, survey, adsorption, thermal, desorption, water, pollution, chlorinated, solvents, groundwater, soils, gases, photoionization, detector, tetrachloroethylene, analysis	Kogai to Taisaku, 27(12), 1213-18 (Japan) 1991	SPECTROMETRY	CODEN KOTAAH ISSN [illegible]
116(8):66141q	Robbat, Albert, Jr ; Liu, Tyng Yun; Abraham, Brian M	Evaluation of a thermal desorption gas chromatograph/mass spectrometer: on-site detection polychlorinated biphenyls at a hazardous waste site	thermal, desorption, gas, chromatograph, spectrometer, detection, polychlorinated, biphenyls, hazardous, waste, solids, sediment, biphenyl, spectrometry, soils, soil	Anal Chem, 64(4), 358-64 (Eng) 1992	CHROMATOGRAPHY	CODEN: ANCHAM ISSN 0003 2700 OTHER SOURCES CJACS
115(8):65013p	Thomson, J S ; Reynolds, J W ; Wu, T K T	The effect of degree of aromaticity and alkyl substitution of polyaromatic hydrocarbons on instrumental factors	aromaticity, polyaromatic, hydrocarbons, energy, coal, liquids, petroleum, shale, oils, polycyclic, gas, flame, ionization, detector, chromatographs, liquid, detectors, fossil, fuel, molecular, aromatic, analysis, basic, pyrene, benzene, naphthalene, carbazole, biphenyl, ethylbenzene, anthracene, dibenzofuran, dibenzothiophene, diphenylsulfide, perylene, chrysene, phenylnaphthalene, benzothiophene, hexahydropyrene, tetradecane	Polynucl Aromat Hydrocarbons: Meas, Means, Metab, Int Symp, 11th, Meeting Date 1987, 885-911 Edited by: Cooke, Marcus; Loening, Kurt; Merritt, Jay Battelle Press: Columbus, Ohio (Eng) 1991	CHROMATOGRAPHY	CODEN: 57LLAW
116(6):50400q	Baton, Maria Rose H ; Cardwell, Terence J ; Cattrall, Robert W ; Deady, Leslie W ; Murphy, Kathryn	Studies on cation selectivities of some pyridine-based ionophores for use in polymer membrane chemical sensors	cation, pyridine, ionophores, polymer, membrane, chemical, sensors, electrodes, potassium, electrode, analysis, potentiometry, mercury, silver, sulfur, ionophore, esterification, methanol, octanol, sodium, octanoate, ethanediol, methoxyethanol, triethylene, glycol, trioxaundecane, dithiol, dithiaoctane, trithiaundecane, dioxaoctane, octyloxypyridinedicarbonyl, chloride, chelidonic, acid, phosphorus, pentachloride	Aust J Chem, 44(11), 1603-13 (Eng) 1991	ELECTROCHEMICAL	CODEN: AJCHAS ISSN: 0004 9425
116(6):47818b	Roschel, D ; Merdel, H	Measurement of low-level radioactivity in environmental samples by gamma-ray spectrometry	radioactivity, environmental, gamma, ray, spectrometry, phragmites, bioindicator, environment, bioindicators, radiochemical, analysis, emission, cesium, cobalt, potassium, beryllium, radium, thorium	Appl Radiat Isot, 43(1-2), 49-60 (Eng) 1992	SPECTROMETRY	CODEN: ARISEF ISSN: 0883-2889
116(2):17627x	Khan, H M ; Tufail, M ; Tahseen, R ; Din, M A ; Hanif, Ansari, F ; Rao, M I ; Wang, Y L ; Guo, S L ; Tabassum, A	Environmental radioactivity in Dera Ismail Khan and its adjacent area-Pakistan	environmental, radioactivity, ismail, adjacent, soil, analysis, gamma, ray emitting, radionuclides, air, radon, radioelements, thorium, uranium, water	Nucl Tracks Radiat Meas, 19(1-4), 761-4 (Eng) 1991	RADIOCHEMICAL	CODEN NTRMDS ISSN 0735-245X
116(5):36119y	Akgerman, Aydin; Erkey, Can; Ghoreishi, Seyyed M	Supercritical extraction of hexachlorobenzene from soil	supercritical, extraction, hexachlorobenzene, soil, analysis, carbon, dioxide, adsorption, fluid, ethylene	Ind Eng Chem Res, 31(1), 333-9 (Eng) 1992	GENERAL	CODEN IECRED ISSN 0888 5885 OTHER SOURCES CJACS

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114(4):33594w	Lopez-Avila, Viorica; Benedicto, Janet; Baldin, Enz; Beckert, Werner F	Analysis of classes of compound of environmental concern: I. Nitroaromatic compounds	analysis, environmental, nitroaromatic, soil, nitrogen, detector, gas, chromatography, aromatic, dinitrobenzene, xylene, pentachloronitrobenzene, nitrotoluene, nitrobenzene, dichloronitrobenzene, hexachlorobenzene, dinitrotoluene, nitrobenzotrifluoride, naphthoquinone, bromopentafluorobenzene, dinitrobenzotrifluoride, dinitronaphthalene, pentachlorobenzene, dibromotoluene, tribromobenzene, tetrabromobenzene, trifluralin, benfluralin, dibromobiphenyl, trichloronitrobenzene, dichlorobenzene, pentabromotoluene, profluralin, dinitramine, butralin, isopropalin, penoxalin	J. High Resolut. Chromatogr., 14(9), 601-7 (Eng) 1991	GENERAL	CODEN: JHRCE7 ISSN: 0935-6304
114(4):33622t	Stockwell, Peter B.; Grillo, Angelo C	Applications of a mercury-vapor atomic fluorescence detector	mercury, vapor, atomic, fluorescence, detector, spectroscopy, sensors, sand, gold, impregnated, air, analysis, gas, water	Spectroscopy (Eugene, Oreg.), 6(7), 39-41 (Eng) 1991	SPECTROMETRY	CODEN: SPECET ISSN: 0887-6703
115(2):12251j	Gallardo, M.; Jimenez, R.; Lerta, L.; Moreno, M.; Seidel, J. L.; Morin, J. P.	Assessment of the effect of environmental factors on radon concentration in soils	environmental, radon, soils, soil, pollution, health, physics, analysis	Nucl. Tracks Radiat. Meas., 19(1-4), 369-73 (Eng) 1991	GENERAL	CODEN: NTRMDV ISSN: 0735-245X
114(2):10934e	Robbins, Gary A	Apparatus and method for measuring volatile constituents in soil samples	apparatus, volatile, constituents, soil, groundwater, analysis, water, ground	U.S. US 5050425 A 24 Sep 1991, 6 pp (Eng)	GENERAL	CODEN: USXXAM CLASS: ICM: G01N001/10 ICS: G01N033-24 NCL: 073019100 APPLICATION: US 89-446517 6 Dec 1989
115(26):272097d	Baldi, Franco; Semplici, Franca; Filippelli, Marco	Environmental applications of mercury resistant bacteria	environmental, mercury, bacteria, water, air, soil, pollutant, pseudomonas, putida, methylmercury, hypnum, cupressiforme, bioindicator, biological	Water, Air, Soil Pollut., 56, 465-75 (Eng) 1991	CHROMATOGRAPHY	CODEN: WAPLAC ISSN: 0049-6979
115(24):265537n	Kwiatkowski, Adam; Witkiewicz, Zygfryd	The dynamics of piezoelectric sorption detectors with liquid crystals as coating materials	dynamics, piezoelectric, sorption, detectors, liquid, crystals, coating, detector, coated, detection, benzene, electric, apparatus, piezo, crystal, samples, dichlorobenzene, nitrobenzene, analysis, cholesteryl, carbonate	Chem. Anal. (Warsaw), 35(1-3), 479-92 (Pol) 1990	PIEZOELECTRIC	CODEN: CHANAJ ISSN: 0009-2223
115(24):265534a	Scott, Les; Kalsi, Amarjit; Cumming, Susan; Thombs, Dave	Approach to the computer aided interpretation of spectra produced on a diode array system	computer, spectra, diode, feldspar, minerals, iron, ores, analysis, photodiode, detectors, spectrochemical, bauxite, steel, gas, metal, white, zircon, aluminum, iridium, lanthanum, lithium, magnesium, manganese, mercury, molybdenum, neodymium, nickel, niobium, osmium, palladium, platinum, potassium, praseodymium, rhenium, rhodium, rubidium, ruthenium, samarium, scandium, silicon, silver, sodium, strontium, tantalum, technetium, terbium, tellurium, thorium, thulium, tin, titanium, tungsten, antimony, arsenic, barium, beryllium, boron, cadmium, carbon, cerium, cesium, chromium, cobalt, copper, erbium, europium, gadolinium, gallium, germanium, gold, hafnium, holmium, uranium, vanadium, ytterbium, yttrium, zinc, zirconium, bismuth, calcium, indium, phosphorus, selenium	Anal. Proc. (London), 28(7), 224-31 (Eng) 1991	SPECTROMETRY	CODEN: ANPRDI ISSN: 0144-557X

CA NO	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
115(24):260385b	Forster, Robert J.; Cadogan, Aodhmar; Diaz, Martin Telting; Diamond, Dermot; Harris, Stephen J.; McKervey, M Anthony	Calixarenes as active agents for chemical sensors.	calixarenes, agents, chemical, sensors, diamond, ionophores, alkali, metal, electrodes, metals, analysis, potentiometric, computer, electrode, cyclophanes, ion, complexes, provide, crosstalk, potassium, sodium, cesium	Sens. Actuators, B, B4(3-4), 325-31 (Eng) 1991	ELECTROCHEMICAL	CODEN: SABCEB ISSN: 0925-4005
115(22):238596a	Hackfort, Helmut; Zajc, Adam; Borchardt, Joachim	Continuous monitoring of emissions of polycyclic aromatic hydrocarbon (PAH)-and micro-PAH-coated submicron combustion aerosols.	emissions, polycyclic, aromatic, hydrocarbon, coated, submicron, combustion, aerosols, wastes, hazardous, incineration, flue, gases, aerosol, sensor, incinerator, waste, hydrocarbons, analysis, anthracene, phenanthrene, fluorene, pyrene, benzo, fluoranthene, chrysene, nitroanthracene, nitropyrene	Int. Annu. Conf. ICT, 22nd(Combust. React. Kinet.), 31/1-31/14 (Ger) 1991	ELECTROCHEMICAL	CODEN: IACIEQ
115(20):222435t	Kirshen, Norman; Almasi, Elisabeth	The automated determination of volatile organic contaminants in ambient air and/or soil gas by gas chromatography with selective detectors	automated, volatile, organic, ambient, air, soil, gas, chromatography, detectors, analysis, gases, automation, carbon, tetrachloride, chloroform, benzene, trichloroethane, vinyl, chloride, methylene, trichloroethene, dibromoethane, dichloroethane, tetrachloroethene	J. High Resolut. Chromatogr., 14(7), 484-9 (Eng) 1991	CHROMATOGRAPHY	CODEN: JHRCE7 ISSN: 0935-6304
115(20):222379m	Wang, Dinglan; Liu, Jun; Sun, Danyun	Study on the cesium source used in thermionic detector for gas chromatography.	cesium, thermionic, detector, gas, chromatography, chromatographs, detectors, rubidium	Gaodeng Xuexiao Huaxue Xuebao, 12(3), 319-21 (Chi) 1991	CHROMATOGRAPHY	CODEN: KTHPDM ISSN: 0251-0790
115(20):222225q	Ballestra, S.; Gastaud, J.; Lopez, J. J.	Radiochemical procedures used at IAEA-ILMR Monaco for measuring artificial radionuclides resulting from the Chernobyl accident.	radiochemical, Monaco, artificial, radionuclides, accident, energy, man, nuclear, reactors, accidents, environmental, radioactivity, radioactive, fallout, transuranium, elements, environment, algae, analysis, air, biota, ecological, geological, sediments, seaweed, soil, radioelement, cesium, cobalt, manganese, zirconium, niobium, lanthanum, plutonium, tellurium, americium, iodine, barium, cerium, water, sea, rain	Low-Level Meas. Man-Made Radionuclides Environ., Proc. Int. Summer Sch., 2nd, Meeting Date 1990, 395-415, Edited by: Garcia-Leon, Manuel; Madurga, Gonzalo. World Sci.: Singapore, Singapore. (Eng) 1991.	RADIOCHEMICAL	CODEN: 57IOAQ
115(20):222084n	Cui, Hongbo; Sun, Junyan	Potassium-sodium-chloride integrated microconduits in a potentiometric analytical system.	potassium, sodium, chloride, integrated, microconduits, potentiometric, analytical, blood, analysis, soil, tubular, flow, ion, electrodes, potentiometry, pipes, tubes, water, serum	Talanta, 38(9), 989-93 (Eng) 1991	ELECTROCHEMICAL	CODEN: TLNTA2 ISSN: 0039-9140
115(20):222073h	Xu, Chaonan; Tamaki, Jun; Miura, Norio; Yamazoe, Noboru	Grain size effects on gas sensitivity of porous tin dioxide-based elements.	grain, gas, sensitivity, porous, tin, dioxide, elements, particle, sintered, sensor, analysis, crystallite, semiconductor, sensors, ethyl, alcohol, isobutane, carbon, monoxide, hydrogen, aluminum, antimony, dopant	Sens. Actuators, B, B3(2), 147-55 (Eng) 1991	ELECTROCHEMICAL	CODEN: SABCEB ISSN: 0925-4005
115(20):216903m	Loomis, G. G.; Holman, C. W.	Rapid monitoring for transuranic contamination during buried waste retrieval.	transuranic, buried, waste, air, pollutant, elements, transuranium, health, physics, gamma, ray, spectrometry, radioactive, wastes, underground, plutonium, isotopes, uranium, americium, alpha, particle	Waste Manage. (Tucson, Ariz.) [Vol. 1], 721-6 (Eng) 1991.	RADIOCHEMICAL	CODEN: 59NMAH. ISSN: 0275-8194
115(20):213780j	Zur Megede, Detlef	Combination of electrochemical gas sensors with chemical reactors	electrochemical, gas, sensors, chemical, reactors, air, analysis, ammonia, hydrocarbon, detection, amperometric, fuel, gases, catalytic, oxide, amperometry, detectors, toxic, palladium, platinum, rhodium, catalysts, dichloromethane, pyrolysis, phosgene, hydrochloric, acid, chlorine, sensor	Sens. Actuators, B, B4(3-4), 373-6 (Eng) 1991	ELECTROCHEMICAL	CODEN: SABCEB ISSN: 0925-4005
115(18):193881d	Murr, J	New aspects in the identification of petroleum-derived oil products in water and soil samples by [modern] chromatographic methods.	aspects, petroleum, oil, water, soil, chromatographic, chromatography, environmental, hydrocarbon, oils, analysis, liquid	Gewaesserschutz, Wasser, Abwasser, 111(Indikatoren [illegible]), 415-35 (Ger) 1989	CHROMATOGRAPHY	CODEN: GWABDD ISSN: 0342-6068

CA NO	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
115(10):104951w	Arma-Asare, O. A.; Ogdsahpo, T. P. T.	4-Chloro-1,2-diaminobenzene as neutral carrier for selenium in selenium ion selective electrode.	diaminobenzene, neutral, selenium, ion, electrode, electrodes, chlorodiaminobenzene, chlorobenzene, potentiometric, analysis	Ghana J. Chem., 1(3), 172-5 (Eng) 1990.	ELECTROCHEMICAL	CODEN: GJCHEU ISSN: 0855-0484
115(18):190046n	Radic, N.	Ion-selective electrode sensitive to mercury(II) ions.	ion, electrode, sensitive, mercury, ions, electrodes, potentiometric, analysis	Glas. Hem. Tehnol. Maked., 7, 37-45 (Eng) 1989	ELECTROCHEMICAL	CODEN: GHTMDD ISSN: 0350-0136
115(16):173797m	Johansen, Neil G.; Legier, Marianne; Matte, Richard S.	New sulfur-selective detector for gas chromatography: principles of operation and applications.	sulfur, detector, gas, chromatography, odor, odorous, chemiluminescence, detection, odorant, petroleum, propylene, analysis, carbonyl, sulfide, thiophene, benzene, ozone	Adv. Instrum. Control, 45(Pt. 1), 419-29 (Eng) 1990	CHROMATOGRAPHY	CODEN: AINCEY.
115(16):173700n	Lowell, James R., Jr.; Edlund, David J.; Friesen, Dwayne T.; Rayfield, George W.	Sensor with a mechanochemically responsive polymeric film.	sensor, mechanochemically, polymeric, metals, analysis, polyamines, amines, environmental, polymer, acid, chlorides, cyanates, sulfonates, polysulfones, siloxanes, silazanes, amine, polyoxyalkylenes, carboxylic, acids, salts, iron, barium, cadmium, chromium, copper, hydrogen, ion, hydroxide, water, sorbitol, propanetriol, mannitol, propenoic, esters, polymers, inositol, benzenedicarbonyl, dichloride, ethylenediamine, ethanediol, diethylenetriamine, adipoyl, chloride, hexanediamine, acrylic, malonyl, trimesoyl, polyethylene, acrylic, polypropylene, methacrylic, phenylenediamine, phenylene, diisocyanate	U.S. US 5028394 A 2 Jul 1991, 20 pp. (Eng).	PIEZOELECTRIC	CODEN: USXXAM. CLASS: ICM: G01N019-00 ICS: G01N019-10, G01N027-04, NCL: 422098000 APPLICATION: US 90-509012 13 Apr 1990
115(16):173575n	Czolk, R.; Reichert, J.; Ache, H. J.	An optical sensor for the detection of cadmium(II) ions.	optical, sensor, detection, cadmium, ions, absorption, spectra, analysis, divalent, tridodecylmethylammonium, chloride, membrane	Sens. Actuators, A, A26(1-3), 439-41 (Eng) 1991.	FIBER-OPTIC	CODEN: SAAPEB ISSN: 0924-4247
115(16):173492h	Taylor, R. G.	The use of electrochemical oxygen sensors in the liquid alkali metals. An assessment.	electrochemical, oxygen, sensors, liquid, alkali, metals, harwell, energy, thermodynamics, electrochem, nuclear, reactors, coolants, cooling, analysis, yttrium, sesquioxide, thoria, zirconia, thorium, dioxide, zirconium, yttria, lithium, potassium, rubidium, cesium	U. K. At. Energy Auth., Harwell Lab., [Rep.] AERE-R, AERE R 13819, 16 pp. (Eng) 1990	ELECTROCHEMICAL	CODEN: UKRDAQ ISSN: 0435-4714
115(14):144186b	Angel, S. M.; Langry, K.; Roe, J.; Colston, B. W., Jr.; Daley, P. F.; Milanovich, F. P.	Preliminary field demonstration of a fiber-optic TCE sensor.	preliminary, fiber, optic, sensor, [illegible], optical, detectors, chloroform, trichloroethylene, groundwater, analysis, water, ground	Proc. SPIE-Int. Soc. Opt. Eng., 1368(Chem., Biochem., Environ. Fiber Sens. 2), 98-104 (Eng) 1991.	FIBER-OPTIC	CODEN: PSISDG ISSN: 0277-786X.
115(15):165656s	Toss, Emma	Instrumentation for waste management	waste, health, hazardous, disposal, wastes, population, protection, hygiene	B.A., Inf. Ambientale, 13(3), 45-7 (Ital) 1989	GENERAL	CODEN: [illegible] ISSN: 0393-6956.
115(16):163227e	Cervelle, Bernard	Application of mineralogical constraints to remote sensing.	mineralogical, sensing, mineral, nickel, ores, spectra, garnierite, goethite, infrared, spectrometry, reflection, diffuse, ore, absorption, signatures	Eur. J. Mineral., 3(4), 677-88 (Eng) 1991.	SPECTROMETRY	CODEN: EJMIER. ISSN: 0935-1221.
115(15):144524s	Silver, Jack; Richwood, Kenneth Ralph; Ahmet, Mustafa Tahsin	Gas sensors and compounds suitable for these sensors.	gas, sensors, silver, analysis, metal, macrocycles, rare, earth, metals, macrocyclic, chlorine, detection, carbon, tetrachloride, chloroform, dichloromethane, bromobenzene, chlorobenzene, hydrogen, sulfide, sensor, macrocycle, phthalocyanine, tetrabenzoporphyrin	PCT Int. Appl. WO 9107658 A1 30 May 1991, 26 pp.	SPECTROMETRY	DESIGNATED STATES: W: JP, US; RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, NL, SE. (Eng). CODEN: PIXX[illegible] CLASS: ICM: G01N031-22. ICS: G01N021-78; G01N027-12 APPLICATION: WO 90-GB1706 7 Nov 1990 PRIORITY: GB 89-25244 8 Nov 1989; GB 89-25245 8 Nov 1989; GB 90-1036 18 Jan 1990.

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115(14):145516y	Budnikov, G K ; Medyantseva, E P ; Babkina, S S	An enzyme amperometric sensor for toxicant determination	enzyme, amperometric, sensor, toxicant, electrochem, pesticides, toxins, electrodes, toxin, metals, analysis, nitrocellulose, cholinesterase, immobilized, chlorophos, [illegible], thallium, cadmium, copper, bismuth, [illegible]	J Electroanal Chem Interfacial Electrochem , 310(1-2), 49-55 (Eng) 1991	ELECTROCHEMICAL	CODEN JEIEBC ISSN: 0022-0728
115(14):149490u	Kicinski, H G ; Adamek, S ; Kettrup, A	Solid-phase extraction and HPLC determination of PAH in drinking water, soil, and waste oil	solid, extraction, drinking, water, soil, waste, oil, analysis, polycyclic, hydrocarbon, chromatography, liquid, environmental, wastes, aromatic, hydrocarbons	Labmed -Biotechnol , 7(2), 65-72 (Ger) 1990	SPECTROMETRY	CODEN: [illegible] ISSN 0934 [illegible]
115(14) 149533q	Uehara, Kaku; Kawai, Kenichi; Kouyama, Tsutomu	Oriented purple membrane as an ether sensor	purple, membrane, ether, sensor, photoelectric, halobacterium, halobium, gold, ethers, analysis	Osaka Kogyo Gijutsu Shikensho Kiho [illegible] Kagaku, 59(12), 1132 5 (Eng) 1990	ELECTROCHEMICAL	CODEN: DKOHAZ ISSN 0364 [illegible]
115(14):145383q	Lane, Edward H ; Kessler, Genevieve B ; Becker, Barry A	Determination of uranium and thorium concentrations in unprocessed soil samples	uranium, thorium, soil, health, analysis, cobalt, ray, fluorescence, [illegible]	Health Phys , 61(2) 231-43 (Eng) 1991	RADIOCHEMICAL	CODEN: HLTPAO ISSN: 0017-9078
115(14):148179q	Huang, Dapei; Liu, Li; Fu, Yingchi; Xia, Yun; Chang, Wendong; Yu, Dawei; Shi, Zujian; Han, Zhen; Fang, Jinming; Wang, Xiaia	Combination lead ion-selective electrode with low output resistance and its application	ion, electrode, air, analysis, potentiometry, wheat, seedlings, electrodes, pharmaceutical, banlangen, silver, nitrate, hydrogen, sulfide, water	Fenxi Huaxue, 19(1), 270-4 (Ch) 1991	ELECTROCHEMICAL	CODEN: FHHHDT ISSN: 0253 3820
115(14):144670t	Simmonds, S M ; Sprinkle, J K , Jr ; Hsue, S T ; Kellogg, M P	Nondestructive assay of plutonium bearing scrap and waste with the advanced segmented gamma-ray scanner	nondestructive, plutonium, bearing, scrap, waste, advanced, segmented, gamma, ray, scanner, radioactive, wastes, radiation, detectors, analysis	Nucl Mater Manage , 19, 425-8 (Eng) 1990	RADIOCHEMICAL	CODEN: NUMMDS ISSN: 0362-0034
115(14):144658h	Solomon, D R ; O'Rourke, P E ; Van Hare, D R	Online analytical systems for the Uranium Solidification Facility at SRS.	analytical, uranium, solidification, river, nuclear, reactor, fuel, radioactive, wastes, radiation, detectors, alpha, particle, scintillation, zinc, sulfide, mylar, scintillator, xenon, fiber, optic, lamp, multiplexed, absorption, spectrophotometers, chloride, uranyl, nitrate, solid, polyvinyl, toluene, plastic, preparation	Nucl Mater Manage , 19, 416-20 (Eng) 1990	SPECTROMETRY	CODEN NUMMDS ISSN: 0362 0034
115(14):141448h	Tarhinger, Stefan; Goepel, Wolfgang; Stetter, Joseph R	Detection of halogenated and other hydrocarbons in air: response functions of catalyst/electrochemical sensor systems.	detection, halogenated, hydrocarbons, air, catalyst, electrochemical, sensor, analysis, hydrocarbon, catalytic, electrochem, sensors, oxidation, catalysts, platinum, amperometric, gas, oxide, formaldehyde, benzene, perchloroethylene, carbon, monoxide	Sens Actuators, B B4(3-4), 327-43 (Eng) 1991	ELECTROCHEMICAL	CODEN: SABCEB ISSN 0925 4005
115(14):139819h	Hafez, A F ; Hussein, A M ; El-Khatib, A M ; Abdel-Naby, A	Effective radium content in Egyptian soil by CR-39 and LR-115 plastic nuclear track detectors	radium, egyptian, soil, plastic, nuclear, track, detectors, egypt, analysis, sealed, tubes, radiation, alpha, particle, sensitivities	Isotopenpraxis 27(4), 185-8 (Eng) 1991	RADIOCHEMICAL	CODEN: IPRXAV ISSN 0021-1915
115(12):135807v	Thompson, Michael; Stone, David C ; Nisman, Rozalia	Response selectivity of etched surface acoustic wave sensors	acoustic, wave, sensors, vapors, sensor, vapor, detection, crystal nitrobenzene, analysis, aminopropyltriethoxysilane	Anal Chim Acta, 248(1), 143-53 (Eng) 1991	PIEZOELECTRIC	CODEN: ACACAM ISSN 0003 2670 OTHER SOURCES: CJELSEVIER
115(12):125933z	Koshiishi, Kiyoshi; Shinohara, Etsuo; Shimomura, Masatsugu	Optical sensor from a thin membrane of an ion-complex material having an ion compound for analyzing solutions	optical, sensor, membrane, ion, ionic, analyzing, solutions, dyes, cyanine, nitrides, oxides, oxonol, rhodamine, lithium, analysis, magnesium, potassium, sodium, calcium, amine, hydrohalide, salts, polymers, aluminum, oxide, valinomycin, dimethyldioctylammonium, bromide, dimethyldioctadecylammonium, silicon, carboxymethyl, cellulose, sulfate, salt, dextran, polystyrene, sulfonate, nitride, polyvinyl, ethylvinylpyridinium, tantalum, octadecylrhodamine	Eur Pat Appl EP 424703 A2 2 May 1991, 30 pp	SPECTROMETRY	DESIGNATED STATES R DE, GB (Eng) CODEN: EPXXDW CLASS: ICM: G01N021-64 ICS: G01N021-77 APPLICATION: EP 90-119048 4 Oct 1990 PRIORITY JP 89-259611 4 Oct 1989

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115(12):123080p	Edelson, M. C.; Winge, R. K.; Eckels, D. E.; Douglas, J. G	High-resolution inductively coupled plasma-atomic emission spectroscopy applied to problems in nuclear waste management.	inductively, plasma, atomic, emission, spectroscopy, nuclear, waste, actinides, fission, radioactive, wastes, spectrochemical, analysis, glass, oxide, vitrified	Nucl. Water Manage., 19, 964-9 (Eng) 1990	SPECTROMETRY	CODEN: [illegible] ISSN: 0162 0016
115(12):119648j	Tsuru, Junji; Toshimoto, Hiroko; Takeshita, Isamu; Kojo, Tomohiro	Determination of trichloroethylene by gas chromatography using autosampler.	trichloroethylene, gas, chromatography, analysis, tetrachloroethylene, groundwater, wastewater, head, space, water, ground	Saga-ken Kogai Senta Shoho, Volume Date 1988-1989 (9), 94 6 (Japan) 1990.	CHROMATOGRAPHY	CODEN: [illegible] ISSN: 0910-0399
115(12):119573x	Cammann, Karl; Dette, Rolf; Hagel, Wolfgang; Sander, Juergen	Groundwater monitoring with chemical sensors	groundwater, chemical, sensors, nitrate, analysis, ammonium, water, ground	Umwelt, 21(6), 321 2 (Ger) 1991	ELECTROCHEMICAL	CODEN: UMWLOA ISSN: 0041-6355
115(12):119518j	Lunenberg, Anne; Davis, Robert; Robinson, David	Hazardous waste site measurements of low levels of chlorinated hydrocarbons using a portable chromatograph	hazardous, waste, chlorinated, hydrocarbons, portable, gas, chromatograph, hazard, analysis, wastes, hydrocarbon, carbon, tetrachloride, chloroform, trichloroethene, bromomethane, chloromethane, chloroethene, methylene, chloride, dichloroethylene	Hazard. Mater. Control, 4(3), 42-6 (Eng) 1991	CHROMATOGRAPHY	CODEN: HMCOEF ISSN: 0895-3260
115(10):101325h	Berg, J. M.; Tait, C. D.; Morris, D. E.; Woodruff, W. H	Actinide speciation by photothermal spectroscopies: instrumentation development.	actinide, photothermal, spectroscopies, waste, radioactive, wastes, spectroscopy, computer, actinides, spectrometry, photoacoustic, hydrochloric, acid, spectra, trivalent, neodymium, ions, carbonate, spectrum, tetravalent, plutonium	Mater. Res. Soc. Symp. Proc., 212(Sci. Basis Nucl. Waste Manage. 14), 531-8 (Eng) 1991	SPECTROMETRY	CODEN: MRSPDH ISSN: 0272-9172
115(8):84318p	Reichert, J.; Czolk, R.; Wollien, M.; Ache, H. J	Chemical sensors in environmental analysis: ammonium and cadmium sensors.	chemical, sensors, environmental, analysis, ammonium, cadmium, optrodes, rubber, silicone, bromocresol, green, bromophenol, porphyrins, optrode, water, spectrophotometric, vinylacetate, membrane, waters, epoxy, tetrakis, carboxyphenol, porphyrin	NATO ASI Ser., Ser. G, 23(Met. Speciation Environ.), 295-311 (Eng) 1990	ELECTROCHEMICAL	CODEN: NASGEJ ISSN: 0258-1256
115(4):63789q	Sotnikov, E. E.	Use of gas chromatography for monitoring of toxic substances in gaseous media and wastewaters.	gas, chromatography, toxic, gaseous, wastewaters, aromatic, hydrocarbons, analysis, plastics, environmental, sorption, polycarbonates, preparation, polysulfones, air, pollutant, plastic, acetone, chloroform, benzene, methanethiol, ethanethiol, methylene, chloride, dimethylsulfide, naphthalene, xylene, dichlorobenzene, dimethylphenol, butylphenol, carbonate, toluene, chlorobenzene, phenol, thiophene, heptane, disulfide, sulfur, dioxide, water, waste	Plast. Massy (2), 43-5 (Russ) 1991	CHROMATOGRAPHY	CODEN: PLMSAI ISSN: 0554-2901
115(6):63510e	Savvin, S. B.; Trutneva, L. M.; Shvoeva, O. P.; Efendieva, K. A.	Mercury sensor based on immobilized 4-phenolazo-3-aminorhodanine (IHPAAR)	mercury, sensor, immobilized, phenolazo, aminorhodanine, geochem, acrylic, fibers, cation, exchanger, phenylazoaminorhodanine, diffuse, reflection, spectrophotometry, polymer, reagents, analysis, acrylonitrile, water, spectrophotometric	Zh. Anal. Khim., 46(4), 789-93 (Russ) 1991	SPECTROMETRY	CODEN: ZAKHA8 ISSN: 0044-4502
115(8):83580b	Kamata, Satsuo; Onoyama, Kazuhiro	Lead-selective membrane electrode using methylene bis(diisobutyldithiocarbamate) neutral carrier	membrane, electrode, methylene, diisobutyldithiocarbamate, neutral, electrodes, thiocarbamate, nitrophenyl, ether, plasticizer, ion, potentiometric, analysis, tetramethylene, dibromide, diisobutylamine, carbon, disulfide, hydroxide, sodium	Anal. Chem., 63(13), 1295-8 (Eng) 1991	ELECTROCHEMICAL	CODEN: ANCHAM ISSN: 0003-2700 OTHER SOURCES: CJACS

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115(5):48212r	Andolina, Jean; Guillitte, Olivier	A methodological approach of soils sampling and analyses in the study of radionuclides transfers in forest ecosystems.	methodological, soils, analyses, radionuclides, forest, ecosystems, soil, pollution, methods, humus, humic, cesium, radioisotopes, ammonium, acetate, radiation, detector, flame, photometer, radioelements, analysis, polluted, extractants, radiocesium	Transfer Radionuclides Nat. Semi-Nat. Environ., [Proc. Workshop], Meeting Date 1989, 161-8 Edited by: Desmet, Gilbert; Nassimbeni, Paolo; Belli, Maria. Elsevier: London, UK. (Eng) 1990.	SPECTROMETRY	CODEN: 56ZTA9
115(4):41094r	Barnard, Steven M.; Walt, David R	Fiber-optic organic vapor sensor.	fiber, optic, organic, vapor, sensor, volatile, groundwater, soil, fluorescence, gasoline, fluorometers, portable, optical, fibers, sensors, soils, analysis, siloxanes, silicones, spectrochemical, fluorometric, aromatic, hydrocarbons, monocyclic, fluorophor, immobilized, silicone, polymer, water, ground	Environ. Sci. Technol., 25(7), 1301-4 (Eng) 1991	FIBER-OPTIC	CODEN: ESTHAG ISSN: 0013-936X OTHER SOURCES: CJACS
115(3):21255v	Locke, Randy J.; Morris, Jeffrey B.; Forch, Brad E.; Miziolek, Andrzej W.	Ultraviolet laser microplasma-gas chromatography detector: detection of species-specific fragment emission.	laser, microplasma, gas, chromatography, detector, detection, emission, ground, chromatographs, detectors, spectrometric, carbon, tetrachloride, analysis, methanol, chloroform, benzene, methane, propane, tetrafluoride, dioxide, fluorobenzene, monoxide	Appl. Opt., 29(33), 4987-92 (Eng) 1990.	CHROMATOGRAPHY	CODEN: APOPAI; ISSN: 0003-6935
115(2):23076n	Kamata, Satsuo; Onoyama, Kazuhiro	Methylene bis(diisobutyldithiocarbamate) neutral carrier as lead sensing material.	methylene, diisobutyldithiocarbamate, neutral, sensing, electrodes, potentiometric, analysis, ion, electrode, tetramethylene, carbon, disulfide, diisobutylamine, sodium, hydroxide, dibromide, methylenedibromide	Chem. Lett. (4), 655-8 (Eng) 1991.	ELECTROCHEMICAL	CODEN: CMLTAG; ISSN: 0366-7022
114(26):253697y	Lowry, F. C.; Ridley, M. N.	In situ detection of organic molecules: optrodes for TCE (trichloroethylene) and chloroform.	detection, organic, molecules, optrodes, trichloroethylene, chloroform, laucenes, energy, optical, detectors, groundwater, volatile, water, analysis, ground, sensors	Report, UCRL-21213; Order No. DE90011085, 40 pp. Avail. NTIS From: Energy Res. Abstr. 1990, 15(17), Abstr. No. 38782 (Eng) 1990.	FIBER-OPTIC	
114(26):253478u	Nakamura, Eiichi; Tanaka, Hiroshi	Biosensor for BOD measurement.	biosensor, trapezoid, saccharomyces, cerevisiae, trichosporon, cutaneum, biosensors, biochemical, oxygen	Gesuido Kyokaishi, 28(324), 96-99 (Japan) 1991.	ELECTROCHEMICAL	CODEN: GKKSAG; ISSN: 0021-4639
114(23):227925f	Sayekar, H. S.; Sellers, P. A.	Instrumental activation analysis of agricultural soils in Maharashtra State (India) by a californium-252 neutron source.	activation, analysis, agricultural, soils, maharashtra, californium, neutron, soil, mineral, elements, radiochemical, aluminum, manganese, potassium, sodium	Appl. Radiat. Isot., 42(3), 275-8 (Eng) 1991.	RADIOCHEMICAL	CODEN: ARISEF; ISSN: 0883-2889.
114(22):217444v	Di Gennaro, M. N.; Walker, C. G. H.; Love, D.; Preston, M.	A UHV compatible Si(Li) x-ray detector.	ray, detector, electron, radiation, detectors, vacuum, silicon, lithium, aluminum, copper, spectra	Inst. Phys. Conf. Ser., 98(EMAG-MICRO 89, Vol. 1), 551-4 (Eng) 1990.	GENERAL	CODEN: IPCSEP ISSN: 0951-3248
114(22):216478g	Bronson, Frazier L.	Q2-a very low level quantitative and qualitative waste assay and release certification system.	waste, gamma, ray, spectroscopy, radioactive, wastes, germanium, sodium, iodide, radiation, detectors, spectroscopic	Proc. Symp. Waste Manage., (Waste Manage. 90, Vol. 2), 407-12 (Eng) 1990	RADIOCHEMICAL	CODEN: PSWMDY; ISSN: 0275-6196
114(22):216041k	Hable, M.; Stern, C.; Asowata, C.; Williams, K.	The determination of nitroaromatics and nitramines in ground and drinking water by wide-bore capillary gas chromatography.	nitroaromatics, nitramines, ground, drinking, water, bore, capillary, gas, chromatography, trinitrotoluene, dinitrotoluene, cyclotrimethylenetrinitramine, cyclotetramethylenetetranitramine, groundwater, analysis, nitroarom, nitramine	J. Chromatogr. Sci., 29(4), 131-5 (Eng) 1991.	CHROMATOGRAPHY	CODEN: JCHSBZ ISSN: 0021-9665
114(22):214003a	Wachter, E. A.; Moore, J. W.; James, D. R.; Dumonge, K. M.; Farrell, P. L.; Vo Dinh, Tuan	Advances in surface-enhanced Raman spectroscopy for hazardous waste monitoring.	advances, spectroscopy, hazardous, waste, health, oak, ridge, toluene, analysis, water	Proc. SPIE-Int. Soc. Opt. Eng., 1336(Raman Lumin. Spectrosc. Technol. II), 156-63 (Eng) 1990.	SPECTROMETRY	CODEN: PSISDG ISSN: 0277-786X

CA NO	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
114(20):198773e	Wenzel, Stuart W.; White, Richard M.	Flexural plate-wave gravimetric chemical sensor.	flexural, plate, wave, gravimetric, chemical, sensor, white, acoustic, detection, toluene, trichloroethane, carbon, tetrachloride, siloxanes, silicones, vapors, analysis, dimethylsiloxane, zinc, oxide, aluminum, silicon, nitride, plates	Sens. Actuators, A, A22(1-3), 700-3 (Eng) 1990	PIEZOELECTRIC	CODEN: SAAPEB
114(20):198618w	Lieberman, S. H.; Inman, S. M.; Theriault, G. A.; Cooper, S. S.; Malone, P. G.; Shimizu, Y.; D. W.	Fiber optic-based chemical sensors for in situ measurement of metals and aromatic organic compounds in seawater and soil systems.	fiber, optic, chemical, sensors, metals, aromatic, organic, seawater, soil, petroleum, hydrocarbon, fluorescence, sensor, hydrocarbons, analysis, fluorometers, optical, fibers, fluorometric, metal, ion, spectrochemical, ions, fluorescence, zinc, cadmium, water, sea	Proc. SPIE-Int. Soc. Opt. Eng., 1269(Environ. Pollut. Meas. Sens. Syst.), 175-84 (Eng) 1990	FIBER-OPTIC	CODEN: PSISDG ISSN: 0277-786X
114(20):196011e	El Gomati, M. M.; Walker, C. G. H.; Lowe, B.; Prutton, M.	A UHV compatible silicon (lithium) x-ray detector	silicon, lithium, ray, detector, electron, radiation, detectors, vacuum	Inst. Phys. Conf. Ser., 98(EMAG-MICRO 89, Vol. 1), 151-4 (Eng) 1990	FIBER-OPTIC	CODEN: IPCSEP, ISSN: 0951-3248
114(18):173469g	Kiptily, V. G.	Capabilities of gamma spectroscopy for fast alpha-particle diagnostics	gamma, spectroscopy, alpha, particle, fusion, nuclear, reactor, fuels, plasmas, ray, plasma, beryllium, analysis, detection, rays, proton, deuterium, resonance, lithium, germanium, detector, doped, drifted, hydride, neutron, absorber, barium, fluoride, scintillation, detectors	Fusion Technol., 18(4), 583-90 (Eng) 1990.	SPECTROMETRY	CODEN: FUSTE8 ISSN: 0748-1896
114(16):155389d	Blais, K	Simultaneous conductivity and potentiometric detector for miniaturized liquid chromatography and flow analysis.	conductivity, potentiometric, detector, miniaturized, liquid, chromatography, flow, analysis, electric, conduction, electrochem, potentiometry, detection, chromatographs, conductometric, detectors, antimony, electrode	J. Chromatogr., 540(1-2), 41-51 (Eng) 1991	ELECTROCHEMICAL	CODEN: JOCRAM ISSN: 0021-9673
114(11):139744g	Kataoka, Masamitsu; Takinami, Masao; Abe, Hirohisa; Umezawa, Yoshio	Amplified determination of metal ions with liposomes incorporating hydrophobic chelating agents	amplified, metal, ions, liposomes, hydrophobic, chelating, agents, liposome, potentiometry, layer, fluoride, membrane, triazine, phenanthroline, ion, receptors, nickel, analysis, cobalt, copper, potentiometric, amplification	Bunseki Kagaku, 39(11), 789-93 (Japan) 1990	ELECTROCHEMICAL	CODEN: BNSKAK ISSN: 0525-1931
114(14):135312e	Jiang, W. R.; Fielden, P. R.; Snook, R. D.	Performance of a laminar flow torch/microwave plasma detector for gas chromatography.	laminar, flow, torch, microwave, plasma, detector, gas, chromatography, chromatographs, detectors, spectrometric, atomizers, torches, trichloroethylene, analysis, chlorobenzene, detection, carbon, chlorine	Appl. Spectrosc., 45(2), 227-30 (Eng) 1991.	CHROMATOGRAPHY	CODEN: APSPA4 ISSN: 0003-7028
114(14):135305u	Nakagawa, Masao; Fujiwara, Nobuaki; Matsuura, Teruaki; Tominaga, Tsuyoshi; Yamamoto, Isao; Okuyama, Koh; Wada, Tomonori; Yamashita, Nobuhiko; Yamashita, Toshihiko	An adsorption luminescence chemical sensor for the measurement of combustible gas mixtures.	adsorption, luminescence, chemical, sensor, combustible, gas, mixtures, air, analysis, detection, luminescent, solid, combustibles, gaseous, ethanol, acetone, barium, gallate, europium, activated, alumina	Bunseki Kagaku, 39(11), 397-400 (Japan) 1990	SPECTROMETRY	CODEN: BNSKAK ISSN: 0525-1931
114(14):135297v	Griffin, Jeffrey W.; Watson, Bradley; Olsen, Khris B.; Kiefer, Thomas C.; Flynn, Connor J.	Fiber optic spectrochemical emission sensors: a detector for chlorinated and fluorinated compounds.	fiber, optic, spectrochemical, emission, sensors, detector, chlorinated, fluorinated, soil, analysis, carbon, tetrachloride, vadose, plasma, sensor, organic, water, helium, radio, frequency, excited	Proc. SPIE-Int. Soc. Opt. Eng., 1172(Chem. Biochem. Environ. Fiber Sens.), 99-107 (Eng) 1990.	FIBER-OPTIC	CODEN: PSISDG ISSN: 0277-786X
114(14):128412g	Basta, N. T.; Tabatabai, M. A.	Determination of total metals in sewage sludges by ion chromatography	metals, sewage, sludges, ion, chromatography, wastewater, sludge, metal, manganese, analysis, nickel, cadmium, cobalt, zinc	J. Environ. Qual., 20(1), 79-88 (Eng) 1991.	CHROMATOGRAPHY	CODEN: JEVQAA ISSN: 0047-2425
114(13):120713d	Wang, Jian; Farrell, Richard E.; Scott, A. Duncan	Comparison of ion-selective electrode methods for determining potassium Q/I relationships.	ion, electrode, potassium, soil, analysis, calcium, potentiometric, electrodes, chloride, soils	Can. J. Soil Sci., 70(4), 693-704 (Eng) 1990	ELECTROCHEMICAL	CODEN: CJSSAR ISSN: 0008-4271

CA NO.	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
114(12):114191n	Vishwakarma, V.; Kazlauskas, R.	Ionometric determination of nickel in cyanide baths for cadmium electroplating.	ionometric, nickel, cyanide, baths, cadmium, electroplating, electrodes, tetracyanonickelate, potentiometric, phthalate, plasticizer, [illegible], cyanonickelate, electrode, tetracyanocadmate, formaldehyde, analysis, potentiometry, tetradecylphosphonium, ion	Zavod. Lab., 56(4), 15-17 (Russ) 1990.	ELECTROCHEMICAL	CODEN: ZVDLAU ISSN: 0321-4265.
114(12):110493t	Grossman, Mark W.; Maya, Jakob; Lagushenko, Radomir	Method and apparatus to measure mercury density in a flow reactor used for mercury-196 isotope separation.	apparatus, mercury, density, flow, reactor, isotope, optical, detectors, electric, lamps, vapor, analysis, preparation	Eur. Pat. Appl. EP 386192 A2 19 Sep 1990, 8 pp.	RADIOCHEMICAL	DESIGNATED STATES: R: BE, DE, FR, GB, NL. (Engl). CODEN: EPXXDW. CLASS: B01D059-34. APPLICATION: EP 90-102724 14 Mar 1990. PRIORITY: U 89-323641 15 Mar 1989.
114(12):110327e	Williams, J. A.; Mihalczo, J. T.; Ricker, C. W.; Glesius, F. L.; Kaiser, T. A.	A high-sensitivity, position-sensitive fission chamber for subcriticality measurements of spent fuel.	sensitivity, sensitive, fission, subcriticality, fuel, oak, ridge, radiation, detectors, nuclear, reactor, fuels, elements, radioactive, wastes, uranium, oxide, plates, coated, californium, neutron, noise	Nucl. Instrum. Methods Phys. Res., Sect. A, A299(1-3), 187-90 (Eng) 1990.	RADIOCHEMICAL	CODEN: NIMAER ISSN: 0168-9002
114(12):108229q	Gu, Linlin	An optical fiber system for the multiparameter observation of groundwater precursors	optical, fiber, groundwater, precursors, rocks, acoustic, emission, sensing, earthquake, prediction, bubbles, fibers, sensors, hydrochem, waters, ground, methane	Proc. SPIE-Int. Soc. Opt. Eng., 1230(Int. Conf. Optoelectron. Sci. Eng. '90, 1990), 545-(Eng) 1990.	FIBER-OPTIC	CODEN: PSISDG. ISSN: 0277-786X.
114(12):103406p	Mal'tseva, L. S.; Nakova, M. N.; Belova, G. P.	Use of gas extraction method for determination of volatile product composition, released from polystyrenes at processing temperature.	gas, extraction, volatile, polystyrenes, thiols, regulators, polystyrene, chromatography, dodecanethiol, benzene, analysis, isopropylbenzene, alpha, methylstyrene, ethylbenzene, styrene, propylbenzene, toluene, phenylacetylene, sulfur, dioxide, hydrogen, sulfide, vapor, flame, photometric, ionization, detectors	Plast. Massy (12), 63-5 (Russ) 1990.	CHROMATOGRAPHY	CODEN: PLMSAI. ISSN: 0554-2901.
114(11):100506v	Basta, N. T.; Tabatabai, M. A.	Ion chromatographic determination of total metals in soils.	ion, chromatographic, metals, soils, soil, analysis, chromatography, liquid, elements, iron, manganese, cadmium, cobalt, absorption, spectrophotometry, nickel, copper, zinc	Soil Sci. Soc. Am. J., 54(5), 1289-97 (Eng) 1990.	CHROMATOGRAPHY	CODEN: SSSJD4 ISSN: 0361-5995
114(11):100300p	Wang, F. L.; Huang, P. M.	Ion-selective electrode determination of solution potassium in soil suspensions and its significance in kinetic studies.	ion, electrode, solution, potassium, soil, significance, kinetic, ionic, soils, exchange, kinetics, analysis, electrodes	Can. J. Soil Sci., 70(3), 411-24 (Eng) 1990.	ELECTROCHEMICAL	CODEN: CJSSAR. ISSN: 0008-4271
114(10):94201p	Bruhnke, K. R.; Fernandez, M.; Kaeltje, G. M.	Characterization of a spectrally segmented photodiode-array spectrometer for inductively coupled plasma emission spectrometry.	spectrally, segmented, photodiode, spectrometer, inductively, plasma, atomic, emission, spectrometry, metals, analysis, optical, detectors, spectrometers, grating, echelle, photodiode-array, aluminum, iron, magnesium, manganese, nickel, silver, tin, titanium, tungsten, arsenic, boron, cadmium, chromium, cobalt, copper, vanadium, zinc, phosphorus, selenium	Spectrochim. Acta, Part B, 46B(1), 81-98 (Eng) 1991.	SPECTROMETRY	CODEN: SAASBH ISSN: 0584-8547.
114(8):74269p	Okseiko, A. A.; Ignat'eva, E. M.; Lonsko, V. L.	Ion-selective electrode for determination of cobalt.	ion, electrode, cobalt, electrodes, quaternary, ammonium, thiocyanatocobaltate, potentiometric, analysis, membrane	Zh. Anal. Khim., 45(8), 1592-6 (Russ) 1990.	ELECTROCHEMICAL	CODEN: ZAKHA8 ISSN: 0044-4502.
114(7):60986v	Yamasaki, S.; Tsumura, Y.	Total analysis of soils by ICP-AES and ICP-MS (mass spectrometry).	analysis, soils, spectrometry, soil, plant, mineral, elements, inductively, plasma, emission, spectrochemical, constituents, spectroscopy, aluminum, iron, magnesium, manganese, potassium, sodium, titanium, copper, zinc, calcium, spectrometric	Commun. Soil Sci. Plant Anal., 21(17-18), 2017-28 (Eng) 1990.	SPECTROMETRY	CODEN: CSOSA2. ISSN: 0010-3624.

CA NO	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
114(4):54997c	Jeffery, Paul Douglas; Barr, Peter Michael	Thin-film chemoresistive sensors	chemiresistive, sensors, gas, analysis, carbon, tetrachloride, chloroform, hexachloroethane, dichloromethane, nitromethane, trichloroethylene, nitroethane, nitropropane, nitrotoluene, nitrobenzene, dinitrobenzene, trinitrotoluene, dinitrotoluene, tetrachloroethylene, propylnitrate, ethylene, glycol, dinitrate, tetracyanoethylene, detection, phthalocyanine, silicon, tin, germanium	PCT Int. Appl. WO 9005160 A1 17 May 1990, 32 pp	PIEZOELECTRIC	DESIGNATED STATES: W: GB, JP, US; RW: AT, BE, CH, DE, FR, GB, IT, LU, NL, SE (Eng) CODEN: PIXXD2 CLASS: ICM: G01N027-00 ICS: C09D183-04; C23C014-08 APPLICATION: WO 89-GB1312 2 Nov 1989 PRIORITY: GB 88-25616 2 Nov 1988
114(1):49681w	Zapo, R.; Uhlig, E.; Hackfort, H.; Niessner, R	On line and in situ control of aerosol emission from hazardous waste combustion.	aerosol, emission, hazardous, waste, combustion, air, pollution, flue, gases, incinerators, sensing, aerosols, incineration, photodiode, sensor, particles, wastes, incinerator, pollutant, aromatic, hydrocarbons, analysis, polycyclic, carbon, monoxide, sulfur, dioxide, nitrogen, oxide	J. Aerosol Sci., 20(8), 1485-8 (Eng) 1989	GENERAL	CODEN: JALSB7 ISSN: 0021-8502
114(4):34959g	Pinochet C., H.; Ouvrard, J.	Design and characterization of a coulometric detector for liquid chromatography	coulometric, detector, liquid, chromatography, metal, ions, detection, alkaline, earth, metals, analysis, chromatographs, detectors, electrode, porous	An. Quim., 86(1), 35-42 (Span) 1990	CHROMATOGRAPHY	CODEN: ANQUEX
114(4):31815z	Tucker, Martin B	Maximum information with minimum complexity from a coincidence assay system	minimum, coincidence, nuclear, reactor, fuels, fuel, elements, arrangement, fissile, radioactive, wastes, radiation, detectors, scintillation, plastic, fissionable, californium, spontaneous, fission, neutron, uranium, analysis	Appl. Radiat. Isot., 41(10-11), 995-1001 (Eng) 1990	RADIOCHEMICAL	CODEN: ARISEF ISSN: 0969-8043
114(2):16852n	Maclay, G. Jordan; Stetter, Joseph R.; Christesen, Steven	Use of time-dependent chemical sensor signals for selective identification	chemical, sensor, signals, gas, analysis, catalytic, filament, electrochem., sensors, benzene, hydrogen, cyanide, carbon, monoxide	Sens. Actuators, 20(3), 277-85 (Eng) 1989	GENERAL	CODEN: SEACDH ISSN: 0250-6874
114(2):14850k	Wentworth, W. E.; D'sa, Ela Desai; Batten, C. F.; Chen, Edward C. M	Oxygen enhancement of thermal electron capture in a nonradioactive discharge source for a quadrupole mass spectrometer	oxygen, thermal, electron, nonradioactive, spectrometer, hydrocarbons, analysis, detection, spectrometry, ion, chromatographs, gas, detectors, halide, signal, spectrometers, chromatograph, carbon, tetrachloride, chloroform, ethyl, bromide, dichloromethane, chloride, chlorobenzene, dichloroethane, chloropropane, detector	J. Chromatogr., 517, 87-98 (Eng) 1990	CHROMATOGRAPHY	CODEN: JOCRAM ISSN: 0021-9673
113(24):223870m	Robbins, Gary A.; Bristol, Robert D.; Roe, Valerie D	A field screening method for gasoline contamination using a polyethylene bag sampling system	screening, gasoline, polyethylene, ground, water, soil, headspace, vapor, detectors, analysis, volatile	Ground Water Monit. Rev., 9(4), 87-97 (Eng) 1989	GENERAL	CODEN: GWMRDU ISSN: 0277-1926
113(24):223783x	Wrighton, Mark S	Amperometric electrochemical ion sensors and method for determining ions	amperometric, electrochemical, ion, sensors, ions, ionophores, electrodes, sensor, blood, analysis, body, fluid, amperometry, cations, anions, cation, exchangers, membranes, pyridinium, viologens, valinomycin, polyvinylpyridine, polythiophene, polypyrrole, polyvinylferrocene, methylpyrrole, hydrogen, carbonate, lithium, potassium, sodium, calcium, chloride	U.S. US 4927313 A 29 May 1990, 6 pp. Cont.-in-part of U.S. 4,721,601 (Eng)	ELECTROCHEMICAL	CODEN: USXXAM CLASS: ICM: G01N027-30 NCL: 204153100 APPLICATION: US 88-140623 4 Jan 1988 PRIORITY: US 84-674410 23 Nov 1984; US 87-116566 29 Oct 1987
113(24):225661c	Tao, Hiroaki; Miyazaki, Akira; Bansho, Kenji	Remote fiber sensing of some organic contaminants in water by laser fluorescence spectrometry.	fiber, sensing, organic, water, laser, fluorescence, spectrometry, optical, fibers, groundwater, phenol, analysis, thiophene, xylene, optic, sensor, chloroform, fluorescent, chlorocarb	Bunseki Kagaku, 39(9), 503-6 (Japan) 1990	FIBER-OPTIC	CODEN: BNSKAK ISSN: 0525-1931

CA NO.	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
113(23):204591d	Wylie, Philip L.; Oguchi, Ruriko	Pesticide analysis by gas chromatography with a novel atomic emission detector.	pesticide, analysis, gas, chromatography, atomic, emission, detector, pesticides, detection, chromatographs, detectors, hydrogen, mercury, silicon, tin, carbon, sulfur, phosphorus, bromine, nitrogen, fluorine, oxygen, chlorine, diazinon, endosulfan, prometon, benfluralin, propachlor, vernolate, butylate, alachlor, oxadiazon, profluralin, pendimethalin, metolachlor	J. Chromatogr., 517, 131-42 (Eng) 1990.	CHROMATOGRAPHY	CODEN: JOCRAM. ISSN 0021-9673.
113(23):204196a	Jin, Qinhan; Wang, Fendi; Zhu, Chu; Chambers, David M.; Hieftje, Gary M.	Atomic emission detector for gas chromatography and supercritical fluid chromatography.	atomic, emission, detector, gas, chromatography, supercritical, fluid, spectrometers, detectors, chromatographs, spectrometric, microwave, plasma, torch, chlorides, analysis, detection, torches, ferrocene, carbon, tetrachloride, argon, helium, element, capillary	J. Anal. At. Spectrom., 5(6), 487-94 (Eng) 1990.	CHROMATOGRAPHY	CODEN: JASPE2. ISSN 0267-9477 OTHER SOURCES: CJRSC
113(22):197394a	Crouch, Michael D.	Check soil contamination easily.	soil, easily, water, pollution, petroleum, groundwater, survey, hygiene, gas, detector, tubes, tube, volatile, oil, spills	Chem. Eng. Prog., 86(9), 41-5 (Eng) 1990.	GENERAL	CODEN: CEPRA8. ISSN 0360-7275
113(20):183581q	Ravishankar, S.; Tilotta, David C.; Busch, Kenneth W.; Busch, Marianna A.	An element-specific, dual-channel, flame infrared emission, gas chromatography detector for chlorinated and fluorinated hydrocarbons.	element, flame, infrared, emission, gas, chromatography, detector, chlorinated, fluorinated, hydrocarbons, spectrometers, chlorine, fluorine, analysis, detection, chromatographs, detectors, carbon, tetrachloride, chloroform, methylene, chloride, trichlorofluoromethane, chlorobutane, perfluorooctane, trifluoroethane, perfluorohexane, perfluorotoluene, nonafluorobenzene, methanesulfonyl, fluoride, trichlorofluoroethane	Appl. Spectrosc., 44(8), 1247-58 (Eng) 1990.	CHROMATOGRAPHY	CODEN: APSPA4. ISSN 0003-7028.
113(20):183707t	Brina, Rossella; Collins, Greg E.; Lee, Paul A.; Armstrong, Neal R.	Chemiresistor gas sensors based on photoconductivity changes in phthalocyanine thin films: of response toward ammonia by photoelectrochemical deposed metal modifiers.	chemiresistor, gas, sensors, photoconductivity, phthalocyanine, ammonia, photoelectrochemical, metal, air, analysis, photoconductors, chemiresistors, photoconduction, nitrogen, mercury, platinum, silver, copper, gold, photoelectrochem, coated, chloroindium, chlorogallium, silicide, microcircuits	Anal. Chem., 62(21), 2357-65 (Eng) 1990.	ELECTROCHEMICAL	CODEN: ANCHAM. ISSN: 0003-2700 OTHER SOURCES: CJACS
113(20):177069t	Crawford, Jeffrey L.; Klainer, Stanley M.; Goswami, Kisholoy; Dandge, Dileep K.	The application of fiber optic sensors to drinking water analysis.	fiber, optic, sensors, drinking, water, analysis, optical, detectors, trichloroethylene	Proc.-Water Qual. Technol. Conf., Volume Date 1989, 17, 467-80 (Eng) 1990	FIBER-OPTIC	CODEN: PWQCD2. ISSN: 0164-0755.
113(20):177068s	Chudyk, Wayne; Pohlig, Kenneth; Wolf, Lisa; Fordiani, Rita	Field determination of ground water contamination using laser fluorescence and fiber optics.	ground, water, laser, fluorescence, fiber, optics, aromatic, hydrocarbons, analysis, groundwater, optic, sensor, optical, fibers, sensors, hydrocarbon, benzene, ethylbenzene, toluene, xylene	Proc. SPIE-Int. Soc. Opt. Eng., 1172(Chem., Biochem., Environ. Fiber Sens.), 123-9 (Eng) 1990.	FIBER-OPTIC	CODEN: PSISDG. ISSN: 0277-786X
113(20):177059q	Crawford, Jeffrey L.; Klainer, Stanley M.; Salinas, Teresa M.; Todechiney, Leslie; Kennedy, James A.; Dandge, Dileep K.; Goswami, Kisholoy	Development of a fiber optic chemical sensor for the monitoring of trichloroethylene in dr water.	fiber, optic, chemical, sensor, trichloroethylene, drinking, water, optical, fibers, sensors, analysis	Proc. SPIE-Int. Soc. Opt. Eng., 1172(Chem., Biochem., Environ. Fiber Sens.), 109-14 (Eng) 1990.	FIBER-OPTIC	CODEN: PSISDG. ISSN 0277-786X.
113(20):177033y	Nakajima, Jun	Measurement of trichloroethylene and tetrachloroethylene in soils.	trichloroethylene, tetrachloroethylene, soils, water, soil, pollution, groundwater, biological	Chiba-ken Suishitsu Hozen Kenkyusho Nenpo, Volume Date 1988 77-80 (Japan) 1989.	RADIOCHEMICAL	CODEN: CSHKEO
113(18):164567y	Wu, Yusheng; Wang, Canglin; Jiang, Zhonghua; Wang, Deliang	A new cobalt ion selective electrode using macrocyclic nitrogen-containing compound as a carrier.	cobalt, ion, electrode, macrocyclic, nitrogen, cell, membrane, nitrophenyldodecyl, ether, plasticizer, ionophores, analysis, divalent, spectrometry	Fenxi Huaxue, 18(1), 15-18 (Ch) 1990	ELECTROCHEMICAL	CODEN: FHHHDT. ISSN: 0253-3820

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113(17):151313g	Hirsch, D.; Banin, A.	Cadmium speciation in soil solutions.	cadmium, soil, solutions, organic, soils, haploxeralfs, xerochrepts, xerorthents, carbonate, sulfate, acid, [illegible]	J. Environ. Qual., 19(3), 366-72 (Eng) 1990	ELECTROCHEMICAL	CODEN: JEVQAA. ISSN: 0047-2425
113(17):150443a	Stein, Vincent B.; Narang, Rajinder S.	A simplified method for the determination of volatiles in eggs using headspace analysis with a photoionization detector.	volatiles, eggs, headspace, analysis, photoionization, detector, health, volatile, egg, gas, aromatic, hydrocarbons, white, yolk, poultry, benzene, trichloroethane, xylene, ethylbenzene, toluene, chlorobenzene, tetrachloroethene	Arch. Environ. Contam. Toxicol., 19(4), 593-6 (Eng) 1990.	ELECTROCHEMICAL	CODEN: AECTCV. ISSN: 0090-4341
113(16):144418y	Angel, S. M.; Ridley, M. N.	Fiber optic environmental chemical sensors.	fiber, optic, environmental, chemical, sensors, increase, optical, detectors, optrodes, ground, water, chloroethylene, chloroform, analysis, optrode, trichloroethylene	Adv. Instrum. Control, 44(Pt. 1), 407-12 (Eng) 1989	FIBER-OPTIC	CODEN: AINCEV
113(16):144403y	Zlatkis, A.; Wentworth, W. E.; Ramatunga, R. F. J.; Chen, E. C. M.; Milligan, M. E.	The deuterium isotope effect on the response of the electron capture detector.	deuterium, isotope, electron, detector, chromatographs, gas, detectors, analysis, bromobenzene, detection, nitrogen	Chromatographia, 29(11-12), 547-50 (Eng) 1990.	CHROMATOGRAPHY	CODEN: CHRGB7. ISSN: 0009-5893
113(16):144403x	Quimby, B. Bonner; Pilon, Michael J.; Rabin, Jeffery F.	Vacuum ultraviolet inductively coupled plasma spectroscopy for element-selective detection of nonmetals.	vacuum, inductively, plasma, spectroscopy, element, detection, nonmetals, chromatography, gas, emission, spectrometry, spectrometers, spectrochemical, analysis, hydrocarbons, chromatographs, detectors, spectrometric, ethanol, propanol, dibromoethane, phenol, bromobutane, tetrachloroethylene, chlorobenzaldehyde, bromine, nitrogen, oxygen, chlorine, carbon, tetrachloride, propanone, acetonitrile, trichloroethylene, bromocyclohexane, bromobenzene, isobutylchloride, bromoheptane, bromopropane	Appl. Spectrosc., 44(6), 975-8 (Eng) 1990.	SPECTROMETRY	CODEN: APSPA4. ISSN: 0003-7028
113(16):144404t	Sev'yalov, E. A.; Sukharev, V. Ya.; Sev'yalova, L. N.; Brovko, I. R.; Myasnikov, I. A.; Tor'man, B. M.	Determination of hydrogen selenide in gaseous and liquid media by using semiconductor chemical sensors.	hydrogen, selenide, gaseous, liquid, semiconductor, chemical, sensors, gas, analysis, time, oxide, sensor, electric, selenium, hydride, water	Zh. Anal. Khim., 45(7), 1338-48 (Russ) 1990	ELECTROCHEMICAL	CODEN: ZAKHA8. ISSN: 0044-4502
113(16):144395g	Iwachido, Tadashi; Hayama, Naoki	Conductometric detector response in ion chromatography.	conductometric, detector, ion, chromatography, alkaline, earth, metals, lithium, complete, eluent, earths, liquid, detection, electric, conductivity, conduction, ionic, oxalic, acid, magnesium, analysis, strontium, barium, calcium	Anal. Sci., 6(2), 307-8 (Eng) 1990.	CHROMATOGRAPHY	CODEN: ANSCEN. ISSN: 0910-6340
113(16):144397b	Attiyat, Abdulrahman S.; Kadry, Asta M.; Hanna, Hisham S.; Ibrahim, Yehia A.; Christian, Gary D.	Synthesis and potentiometric selectivity study of 14-cyclic dioxodiamides.	synthesis, potentiometric, cyclic, dioxodiamides, ionophores, dioxodiamide, macrocycles, lithium, ion, electrodes, macrocyclic, amides, macrocycle, dimethylmalonic, acid, cyclocondensation, dioxanonanediamine, propanedioic, analysis, dibenzylmalonic, dioxanonanediamine, tributylphosphine, oxide, electrode, nitrophenyl, phenyl, ether, plasticizer, dibutyl, malonic, dioxanonanediamide, aluminum, hydride	Anal. Sci., 6(2), 233-7 (Eng) 1990	ELECTROCHEMICAL	CODEN: ANSCEN. ISSN: 0910-6340

CA NO.	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
113(14):120384c	Angel, S. M.; Ridley, M. N.	Dual-wavelength absorption optrode for trace level measurements of trichloroethylene and chloroform.	wavelength, absorption, optrode, trichloroethylene, chloroform, lenience, fiber, optical, detectors, optrodes, water, analysis, ground, groundwater, adsorption, pyridine, tetrabutylammonium, chloride	Proc. SPIE-Int. Soc. Opt. Eng., II72(Chem. Biochem. Environ. Fiber Sens.), 115-22 (Eng) 1990.	FIBER-OPTIC	CODEN: PSISDG, ISSN: 0277-786X.
113(14):123170q	Mogilevskii, A. N.; Mazorov, A. D.; Strogonova, N. E.; Galkina, I. P.; Stavrovskii, D. B.; Spasov, A.; Mikhailov, D.	Piezoelectric sensor for the detection of mercury vapor.	piezoelectric, sensor, detection, mercury, vapor, geochem, air, analysis	Zh. Anal. Khim., 45(7), 1525-6 (Russ) 1990.	PIEZOELECTRIC	CODEN: ZAKHA8, ISSN: 0044-4502
113(14):125753f	Hornik, M.	A novel structure for detecting organic vapors and hydrocarbons based on a palladium-MOS sensor.	organic, vapors, hydrocarbons, palladium, sensor, electric, capacitors, analysis, detection, gas, hydrocarbon, vapor, thermal, decomposition, catalysis, platinum, catalyst, chloroform, ether, ethanol, methanol, isobutane, trichloroethylene, hexane, hydrogen, capacitor	Sens. Actuators, B, B1(1-6), 35-9 (Eng) 1990.	ELECTROCHEMICAL	CODEN: SABCEB, ISSN: 0925-4005
113(14):124180q	Zusman, Rivka; Rottman, Claudio; Ottolenghi, Michael; Avnir, David	Doped sol-gel glasses as chemical sensors.	doped, gel, glasses, chemical, sensors, solids, silica, colorimetric, analysis, gels, micro, reagent, phenanthroline, aluminum, iron, nickel, cobalt, copper, sulfate, detection, glass, sensor, tetramethoxysilane, hydrolysis, reagents, xerogel	J. Non-Cryst. Solids, 122(1), 107-9 (Eng) 1990.	RADIOCHEMICAL	CODEN: JNCSBJ, ISSN: 0022-3093
113(14):123445p	Attiyat, Abdulrahman S.; Kadry, Azza M.; Badawy, Mohamed A.; Hanna, Nashwatt B.; Ibrahim, Yahia A.; Christian, Gary D.	Synthesis and potentiometric study of acyclic monoamidamides as ionophores in ion-selective electrodes.	synthesis, potentiometric, acyclic, monoamidamides, ionophores, ion, electrodes, lithium, electrode, nitrophenylphenyl, ether, nitrophenylbutyl, plasticizer, analysis, potentiometry, trioctylphosphine, oxide, sensitivity, amines, formylphenoxyacetic, acid, potassium, hydroxide, carboxyphenoxyacetic, thionyl, chloride, ionophore, chloroacetic, reaction, salicylaldehyde	Electroanalysis (N. Y.), 2(2), 119-25 (Eng) 1990.	ELECTROCHEMICAL	CODEN: ELANEU, ISSN: 1040-0397
113(14):122405f	Martin, James E.; Wereinowski, Frank; Cook, Gwellen F.	Optimization of neutron activation analyses of iodine-129 in low-level radioactive waste samples.	optimization, neutron, activation, analyses, iodine, radioactive, waste, health, wastes, analysis	Appl. Radiat. Isot., 41(8), 727-31 (Eng) 1990.	RADIOCHEMICAL	CODEN: ARISEF, ISSN: 0883-2889
113(14):120074a	Stetter, Joseph R.; Findlay, Melvin W.; Maclay, G. Jordan; Zhang, J.; Vaihinger, Stefan; Goep Wolfgang	Sensor array and catalytic filament for chemical analysis of vapors and mixtures.	sensor, catalytic, filament, chemical, analysis, vapors, mixtures, transducer, air, amperometric, gas, amperometry, microreactor, sensors, platinum, catalyst, formaldehyde, benzene, carbon, monoxide, trichloroethane	Sens. Actuators, B, B1(1-6), 43-7 (Eng) 1990.	ELECTROCHEMICAL	CODEN: SABCEB, ISSN: 0925-4005.
113(12):100157k	Thomsen, Karsten N.; Baldwin, Richard P.	Evaluation of electrodes coated with metal hexacyanoferrate as amperometric sensors for nonelectroactive cations in flow systems.	electrodes, coated, metal, hexacyanoferrate, amperometric, sensors, nonelectroactive, cations, flow, urine, analysis, ammonium, potassium, ion, detection, alkali, metals, amperometry, blood, chromatographs, liquid, detectors, chromatography, rubidium, cesium, cupric, electrode	Electroanalysis (N. Y.), 2(4), 263-71 (Eng) 1990.	ELECTROCHEMICAL	CODEN: [illegible], ISSN: [illegible]

CA NO	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
113(12):103097t	Feltes, Joachim	Use of a thermal energy analyzer (TEA) in water analysis	thermal, energy, analyzer, water, analysis, aromatic, hydrocarbons, chemiluminescent, detector, pollution, explosives, dinitrophenol, nitrotoluene, nitronaphthalene, nitrobenzene, nitroaniline, nitrophenol, nitroanisole, dinitrobenzene, dinitroaniline, dinitrotoluene, nitrobenzonitrile, dinitrobiphenyl, cresol, [illegible]	Vom Wasser, 74, 127-33 (Ger) 1990	CHROMATOGRAPHY	CODEN: VWMWAO ISSN: 0083-6915
113(12):102524t	Pierotti, David	Analysis of trace oxygenated hydrocarbons in the environment	analysis, oxygenated, hydrocarbons, environment, earth, air, hydrocarbon, gas, propanone, acetaldehyde, methacrolein, butanone	J Atmos Chem, 10(4), 373-82 (Eng) 1990	CHROMATOGRAPHY	CODEN: JATCE2 ISSN: 0167-7764
113(10):90432m	Arbon, R E; Grimsrud, Eric P	Selective detection of iodinated hydrocarbons by the electron capture detector with negative ion hydration and photodetachment	detection, iodinated, hydrocarbons, electron, detector, negative, ion, hydration, photodetachment, air, analysis, haloalkane, gas, anions, haloalkanes, chemical, halides, ions, alkanes, chromatographs, detectors, iodoalkanes, photo, water, chloride, iodide, bromide, carbon, tetrachloride, trichloroethane, dibromoethane, ethyl, dibromodifluoromethane, fluorotrichloromethane	Anal Chem, 62(17), 1762-8 (Eng) 1990	RADIOCHEMICAL	CODEN: ANCHAM ISSN: 0003-2700 OTHER SOURCES: CJACS
113(10):90480n	Wang, Ziqian; Peng, An	Determination of dissolved selenium species in environmental samples	selenium, environmental, soil, analysis, fluorescence, detection, fluorescence, naphthalenediamine, water	J Environ Sci (China), 1(2), 116-21 (Eng) 1989	CHROMATOGRAPHY	CODEN: JENSEE
113(10):83957c	Hanss, Guenther	Trace detectors in environmental analysis	detectors, environmental, analysis, air, pollution, soil, water	Chem Ind (Duesseldorf), 113(4), 46, 48, 70 (Ger) 1990	CHROMATOGRAPHY	CODEN: CHIDA9 ISSN: 0009-2959
113(10):83952n	Gholson, Alex R; Storm, Julia F; Jayanty, R K M; Fuerst, Robert G; Logan, Thomas J; Midgett, M Rodney	Evaluation of canisters for measuring emissions of volatile organic air pollutants from hazardous waste incineration	emissions, volatile, organic, air, pollutants, hazardous, waste, incineration, flue, gases, steel, wastes, gas, apparatus, hazard, carbon, tetrachloride, analysis, chloroform, benzene, trichloroethane, bromomethane, vinyl, chloride, methylene, trichlorofluoromethane, dichloropropane, trichloroethylene, xylene, ethylbenzene, dibromoethane, butadiene, dichloroethane, toluene, chlorobenzene, tetrachloroethylene, passivated	JAPCA, 39(9), 1210-17 (Eng) 1989	RADIOCHEMICAL	CODEN: JJAMEX ISSN: 0894-0630
113(6):51868y	Broekaert, Markus W; Buscher, Wolfgang W; Cammann, Karl; Faust, Michael J; Winter, Frank G	New studies of the plasma emission detector.	plasma, emission, detector, environmental, analysis, gas, chromatographs, detectors, spectrometric, spectrochemical, carbon, fluorine, trifluoromethyl, benzonitrile, hexafluoro, propanol	Mikrochim Acta, 3(3-6), 215-22 (Eng) 1989	CHROMATOGRAPHY	CODEN: MIACAQ ISSN: 0026-3672
113(6):51715w	Lieberman, S H; Inman, S M; Theriault, G A	Use of time-resolved spectral fluorometry for improving specificity of fiber optic-based chemical sensors	spectral, fluorometry, fiber, optic, chemical, sensors, optical, fibers, metals, analysis, fluorometric, sensor, environmental, spectrochemical, elements, aromatic, hydrocarbons, polycyclic, detection, seawater, anthracene, pyrene, chrysene, cadmium, zinc, [illegible], fluorescence, water, hydrocarbons, sea	Proc SPIE Int Soc Opt Eng, 1172(Chem Biochem Environ Fiber Sens), 94-8 (Eng) 1990	FIBER-OPTIC	CODEN: PSISDG ISSN: 0277-786X

CA NO.	AUTHOR	TITLE	KEYWORD	CITATION	SENSOR TYPE	OTHER
113(8):65686c	Fernestael, T.; Bruns, J.	A coated piezoelectric crystal detector system with high stability.	coated, piezoelectric, crystal, detector, detectors, volatile, air, analyzer, trichloroethylene	Sens. Actuators, 19(2), 85-98 (Eng) 1989.	PIEZOELECTRIC	CODEN: SEACOM. ISSN: 0250-6874
113(4):34173a	Danon, Albert; Amirav, Aviv	Hyperthermal surface ionization: a novel ion source with analytical applications.	hyperthermal, ionization, ion, analytical, halides, detection, spectrometry, alkenes, analysis, halogenation, spectroscopy, jet, expansion, air, halocarbon, hydrocarbons, chromatographs, gas, detectors, spectrometric, electron, beam, lock, amplification, isomerism, isomers, molybdenum, scattering, iodoheptafluoropropane, phosphonate, butyliodide, pentyliodide, hexyliodide, carbon, tetrachloride, pentafluoroiodobenzene, cyclohexene, cyclohexadiene, paraffins, iodopropane, chloropropane, isomer, bromoiodobenzene, dibromobutane, methylpropane, hexane, benzene, magnesium, oxide, silicon, silica, steel, diamond, purine, spectrum, isoquinoline, xylene, nickelocene, anthracene, tungsten, thorium, doped, halocarbons, filament	Int. J. Mass Spectrom. Ion Processes, 86(2), 139-47 (Eng) 1988.	SPECTROMETRY	CODEN: IJMPEO ISSN: 0168-1176
113(4):34121p	Klainer, Stanley M.; Goswami, Kisholoy; Herron, Nelson R.; Simon, Stephen J.; Eccles, Lawrence A.	Reservoir fiber-optic chemical sensors.	fiber, optic, chemical, sensors, reagents, sensor, carbon, analysis, trichloroethylene, vapor, chloride, dioxide, oxygen, seawater, water	U.S. US 4892383 A 9 Jan 1990, 23 pp. (Eng).	FIBER-OPTIC	CODEN: USXXAM. CLASS: ICM: G02B006-02 ICS: B01J001-18; A61B005-00; G01N021-00. NCL: 350096230. APPLICATION: US 89-312644 17 Feb 1989.
113(4):34041f	Azam, Ameer; Prasad, Rajendra	Determination of uranium content in soil samples by fission track registration technique.	uranium, soil, fission, track, analysis, melinex, radiation, detectors	Indian J. Environ. Prot., 9(6), 445-6 (Eng) 1989.	RADIOCHEMICAL	CODEN: IJEPDH. ISSN: 0253-7141
113(4):33810a	Shubina, N. A.; Kolesov, G. M.	Analysis of a multicomponent radionuclide mixture with respect to their gamma radiation by using automatic computerized spectral data processing.	analysis, multicomponent, radionuclide, mixture, gamma, radiation, automatic, computerized, spectral, rocks, computer, neutron, activation, radiochemical, spectrochem, radionuclides, iron, scandium, tantalum, terbium, thorium, barium, cesium, chromium, cobalt, europium, gadolinium, hafnium, ytterbium	Probl. Anal. Khim., 9, 77-87 (Russ) 1989.	SPECTROMETRY	CODEN: PYAKAF ISSN: 0370-2677
113(2):17154y	Rai, [illegible]; Chattopadhyaya, M. C.	A new heterogeneous selective ion sensitive electrode for lead(II) ions.	heterogeneous, ion, sensitive, electrode, ions, electrodes, polyvinylchloride, membrane, potentiometry, analysis	J. Indian Chem. Soc., 66(11), 823-4 (Eng) 1989.	ELECTROCHEMICAL	CODEN: JICSAH. ISSN: 0019-4522.
113(2):11721p	Herron, Nelson R.; Simon, Stephen J.; Eccles, Lawrence	Remote detection of organochlorides with a fiber optic based sensor. III. Calibration and field evaluation of an improved chloroform fiber optic chemical sensor.	detection, organochlorides, fiber, optic, sensor, chloroform, chemical, lawrence, optical, detectors, optrodes, fluorescent, chloroform, groundwater, sand, water, analysis, ground, optrode, fluorometry, fluorometer, pyridine, tetrapropylammonium, hydroxide, fluorometric	Anal. Instrum. (N. Y.), 18(2), 107-26 (Eng) 1989.	FIBER-OPTIC	CODEN: ANINDS. ISSN: 0743-5797.
112(26):246330p	Daniel, Daniel S.; Dalton, Mary M.; Warren, Harold C., III	Lithium-selective compositions and electrodes, as well as methods for their use.	lithium, electrodes, well, lipophilic, phenanthroline, analysis, ion	U.S. US 4853090 A 1 Aug 1989, 35 pp. (Eng).	ELECTROCHEMICAL	CODEN: USXXAM. CLASS: ICM: G01N027-30. NCL: 204-1T. APPLICATION: US 88-187175 28 Apr 1988

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112(26):239764a	Butler, M. A.; Ricco, A. J.; Buss, R.	Fiber optic micromirror sensor for volatile organic compounds.	fiber, optic, micromirror, sensor, volatile, organic, electrochem, optical, fibers, chromium, tetrachloroethylene, coated, air, analysis, methanol, acetone, dichloromethane, trichloroethylene, xylene, hexane	J. Electrochem. Soc., 137(4), 1325-6 (Eng) 1990.	FIBER-OPTIC	CODEN: JESOAN. ISSN: 0013-4651.
112(26):231025w	Ramola, R. C.; Singh, M.; Sandhu, A. S.; Singh, S.; Virk, H. S.	Radon-thoron discrimination using a polythene foil: An application in uranium exploration.	radon, thoron, polythene, foil, uranium, exploration, ores, soils, screening, plastic, track, detector, detectors, ore, analysis, prevention, barrier, alpha, radiation, permeability	Nucl. Geophys., 3(2), 137-9 (Eng) 1989.	RADIOCHEMICAL	CODEN: NUGEEP ISSN: 0886-0130
112(24):220720b	Verloo, Marc; Eeckhout, Mia	Metal species transformations in soils: an analytical approach.	metal, soils, analytical, soil, analysis	Int. J. Environ. Anal. Chem., 39(2), 179-86 (Eng) 1990	CHROMATOGRAPHY	CODEN: IJEAA3 ISSN: 0306-7319
112(22):210245n	Wylie, P. L.; Quimby, B. D.	Applications of gas chromatography with an atomic emission detector.	gas, chromatography, atomic, emission, detector, halogens, metals, analysis, detectors, computer, detection, chromatographs, spectrometric, hydrogen, iron, mercury, nickel, silicon, carbon, tin, arsenic, carbon, cobalt, copper, vanadium, iodine, sulfur, phosphorus, bromine, nitrogen, deuterium, fluorine, oxygen, chlorine, tellurium	J. High Resolut. Chromatogr., 12(12), 813-18 (Eng) 1989	CHROMATOGRAPHY	CODEN: JHRCE7.
112(22):203857p	Dasgupta, Purnendu K.; Ping, Liu; Zhang, Genfa; Hwang, Hoon	Two automated methods for measuring trace levels of sulfur dioxide using translation reactions.	automated, sulfur, dioxide, air, analysis, sulfites, oxidase, hydrogen, peroxide, mercurous, nitrate, mercury, fluorometric, nitrates, preparation, sulfide, conductometric, gold, sensor	ACS Symp. Ser., 393(Biog. Sulfur Environ.), 380-401 (Eng) 1989.	SPECTROMETRY	CODEN: ACSMC8. ISSN: 0097-6156
112(20):191841j	Gehrig, Peter; Rusterholz, Bruno; Simon, Wilhelm	Very lipophilic calcium(2+)-selective ionophore for chemical sensors of high lifetime.	lipophilic, calcium, ionophore, chemical, sensors, lifetime, alkaline, earth, metals, alkali, analysis, ion, membranes, oxapentane, diamide, transistors, sensitive, electrodes, pyrrolidinyl, phosphinic, acid, chloride, dioctadecylamine, oxapentanoic, dicyclohexylamide, membrane, triethylamine, selective, dioxane, dicyclohexylamine, oxapentanedioic, anhydride, lithium, potassium, rubidium, sodium, cesium, hydrogen, ammonium, magnesium, strontium, barium	Chimia, 43(12), 377-9 (Eng) 1989.	ELECTROCHEMICAL	CODEN: CHIMAD ISSN: 0009-4293.
112(20):191028d	Wagner, Thomas	Method for monitoring flowing water for specific elements using x-ray fluorescence radiation.	flowing, water, elements, ray, fluorescence, radiation, analysis, strontium, barium, cadmium, copper	Ger. (East) DD 271570 A1 6 Sep 1989, 5 pp. (Ger).	SPECTROMETRY	CODEN: GEXXA8. CLASS: ICM: G01N023-223. ICS: G01N033-18 APPLICATION: DD 88-316815 18 Apr 1988
112(20):190825a	Quimby, Bruce D.; Sullivan, James J.	Evaluation of a microwave cavity, discharge tube, and gas flow system for combined gas chromatography-atomic emission detection	microwave, cavity, tube, gas, flow, chromatography, atomic, emission, detection, detectors, spectrometers, chromatographs, electric, lamps, methane, propane, hydrogen, analysis, mercury, silicon, carbon, sulfur, phosphorus, bromine, nitrogen, deuterium, fluorine, oxygen, chlorine	Anal. Chem., 62(10), 1027-34 (Eng) 1990.	CHROMATOGRAPHY	CODEN: ANCHAM. ISSN: 0003-2700. OTHER SOURCES: CJACS.
112(20):187995b	Goles, Ronald W.; Nof, Peter J.; Bierke, Richard D.; Holton, Langdon K., Jr.	A remote canister-positioning and glass level detection system.	glass, detection, dynamics, radioactive, ceramic, melter, vitrification, melting, wastes, oxide, waste, radiation, detectors, scintillation, sodium, iodide, thallium, activated, gamma, ray	Nucl. Technol., 89(2), 203-10 (Eng) 1990.	GENERAL	CODEN: NUTYBB ISSN: 0029-5450

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112(20):187694a	Akatsu, Jukkou; Kubota, Takumi; Mutoh, Hiroshi	Gamma ray assay of a waste drum for the determination of plutonium amount (III).	gamma, ray, waste, plutonium, energy, radioactive, wastes, analysis, cesium, attenuation, external, bearing	JNMM, 18(3), 1-5 (Eng) 1990.	RADIOCHEMICAL	CODEN: JNMMEK. ISSN: 0893-6188
112(20):187625d	Markelova, V. F.; Matyukevich, N. P.	Monitoring the tritium content in wastewaters and environmental objects of some Soviet nuclear power stations.	tritium, wastewaters, environmental, nuclear, radiation, detectors, scintillation, radioactive, wastes, plants, analysis, environment, toluene, triton, [illegible], plant	Gig. Sanit. (2), 12-5 (Russ) 1990.	RADIOCHEMICAL	CODEN: GISAAA. ISSN: 0016-9900.
112(20):185460u	Murphy, E. M.; Hostetler, D. D.	Evaluation of chemical sensors for in situ ground-water monitoring at the Hanford Site	chemical, sensors, ground, water, hanford, energy, hydrocarbons, analysis, groundwater, pollution, chromium, hexavalent, carbon, tetrachloride, cyanide, uranium, nitrate, fluoride	Report, PNL-6864; Order No. DE89011304, 85 pp. Avail. NTIS From: Energy Res. Abstr. 1989, 14(14), Abstr. No. 29402 (Eng) 1989.	GENERAL	
112(19):177462r	Lane, E. M.	Determination of radionuclide concentrations of uranium and thorium in unprocessed soil samples.	radionuclide, uranium, thorium, soil, energy, analysis, radioisotopes, ray, fluorescence	Report, DOE/OR/00033-T131; Order No. DE89010612, 150 pp. Avail. NTIS From: Energy Res. Abstr. 1989, 14(13), Abstr. No. 26126 (Eng) 1988.	SPECTROMETRY	
112(18):171388x	Ryan, David A.; Argentine, Suzanne M.; Rice, Gary W.	Helium discharge detector for quantitation of volatile organohalogen compounds.	helium, detector, volatile, organohalogen, rice, hydrocarbons, analysis, gas, spectrometric, chromatographs, detectors, plasma, brominated, chlorinated, carbon, tetrachloride, chloroform, trichloroethane, dibromomethane, bromochloromethane, dichloromethane, bromoform, bromodichloromethane, bromotrichloromethane, dichloropropane, trichloroethylene, tetrabromoethane, tetrachloroethane, dichlorobutane, dibromobenzene, dibromoethane, bromopropane, dibromobutane, chlorobenzene, dibromopropane, dichlorobutane, chlorodibromomethane, tetrachloroethylene, tetrabromide, bromochlorobenzene, chlorobutane, bromine, chlorine, water, halohydrocarbon	Anal. Chem., 62(8), 853-7 (Eng) 1990	CHROMATOGRAPHY	CODEN: ANCHAM. ISSN: 0003-2700. OTHER SOURCES: CJACS
112(18):171389a	Bombick, Daniel D.; Allison, John	Investigations into the response mechanism of the gas chromatographic thermionic ionization detector. Part I. Mass spectral studies.	gas, chromatographic, thermionic, ionization, detector, spectral, chromatographs, detectors, spectroscopic, gases, alkali, aluminosilicate, ceramic, beads, carbon, tetrachloride, analysis, aniline, ethylamine, acetonitrile, nitromethane, nitrobenzene, diethylamine, hexane, triethylamine, trimethylphosphate, butylnitrite, tetracyanoethylene, phosphorus, nitrogen, detection, chromatograph, aluminum, potassium, silicate, alkali	J. Chromatogr. Sci., 27(10), 612-19 (Eng) 1989.	CHROMATOGRAPHY	CODEN: JCHSBZ ISSN: 0021-9665
112(18):158019u	Trutneva, L. M.; Shvoeva, O. P.; Savvin, S. B.	Immobilized Xylenol Orange as sensitive element for fiber optics sensors for thorium(IV) and lead(II).	immobilized, xylenol, orange, sensitive, element, fiber, optics, sensors, thorium, acrylic, fibers, anion, exchanger, exchangers, polyacrylonitrile, optical, detectors, spectrophotometric, analysis, diffuse, reflection, spectrophotometry, elements, optic	Zh. Anal. Khim., 44(10), 1804-8 (Russ) 1989	FIBER-OPTIC	CODEN: ZAKHA8 ISSN: 0044-4502.

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112(14):127337b	Coakes, B. T.; Wieser, A.; Waibel, A.; Vogenauer, A.; Regulla, D. F.	Comparing measurements of free radicals, optical density and thermoluminescence in solids for high-level dosimetry.	radicals, optical, density, thermoluminescence, solids, dosimetry, dosimeters, radioactive, waste, disposal, glass, ceramics, dosimetric, alanine, dosimeter, wastes, manganese, calcium, fluoride, doped, cerium, oxide, calcite, magnesium, lithium, boron, titanium, beryllium, aluminum	Appl. Radiat. Isot., 40(10-12), 905-9 (Eng) 1989.	SPECTROMETRY	CODEN: ARISEF ISSN: 0883-2889
112(14):124766e	Angel, S. M.; Ridley, M. N.; Langry, K.; Kulp, T. J.; Myrick, M. L.	New developments and applications of fiber-optic sensors.	fiber, optic, sensors, laser, radiation, chemical, spectroscopy, water, pollution, detection, waters, geothermal, well, optrodes, optical, detectors, chloroform, trichloroethylene, analysis, chloropyridines, bipyridine, ruthenium, diode	ACS Symp. Ser., 403(Chem. Sens. Microinstrum.), 345-63 (Eng) 1989.	FIBER-OPTIC	CODEN: ACSMC8 ISSN: 0097-6156
112(14):124551f	Koester, Michael	Occurrence, characterization, and analysis of vinyl chloride as a degradation product of chlorinated a from waste disposal sites.	analysis, vinyl, chloride, chlorinated, ethenes, waste, disposal, gas, wastes, trichloroethene, tetrachloroethene, dichloroethene	GWF, Gas-Wasserfach: Wasser/Abwasser, 130(12), 594-7 (Ger) 1989.	CHROMATOGRAPHY	CODEN: GWWAAQ ISSN: 0016-3651.
112(12):104855f	Trojanowicz, Marek; Meyerhoff, Mark E.	Replacement ion chromatography with potentiometric detection using a potassium-selective membrane electrode.	ion, chromatography, potentiometric, detection, potassium, membrane, electrode, chromatographic, liquid, detectors, electrodes, valinomycin, jet, lithium, analysis, sodium, nitrate, ammonium, chloride, fluoride, bromide, potentiometry, polymer	Anal. Chim. Acta, 222(1), 95-107 (Eng) 1989.	CHROMATOGRAPHY	CODEN: ACACAM ISSN: 0003-2670.
112(11):91126p	Matz, Susan G.; Elder, R. C.; Tepperman, Katherine	Liquid chromatography with an inductively-coupled plasma-mass spectrometric detector for simultaneous determination of gold drug metabolites and related metals in human blood.	liquid, chromatography, inductively, plasma, spectrometric, detector, gold, drug, metabolites, metals, human, blood, analysis, spectroscopy, desorption, drugs, myochrysine, triethylphosphine, auranofin, deacetylated, humans, cadmium, copper, zinc	J. Anal. At. Spectrom., 4(8), 767-71 (Eng) 1989	CHROMATOGRAPHY	CODEN: JASPE2, ISSN: 0267-9477, OTHER SOURCES: CJRSC
112(10):85584x	Shinohara, Taizo; Tanaka, Toshiharu	Sensor for detecting the toxic components in wastewater.	sensor, toxic, wastewater, electric, cyanides, analysis, phenols, metals, arsenic	Jpn. Kokai Tokkyo Koho JP 01043050 A2 9 Mar 1989 Heisei, 5 pp. (Japan).	ELECTROCHEMICAL	CODEN: JKXXAF CLASS: ICM G01N027-30 ICS: G01N027-48 APPLICATION: JP 87-220847
112(7):54216x	Bukin, V. V.	Compensation for temperature dependence of ion-selective electrodes during soil analysis	ion, electrodes, soil, analysis, activity, temp. soils, electrode	Izv. Akad. Nauk SSSR, Ser. Biol. (6), 940-4 (Russ) 1989.	ELECTROCHEMICAL	CODEN: IZANAN ISSN: 0002-3329
112(6):49058h	Costanzo, Robert B.; Barry, Eugene F.	Gas chromatographic detection of selected organochlorine species using an alternating current plasma detector.	gas, chromatographic, detection, organochlorine, alternating, plasma, detector, chromatography, chlorotoluene, dichlorobenzene, butylchloride, tetrachloroethylene, analysis, chloropropane, pentylchloride, hexylchloride, dichlorodecane, dichlorobenzene, chlorane, [illegible]	J. Chromatogr., 467(2), 373-84 (Eng) 1989	CHROMATOGRAPHY	CODEN: JOCRAM ISSN: 0021-9673
112(4):44116e	Files, Peter	Specific activity of large-volume sources determined by a collimated external gamma detector.	activity, external, gamma, detector, radioactive, wastes, cobalt, cesium, spectrometry, analysis, waste	Kerntechnik, 54(3), 196-201 (Eng) 1989.	RADIOCHEMICAL	CODEN: KRNTAJ ISSN: 0932-3902

CA NO.	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
112(6):39457h	Olsen, K. B.; Evans, J. C.; Sklarew, D. S.; Fruchter, J. S.; Girvin, D. C.; Nelson, C. L.	Characterization of mercury, arsenic, and selenium in the product streams of a bench-scale, inert-gas, oil shale retort.	mercury, arsenic, selenium, streams, inert, gas, oil, shale, water, pollution, air, rates, waste, gases, wastewater, petroleum, environmental, preparation	Environ. Sci. Technol., 24(2), 258-63 (Eng) 1990.	SPECTROMETRY	CODEN: ESTHAG. ISSN: 0013-936X. OTHER SOURCES: CJACS
112(4):30071x	Abe, Hidetsugu; Kanaya, Shigehiko; Takahashi, Yoshimasa; Sasaki, Shinichi	Combined semiconductor gas sensor system for detection of specific substances in particular environments.	semiconductor, gas, sensor, detection, particular, environments, analysis, ethanol, acetic, acid, acetone, gases	Anal. Chim. Acta, 219(2), 223-32 (Eng) 1989.	RADIOCHEMICAL	CODEN: ACACAM. ISSN: 0003-2670
112(3):20358g	Yu, T. R.; Beyme, B.; Richter, J.	Direct determination of potassium-calcium activity ratio in soils with two ion-selective electrodes. Part 2. Interactions of potassium and calcium ions with soils.	potassium, calcium, activity, ratio, soils, ion, electrodes, ions, soil, ferralsols, exchange, aluminum, anion, ferric, luvisols, sulfate, chloride, affinity	Z. Pflanzenernaehr. Bodenkd., 152(5), 359-65 (Eng) 1989.	ELECTROCHEMICAL	CODEN: ZPBOAL. ISSN: 0044-3263.
112(3):20034t	Yu, T. R.; Beyme, B.; Richter, J.	Direct determination of the potassium-calcium activity ratio in soils with two ion-selective electrodes. Part 1. Method of determination.	potassium, calcium, activity, ratio, soils, ion, electrodes, soil, analysis	Z. Pflanzenernaehr. Bodenkd., 152(5), 353-8 (Eng) 1989.	ELECTROCHEMICAL	CODEN: ZPBOAL. ISSN: 0044-3263
112(2):15769n	Zhang, Li Ming; Uttamchandani, D.	Optical chemical sensing using the surface plasmon absorption line.	optical, chemical, sensing, plasmon, absorption, electron, detectors, resonance, acetone, analysis	Proc. SPIE-Int. Soc. Opt. Eng., 1012(In-Process Opt. Meas.), 80-5 (Eng) 1989.	SPECTROMETRY	CODEN: PSISDG. ISSN: 0277-786X
112(1):4184r	Yasuhara, Akio; Shibamoto, Takayuki	Determination of physical and spectral data on thiazolidines for trace aldehyde analysis.	spectral, thiazolidines, aldehyde, analysis, environmental, food, aldehydes, gas, spectra, nuclear, magnetic, resonance, chromatography, formaldehyde, acetaldehyde, pentanal, thiazolidine, foods, environment, isobutylthiazolidine, heptylthiazolidine, octylthiazolidine, dimethylthiazolidine, ethylthiazolidine, isopropylthiazolidine, methylthiazolidine, butylthiazolidine, hexylthiazolidine, pentylthiazolidine, cysteamine, propanone	Agric. Biol. Chem., 53(8), 2273-4 (Eng) 1989.	CHROMATOGRAPHY	CODEN: ABCHA6. ISSN: 0002-1369
111(26):246831a	Kondratenko, L. A.; Lyubina, V. A.	Potentiometric determination of sulfate ion by using ion-selective electrodes.	potentiometric, sulfate, ion, electrodes, anion, exchangers, sorption, potentiometry, barium, analysis, cation, electrode, thiosulfate, removal, water	Izv. Sib. Otd. Akad. Nauk SSSR, Ser. Khim. Nauk (3), 91-7 (Russ) 1989.	ELECTROCHEMICAL	CODEN: IZSKAB. ISSN: 0002-3426.
111(26):234684y	Klainer, Stanley M.; Koutsandreas, John D.; Eccles, Lawrence	Monitoring ground-water and soil contamination by remote fiber spectroscopy.	ground, water, soil, fiber, spectroscopy, isotopes, analysis, spectrochemical, environmental, optics, optical, fibers, spectrochem, fluorometers, chlorides	ASTM Spec. Tech. Publ., 963(Ground-Water Contam.), 370-80 (Eng) 1988.	FIBER-OPTIC	CODEN: ASTTA8. ISSN: 0066-0558.
111(26):224526x	Aleksandrova, A. M.; Rappoport, L. R.; Borisheva, Zh. L.; Khutsishvili, A. M.; Pletneva, T. V.	Method of determining exchange ammonium and potassium in soil using a potassium ion-selective electrode.	exchange, ammonium, potassium, soil, ion, electrode, analysis, electrodes	U.S.S.R. SU 1508913 A1 15 Aug 1989 From: Otkrytiya, Izobret. 1989, (34), 164. (Russ).	ELECTROCHEMICAL	CODEN: URXXAF. CLASS: ICM: G01N033-24 APPLICATION: SU 86-4133030 14 Oct 1986.
111(26):224360r	Tan, Kaixie	Indirect determination of arsenic in rocks, minerals and soils by hydride generation and using an ion-selective electrode.	arsenic, rocks, minerals, soils, hydride, ion, electrode, geol, nonferrous, metal, soil, analysis, potentiometry, silver, zinc, ores	Fenxi Shiyanshi, 7(10), 37-9 (Ch) 1988.	ELECTROCHEMICAL	CODEN: FENSE4

CA NO.	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
111(19):178375d	Suzuki, Shogo; Saitoh, Kiyoe; Hirai, Shoji	Determination of multielements in Japanese reference material by instrumental neutron activation analysis.	multielements, neutron, activation, analysis, energy, elements, environmental, analytical, environment, metals, radiochemical, aluminum, iron, lanthanum, magnesium, manganese, molybdenum, nickel, potassium, rubidium, samarium, scandium, element, sodium, strontium, terbium, thorium, antimony, arsenic, barium, cerium, cesium, chromium, cobalt, europium, gold, hafnium, uranium, vanadium, ytterbium, zinc, zirconium, calcium, iodine, sulfur, bromine, selenium, chlorine, tellurium	Bunseki Kagaku, 38(4), 198-204 (Japan) 1989	SPECTROMETRY	CODEN: BNSKAK ISSN: 0525-1931
111(10):084704q	Pinochet, Hugo; Delgado, Diana; DeGregori, F. Ida	Amperometric detector for continuous flow analysis.	amperometric, detector, flow, analysis, amperometry, mercury	Bol. Soc. Chil. Quim., 34(1), 3-10 (Span) 1989.	ELECTROCHEMICAL	CODEN: BSCQAK ISSN: 0366-1644
111(10):56430lj	Carrabba, M. M.; Rauh, R. D.	Remote fiber optic sensor for gaseous and liquid environments based on surface-enhanced Raman spectroscopy (SERS Phase I.	fiber, optic, sensor, gaseous, liquid, environments, spectroscopy, SERS, analysis, environmental, optical, fibers, spectrometric, spectrometers, optics, spectrochemical, water, ground	Report, Order No. AD-A205218, 30 pp. Avail. NTIS From: Gov. Rep. Announce. Index (U. S.) 1989, 89(22), Abstr. No. 936,788 (Eng) 1989.	FIBER-OPTIC	
111(10):166278g	Davydova, E. L.; Chervina, L. V.; Shpigun, L. K.; Radchenko, A. F.; Ostrotskaya, N A.	Electrochemical properties and use of a copper-selective electrode in mixed solvents.	electrochemical, copper, electrode, mixed, solvents, petrochem, metals, analysis, organometallic, potentiometric, chelatometry, electrodes, chelates, metal, titration, cadmium, ligands, cobalt, iron, manganese, nickel, analysis, zinc, ligand, ethanol, propanol	Zh. Anal. Khim., 43(11), 1976-80 (Russ) 1988.	ELECTROCHEMICAL	CODEN: ZAKHA8, ISSN: 0044-4502
111(10):163391l	Vetsev, A. A.	Search for a means of developing photomultipliers with an ultralow level of inherent noises.	photomultipliers, noises, radiation, detectors, sodium, iodide, thallium, activated, photomultiplier, noise, glass, oxide, borosilicate, photocathode, photoelectric, multipliers, iron, analysis, potassium, thorium, hafnium, uranium, refractory, antimony, cesium, photocathodes	Prib. Tekh. Eksp. (3), 147-52 (Russ) 1989.	RADIOCHEMICAL	CODEN: PRTEAJ, ISSN: 0032-8162
111(16):140642d	Angel, S. M.; Langry, K. C.; Kulp, T. J.; Daley, P. F.; Bishop, D. J.	In situ detection of organic molecules.	detection, organic, molecules, Lawrence, energy, optical, fibers, sensor, chloroform, trichloroethylene, ground, water, analysis, trifluoroethylene, fluorescence	Report, UCRL-21081, DOE/HWP-66; Order No. DE89016146, 58 pp. Avail. NTIS From: Energy Res. Abstr. 1989, 14(22), Abstr. No. 52174 (E	SPECTROMETRY	
111(16):145037y	Cheng, Chundei; Wang, Yuting; Huang, Sazle	Study on ferrocenylpolythiaoxa crown ether mercury(II) ion-selective electrode.	ferrocenylpolythia, crown, ether, mercury, ion, electrode, electrodes, membrane, analysis, divalent, potentiometry	Fenxi Huaxue, 9(4), 52-5 (Ch) 1989.	ELECTROCHEMICAL	CODEN: HCHMDW. ISSN: 0258-1561
111(16):140078h	Duchart, F. L.; Schreiner, S. K.; Nagar, G. R.; Simmel, Heinz	A fiber-optic dipping sensor for organic solvents in wastewater.	fiber, optic, dipping, sensor, organic, solvents, wastewater, triphenylmethane, dye, immersion, sensors, optical, fibers, solvent, ammonia, dyes, ethanol, analysis, methanol, acetone, tetrahydrofuran, ethyl, acetate, bisphenol, nitrophenol, water, waste	Anal. Chem., 61(20), 2306-9 (Eng) 1989.	FIBER-OPTIC	CODEN: ANCHAM, ISSN 0003-2700 OTHER SOURCES: CJACS

CA NO	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
111(14):126120b	Wang, Erkang; Ji, Huamin	Ion transfer across water/solidified nitrobenzene interface as amperometric flow detector.	ion, across, water, solidified, nitrobenzene, amperometric, flow, detector, electrodes, detection, injection, chromatographs, liquid, detectors, electric, wave, ions, electrode, tetramethylammonium, perchlorate, cesium, tetrabutylammonium, permanate, ratio, hydrodynamic, voltammogram, choline, acetylthiocholine, acetylcholine, analysis	Electroanalysis (N. Y.), 1(1), 75-80 (Eng) 1989	ELECTROCHEMICAL	CODEN: ELANEU ISSN: 1040-0397
111(14):125955p	Avezzano, P.; Silvestri, M	Determination of alpha-emitting nuclides of thorium and uranium in soil and sediment samples	alpha, emitting, nuclides, thorium, uranium, soil, sediment, fuel, geological, sediments, analysis, spectrometry, soils	Stud. Environ. Sci., 34(Chem. Prot. Environ. 1987), 131-9 (Eng) 1988.	RADIOCHEMICAL	CODEN: SENSDA ISSN: 0166-1116
111(12):100124t	Reylev, V. A.; Krasotskii, B. G.; Gershtein, L. I.	Nonselective dielectrometric detector for gas chromatography.	dielectrometric, detector, gas, chromatography, dielectric, dispersion, detectors, chromatographs, capillary, carbon, tetrachloride, analysis, trichloroethane, methane, disulfide, hydrogen, sulfur, hexafluoride, neon, hydrochloric, acid, nitrogen, oxygen, sulfide	Vysokochist. Veshchestva (1), 140-6 (Russ) 1989	CHROMATOGRAPHY	CODEN: VVVEEC ISSN: 0235-0122
111(12):102141q	Ephraim, J. H.; Xu, H.	The binding of cadmium by an aquatic fulvic acid: a comparison of ultrafiltration with ion-exchange distribution and ion-selective electrode techniques	binding, cadmium, aquatic, fulvic, acid, ultrafiltration, ion, exchange, electrode, water, acids	Sci. Total Environ., Volume Date 1989, 81-82, 625-34 (Eng) 1989.	ELECTROCHEMICAL	CODEN: STENDL ISSN: 0048-9697
111(10):85534h	Rajakovic, Ljubinka; Ghaemmaghami, Vida; Thompson, Michael	Adsorption on film-free and antibody-coated piezoelectric sensors	adsorption, antibody, coated, piezoelectric, sensors, albumins, bovine, biosensors, gas, antibodies, parathion, antiserums, valproic, acid, analysis, immunoglobulins, human, oscillators, resonators, coatings, nitrotoluene, malathion, dimethoate, detection	Anal. Chim. Acta, 217(1), 111-21 (Eng) 1989	PIEZOELECTRIC	CODEN: ACACAM ISSN: 0003-2670
111(16):[illegible]	Nishikawa, T.; Nakajima, K.; Kawase, Y.; Nagaya, H.; Nagakura, H.; Imaizumi, H.	Development of a simplified nondestructive gamma-nuclide assay system employing an auto-iris collimator.	nondestructive, gamma, nuclide, employing, iris, waste, ray, cement, surrogate, radioactive, wastes, cesium, analysis, cobalt, germanium, radiation, detectors, iron	Proc. Symp. Waste Manage. (Waste Manage. 89, Vol. 2), 807-14 (Eng) 1989	RADIOCHEMICAL	CODEN: PSWMDT ISSN: 0275-6196.
111(14):45957f	Hemy, Karen C.; Liddle, Steven D.; Hickey, Cathy B.; Evans, Richard W.	Thorium-230 contamination: problems in field detection and recent advances.	thorium, detection, advances, oak, ridge, waste, soil, pollution, analysis, radiation, detectors, scintillation, radioactive, wastes, solid, soils	Proc. Symp. Waste Manage. (Waste Manage. 89, Vol. 2) 415-18 (Eng) 1989.	GENERAL	CODEN: PSWMDT ISSN: 0275-6196
111(14):61610n	Todd, Peter W.; Lacombe, Eleanor; Hess, C. Thomas	Cross contamination between alpha-track detectors.	cross, alpha, track, detectors, portland, health, physics, radon, activity, air, analysis, soil, radiation, particle, water	Health Phys., 57(1), 163-5 (Eng) 1989	RADIOCHEMICAL	CODEN: HLTPAO ISSN: 0017-9078
111(8):66320w	Pineira, Thomas H.	Improved gamma spectrometry of very low level radioactive samples	gamma, spectrometry, radioactive, waste, ray, spectroscopy, radiation, detectors, wastes, iodine, analysis, cesium, cobalt, potassium, radium, actinium, bismuth, cadmium, copper, shielding	Proc. Symp. Waste Manage. (Waste Manage. 89, Vol 2), 141-9 (Eng) 1989	SPECTROMETRY	CODEN: PSWMDT ISSN: 0275-6196

CA NO	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
111(8):53633q	Basilico, James V ; Pfeiffer, Thomas	New developments in field monitoring techniques for measuring toxics in ground water and their potential for environmental control applications	toxics, ground, water, environmental, hazard, waste, solvents, chlorinated groundwater, fiber, optic, sensor, pollution, chloroform, analysis, pollutant	Hazard Ind Waste, 20th, 122-33 (Eng) 1988	GENERAL	CODEN: HIWAE8
111(8):63436v	Jansen, Ortrun	Characterization of landfill gas by selected trace compounds with special regard to sulfur compounds	landfill, gas, sulfur, waste, dense hazardous, tetrachloroethane, analysis, chloroform, benzene trichloroethane, methanethiol, vinylchloride, dichloromethane, dimethylsulfide, propanethiol, dichloroethane, trichlorofluoromethane, dichlorodifluoromethane, trichloroethane, xylene, ethylbenzene, toluene, hexane, cyclohexane, tetrachloroethene, butanethiol, dimethyldisulfide, dimethyltrisulfide hydrogen, sulfide, disposal	Muell Abfall, 21(4), 198-202, 204, 206 8 (Ger) 1989	CHROMATOGRAPHY	CODEN MUABAB ISSN: 0027-2957
111(7):153174	Zhu, M M ; Yang, X L	Determination of plutonium in environmental soil using plutonium-238 as a yield tracer	plutonium, environmental, soil, health, analysis, spectrometric, isotope	J Radioanal Nucl Chem , 130(2), 443-9 (Eng) 1989	RADIOCHEMICAL	CODEN: JRNCDM ISSN 0236-5731
111(4):49673f	Jones, Bradley T ; Smith, Ben W ; Winefordner, James D	Continuum source atomic absorption spectrometry in a graphite furnace with photodiode array detection	atomic, absorption, spectrometry, graphite, furnace, photodiode, detection, alkaline, earth, metals, analysis, spectrochemical, spectrometers, water, sea, bronze, aluminum, iron, lithium, magnesium, manganese, nickel, element, sodium strontium, antimony, arsenic, barium cadmium, chromium, cobalt, copper, zinc, calcium	Anal Chem , 61(15) 1670-4 (Eng) 1989	SPECTROMETRY	CODEN ANCHAM ISSN: 0003-2700 OTHER SOURCES: CJACS
111(6):44020f	Marsaguerra, M	Use of the spectral analysis for estimating the intensity of a weak periodic source	spectral, analysis, radioactive, wastes, plutonium, oscillating, sealed, radiation, buried	Nucl Instrum Methods Phys Res , Sect A A277(2-3), 611-19 (Eng) 1989	SPECTROMETRY	CODEN NIMAER ISSN 0168-9002
111(6):44532m	Tarkan, Necdet	A laboratory method of making detector tubes for the determination of benzene concentration in the exhaled breath	detector, tubes, benzene, exhaled breath, health, air, analysis, hygiene, toluene, formaldehyde, reagents	J Environ Sci Health, Part A, A24(2), 111-25 (Eng) 1989	CHROMATOGRAPHY	CODEN: JESEDU ISSN 0360-1226
111(4):28263x	Nakajima, Jun	Simple determination of trichloroethylene and tetrachloroethylene in water by detector tube.	trichloroethylene, tetrachloroethylene, water, detector, tube, analysis, wastewater	Chiba-ken Suishitsu Hozen Kenkyusho Nempo 51-5 (Japan) 1988	CHROMATOGRAPHY	CODEN: CKKNED
111(2):14193f	Chiba, Tsutomu	Development of nondestructive assay system for waste containing TRU (transuranium) isotopes	nondestructive, waste, transuranium, isotopes, elements, radioactive, wastes, alpha, particle, emitting, plutonium, analysis, uranium	Mitsubishi Genshiryoku Giho, 53, 28-32 (Japan) 1989	RADIOCHEMICAL	CODEN: MGGIDT ISSN: 0388-3194
111(2):14044v	Meyer, H R ; Begley, C ; Daily, C	Field instruments developed for radiation measurements on the UMTRA project	radiation, waste, health, uranium tailings, action, soil, analysis, radium, detectors, radioactive, wastes, alpha, particle, nuclear, spectrometers gamma, ray, scintillation, thorium tailings	Proc Symp Waste Manage (Waste Manage 87, Vol 3), 585-9 (Eng) 1987	GENERAL	CODEN WAMADT ISSN 0275-6196

CA NO.	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
110(26):238874a	Wise, S. M.; Valtkamp, D. J.; Davis, T.; Tucker, R. L.; Kowalski, B. R.	Principal components analysis for monitoring the West Valley liquid fed ceramic melter.	analysis, valley, liquid, ceramic, melter, waste, furnaces, electric, melting, vitrified, radioactive, glass, oxide, wastes	Proc. Symp. Waste Manage. (Waste Manage. 88, Vol. 2), 811-16 (Eng) 1988	GENERAL	CODEN: PSWMDY ISSN: 0275-6196.
110(26):238780v	Tagi, T.; Kato, T.; Hashimoto, M.; Moribayashi, H.; Motise, T.	Practicable assay system for radionuclide quantification of disposal packages.	radionuclide, disposal, waste, radiochemical, analysis, radioactive, wastes, radiation, detectors, scintillation, spectroscopy, cesium, strontium, cobalt, nickel, carbon	Proc. Symp. Waste Manage. (Waste Manage. 88, Vol. 2), 429-35 (Eng) 1988	RADIOCHEMICAL	CODEN: PSWMDY ISSN: 0275-6196
110(26):238665h	Marton, R. A.; Taylor, L. R.; Wilson, K. L.	Development of an in situ subsurface radioactivity detection system-the "Radcone".	subsurface, radioactivity, detection, radcone, earth, waste, radioelements, analysis, health, physics, soil, radioactive, wastes, radionuclide, radiation, detectors, gamma, ray	Proc. Symp. Waste Manage. (Waste Manage. 88, Vol. 1), 865-51 (Eng) 1988	RADIOCHEMICAL	CODEN: PSWMDY. ISSN: 0275-6196
110(26):238664j	Green, Steven	A field study designed to select the in-situ instrument most useful for estimating uranium contamination in soil.	uranium, soil, green, waste, analysis, radiation, detectors, scintillation, sodium, iodide, scintillometer	Proc. Symp. Waste Manage. (Waste Manage. 88, Vol. 1), 695-701 (Eng) 1988	GENERAL	CODEN: PSWMDY ISSN: 0275-6196.
110(22):204819y	Dunsmo, Tshungu; Peterman, Dean; Shaffer, John; Meloreno, Paula R.	Flow-through spectroelectrochemical detector based on diffraction at a cylindrical electrode.	flow, spectroelectrochemical, detector, diffraction, cylindrical, electrode, optical, pencil, electrodes, spectroelectrochem, detectors, diffracting, spectrochemical, analysis, electrochem, diffractive, ascorbic, acid, bromocresol, green, viologen	Anal. Chem., 61(11), 1214-21 (Eng) 1989.	ELECTROCHEMICAL	CODEN: ANCHAM. ISSN: 0003-2700 OTHER SOURCES: CJACS
110(22):204817w	Griffin, J. W.; Olsen, K. B.; Matson, B. S.; Nelson, D. A.; Eschbach, P. A.	Fiber optic spectrochemical emission sensors.	fiber, optic, spectrochemical, emission, sensors, fibers, optical, detectors, optics, pollutants, air, groundwater, analysis, pollutant, spectrochem, pollution, water, ground	Proc. SPIE-Int. Soc. Opt. Eng., 990(Chem., Biochem., Environ. Appl. Fibers), 55-60 (Eng) 1989.	CHROMATOGRAPHY	CODEN: PSISDG. ISSN: 0277-786X.
110(22):198814a	Jalkian, R. D.; Denton, M. B.	Femtogram level determination of cobalt and chromium by luminol chemiluminescence detected by a charge coupled device.	femtogram, cobalt, chromium, luminol, chemiluminescence, water, analysis, hydrogen, peroxide, detector	Report, TR-53; Order No. AD-A194307, 5 pp. Avail. NTIS From: Gov. Rep. Announce. Index (U. S.) 1988, 88(20), Abstr. No. 854,830 (Eng) 1989.	SPECTROMETRY	
110(20):181317a	Rodgers, J. C.; Kenney, J. W.	A critical assessment of continuous air monitoring systems at the Waste Isolation Pilot Plant.	critical, air, waste, pilot, plant, health, energy, radioactive, wastes, radiation, detectors, analysis, radioactivity, radon, thoron	Report, DOE/AL/10752-38, EEG-38, 87 pp. Avail. GPO From: Energy Res. Abstr. 1988, 13(14), Abstr. No. 30030 (Eng) 1988.	GENERAL	
110(20):175909w	Wise, B. M.; Ricker, N. L.	Feedback strategies in multiple sensor systems.	feedback, multiple, sensor, dynamics, radioactive, wastes, vitrification	AIChE Symp. Ser., 85(267, Process Sens. Diagn.), 19-23 (Eng) 1989.	GENERAL	CODEN: ACSSCQ ISSN: 0065-8812.
110(18):165228a	Bright, F. V.; Poirier, G. E.; Hieftje, G. M.	New fiber-optic-based ion sensor.	fiber, optic, ion, sensor, alkaline, earth, metals, alkali, analysis, fluorometric, immobilized, rhodamine, optical, fibers, sensors, spectrochemical, metal, ions, detectors, optrodes, fluorometric, hydrogen, iron, lithium, magnesium, manganese, nickel, potassium, sodium, barium, chromium, cobalt, copper, zinc, calcium, ammonium	Report, INDU/DC/GMH/TR-88-17; Order No. AD-A191332, 38 pp. Avail. NTIS From: Gov. Rep. Announce. Index (U.S.) 1988, 88(15), Abstr. No. 830,316 (Eng) 1988	FIBER-OPTIC	
110(18):160331f	Kenny, Jonathan E.; Jarvis, George B.; Chudyk, Wayne A.; Pohlig, Kenneth O.	Ground-water monitoring using remote laser-induced fluorescence.	ground, water, laser, fluorescence, pollution, groundwater, aromatic, gasoline, organic, biological, phenol	ACS Symp. Ser., 383(Luminesc. Appl. Biol., Chem., Environ., Hydrol. Sci.), 233-9 (Eng) 1989.	FIBER-OPTIC	CODEN: ACSMC8 ISSN: 0097-6156
110(18):160030e	Kalinec, G. M.; Koutsandreas, J. D.; Bowles, L.	Monitoring ground water and soil contamination by remote fiber spectroscopy.	ground, water, soil, fiber, spectroscopy, pollution, chloroorg, optic, sensors, groundwater, organic, biological, analysis, chloroform	Stud. Environ. Sci., 34(Chem. Prot. Environ. 1987), 293-306 (Eng) 1988.	FIBER-OPTIC	CODEN: SENSDA ISSN: 0166-1116

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110(15):1[illegible]d	Yu, [illegible]	Development and application of a microwave-induced plasma emission spectrometric detector for gas chromatography in China.	microwave, plasma, emission, spectrometric, detector, gas, chromatography, chemical, alcohols, analysis, gasoline, impurities, chromatographs, detectors, spectrometers, detection, tetrachloropropene, raw, dichlorofluoromethane, chlorodifluoromethane, trichlorofluoromethane, chlorotrifluoromethane, carbon, dioxide, water, freon, mercury, ethylmethyl, ethanol, butanol, hydrogen, iodine, sulfur, phosphorus, bromine, nitrogen, deuterium, fluorine, oxygen, chlorine, dichloropropane, trichloropropane, empirical, methanol, acetone, benzene, trimethylbenzene, butylbenzene, ethylbenzene, xylene, cyclohexane, octane, ethyl, acetate, heptane, impurity	J. Anal. At. Spectrom., 3(4), 491-[illegible] (Eng) 1988.	CHROMATOGRAPHY	CODEN: JASPE2. ISSN: 0267-9477. OTHER SOURCES: CJACS.
110(15):1[illegible]	Batra, R. J.; Garg, A. N.	Bulk analyses of soils by fast neutron activation analysis using an americium-241-beryllium neutron source.	bulk, analyses, soils, neutron, activation, americium, beryllium, soil, aluminum, iron, silicon	J. Indian Chem. Soc., 65(10), 705-[illegible] (Eng) 1988	RADIOCHEMICAL	CODEN: JICSAH ISSN: 0019-4522
110(14):1[illegible]	Younger, A. F.; Thomas, R. C.	Variable matrix combustible crate design and fabrication.	combustible, rocky, flats, plant, energy, radiochemical, analysis, neutron, radioactive, waste, shipping, wastes, radiation, detectors	Report, RFP-4[illegible]; Order No. [illegible], 22 pp. Avail. NTIS From: Energy Res. Abstr. 1988, 13(1[illegible]), Abstr. No. [illegible] (Eng) 1988.	GENERAL	
110(15):1[illegible]	Eccles, Larry; Eastwood, DeLyle	Rationale for in situ environmental monitoring with fiber optics.	rationale, environmental, fiber, optics, fibers, water, pollution, groundwater, hazardous, waste, disposal, optic, sensors, optical, analysis, ground	Proc. SPIE-Int. Soc. Opt. Eng., 990(Chem., Biochem., Environ. Appl. Fibers), 30-6 (Eng) 1989.	FIBER-OPTIC	CODEN: PSISDG ISSN: 0277-786X
110(16):1[illegible]	Zhuang, [illegible]; Qi, [illegible]	Studies on PVC lithium ion-selective electrodes based on tetraphenylborates	lithium, ion, electrodes, tetraphenylborates, potassium, tetraphenylborate, membrane, phenylphosphonate, phosphate, sodium, analysis, potentiometry, electrode	Gaodeng Xuexiao Huaxue Xuebao, 9(8), 847-9 (Ch) 1988.	ELECTROCHEMICAL	CODEN: [illegible] ISSN: 0251-0790
110(12):103775[illegible]	Parcher, Jon F.; Barbour, Carleton J.; Murray, Royce W.	Solid-state voltammetry and polymer electrolyte plasticization as a basis for an electrochemical gas chromatographic detector.	solid, voltammetry, polymer, electrolyte, plasticization, electrochemical, gas, chromatographic, detector, sorption, polyethylene, oxide, lithium, triflate, electrochem, diffusion, electrolytic, platinum, electrode, ethanol, analysis, methanol, propanol, butanol, acetonitrile, methylene, chloride, toluene, pentane, pyridine, helium, ferrocenecarboxylic, acid	Anal. Chem., 61(6), 584-9 (Eng) 1989.	ELECTROCHEMICAL	CODEN: ANCHAM. ISSN: 0003-2700 OTHER SOURCES: CJACS
110(12):103655m	Moulin, Christophe; Delorme, Nathalie; Berthoud, Thierry; Mauchien, Patrick	Double beam thermal lens spectroscopy for actinides detection and speciation.	beam, thermal, spectroscopy, actinides, detection, spectrometry, radioactive, wastes, spectrochemical, analysis, water, plutonium, nuclear, lensing	Radiochim. Acta, 44-45(Pt. 1), 103-6 (Eng) 1988.	SPECTROMETRY	CODEN: RAACAP ISSN: 0033-8230

CA NO.	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
110(11):93934h	Tsujimoto, Tadashi	A comparison between in-situ and sampling methods for the determination of radionuclides in soil.	radionuclides, soil, radioelements, analysis, portable, gamma, ray, detectors, radioactive, thorium, uranium, potassium	J. Radiat. Res., 29(4), 235-37 (Eng) 1988.	RADIOCHEMICAL	CODEN: JRARAX ISSN: 0449-3060
110(10):87711u	Dong, Michael W.; Greenberg, Arthur	Liquid chromatographic analysis for polynuclear aromatic hydrocarbons with diode array detection.	liquid, chromatographic, analysis, polynuclear, aromatic, hydrocarbons, diode, detection, chromatography, hydrocarbon, pollutants, air, environmental, soil, spectrochemical, particles, airborne, polycyclic, benzo, pyrene, anthracene, acenaphthene, phenanthrene, fluorene, naphthalene, perylene, acephenanthrylene, fluoranthene, acenaphthylene, chrysene	J. Liq. Chromatogr., 11(9-10), 1887-905 (Eng) 1988.	CHROMATOGRAPHY	CODEN: JLCHD8 ISSN: 0148-3919
110(8):65399x	Bansal, V.; Tyagi, R. K.; Prasad, R.	Determination of uranium concentration in domestic water samples by fission track method.	uranium, water, fission, track, health, physics, analysis	J. Radioanal. Nucl. Chem., 125(2), 439-43 (Eng) 1988.	RADIOCHEMICAL	CODEN: JRNCDM. ISSN: 0236-5731
110(6):47186e	Carmon, B.; Dyer, A.; Keir, D.	Cherenkov spectroscopic assay of fission isotopes. III. A study on the influence of pH and sodium concentration on the uptake of cesium-137, strontium-90, and yttrium-90 onto zeolites.	spectroscopic, fission, isotopes, sodium, cesium, strontium, yttrium, zeolites, gamma, ray, chemical, spectrometry, adsorption, radionuclides, radiation, detectors, radioactive, wastes, removal, analysis, nitrate, ion, exchange, clinoptilolite	J. Radioanal. Nucl. Chem., 125(1), 135-42 (Eng) 1988.	SPECTROMETRY	CODEN: JRNCDM ISSN: 0236-5731.
110(6):47857a	Li, T. K.; Simonds, S. M.; Ensslin, N.; Cowder, L. R.; Sprinkle, J. K.; Parker, J. L.; Hytel, M. M.; Bourret, S. C.; Garcia, D. L.; Kroeger, J.	A high-performance, low-density waste assay system.	density, waste, radioactive, wastes, uranium, detector, radiation, detectors, gamma, ray, analysis	Nucl. Mater. Manage., 17, 344-5 (Eng) 1988	RADIOCHEMICAL	CODEN: NUMMD8. ISSN: 0362-0034.
110(4):33125n	Mcnamara, E. A.; Montzka, S. A.; Barkley, R. M.; Sievers, R. E.	Superconductor metal oxide catalyst in a chemiluminescence chromatography detector.	superconductor, metal, oxide, catalyst, chemiluminescence, chromatography, detector, gasoline, detection, gas, alcohols, analysis, alkenes, catalysts, catalysis, superconducting, oxygen, perovskite, yttrium, barium, copper, detectors, spectrochemical, chromatographic, nitrogen, methanol, acetone, benzene, acetonitrile, acetaldehyde, nitromethane, butanol, methylethylketone, methylcyclohexane, toluene, octane, octene, ammonia, ethanol, dioxide	J. Chromatogr., 452, 75-83 (Eng) 1988.	CHROMATOGRAPHY	CODEN: JOCRAM ISSN:
110(4):32593g	[illegible], V.; Marutis, A.; [illegible], [illegible]; Petrukhin, O. M.	Plasticized ion-selective electrode for determination of nickel in cyanide solutions.	plasticized, ion, electrode, nickel, cyanide, solutions, electrodes, membranes, tetradecylphosphonium, tetracyanonickelate, analysis, potentiometry, cadmium, electroplating, baths	Zh. Anal. Khim., 42(12), 2209-12 (Russ) 1987.	ELECTROCHEMICAL	CODEN: ZAKHA8. ISSN: 0044-4502.
110(2):17740d	Wolfbeis, Otto S.	Fiber optical fluorosensors in analytical and clinical chemistry.	fiber, optical, fluorosensors, analytical, fluorometers, optics, sensors, detectors, spectrochemical, analysis, fluorometric, optic	Chem. Anal. (N. Y.), 77(Mol. Lumin. Spectrosc., Pt. 2), 129-281 (Eng) 1988	FIBER-OPTIC	CODEN: CANLAN ISSN: 0069-2883
110(2):14040j	Filss, P.; Odoj, R.; Rege, K.	Possibilities and limits of gamma-ray spectrometric activity determination in waste vessels.	gamma, ray, spectrometric, activity, waste, vessels, radioactive, wastes, spectrometry, radiation, detectors, vessel, cesium, analysis, cobalt, germanium, detector	Fachverb. Strahlenschutz, [Ber.] FS, FS-87-44-T, Entsorgung, 67-74 (Ger) 1987	SPECTROMETRY	CODEN: FSBEDK. ISSN: 0253-0341

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109(26):243283a	Lauzon, Claude; Tran Khanh Chi; Hubert, Joseph	Multiwavelength detection in gas chromatography with microwave-induced plasma atomic emission Fourier-transform spectrometry.	multiwavelength, detection, gas, chromatography, microwave, plasma, atomic, emission, spectrometry, spectrometers, element, detectors, chromatographs, spectrometric, iodine, sulfur, bromine, chlorine, carbon, tetrachloride, analysis, chloroform, dibromomethane, iodoethane, dichloromethane, thiophene, enflurane, isoflurane	J. Anal. At. Spectrom., 3(6), 901-5 (Eng) 1988.	CHROMATOGRAPHY	CODEN: JASPE2. ISSN: 0267-9477.
109(26):243167h	Charbucinski, J.; Eisler, P. L.; Borsaru, M.	Quantitative nuclear borehole logging based on neutron excited gamma-reactions.	nuclear, borehole, logging, neutron, excited, gamma, energy, earth, ashes, residues, coal, rays, soil, analysis, salinity, radiochemical, activation, ray, spectrometry, dry, water, boreholes	Nucl. Geophys., 2(3), 137-50 (Eng) 1988.	RADIOCHEMICAL	CODEN: NUGEEP. ISSN: 0886-0130
109(26):243108g	Van Staden, Jacobus F	Preparation and performance of a coated tubular solid-state cadmium-selective electrode in flow-injection analysis.	preparation, coated, tubular, solid, cadmium, electrode, flow, injection, analysis, electrodes, potentiometry, ion, sulfide, membrane	Fresenius' Z. Anal. Chem., 331(6), 594-8 (Eng) 1988	ELECTROCHEMICAL	CODEN: ZACFAU ISSN: 0016-1152
109(26):239086g	Ishiyama, Toshio; Doi, Masahiro; Matsunami, Tadao; Matsuda, Yasuaki; Kikuchi, Hiroshi	Measurement of barium carbonate (Ba14CO3) precipitate from carbon dioxide (14CO2) produced by combustion of radioactive liquid scintillation-cocktail waste.	barium, carbonate, precipitate, carbon, dioxide, combustion, radioactive, liquid, cocktail, waste, wastes, exhaust, gas, radiation, detectors, scintillation, ammonium, hydroxide, cesium, absorption, ammonia, tritium, toluene, analysis	Annu. Rep. Radiat. Cent. Osaka Prefect., 28, 9-12 (Eng) 1988.	GENERAL	CODEN: ARRCAK ISSN: 0473-7938.
109(22):204163e	Ewbank, John D.; Paul, David W.; Schaefer, Lothar; Siam, Kamal; Monts, David L.; Faust, Walter L.	On-line gas electron diffraction identification of gas chromatography effluents (GC-GED).	gas, electron, diffraction, chromatography, diffractometry, chromatographs, detectors, gases, photodiode, detection, carbontetrachloride, analysis, dichloroethane, isomers	Rev. Sci. Instrum., 59(7), 1164-7 (Eng) 1988.	CHROMATOGRAPHY	CODEN: RSINAK ISSN: 0034-6748
109(22):204111v	Cammann, K.; Mueller, H.	Reduced calibration needs in gas chromatography by using an element-selective plasma-emission detector.	needs, gas, chromatography, element, plasma, emission, detector, chromatographs, detectors, spectrometric, microwave, capillary, carbon, sulfur, bromine, chlorine, detection, tetrachlorobenzene, pentachlorobenzene, hexachlorobiphenyl, hexachlorobenzene, dichlorobiphenyl, trichlorobiphenyl, heptachlorobiphenyl, pentachlorobiphenyl	Fresenius' Z. Anal. Chem., 331(3-4), 336-41 (Ger) 1988.	CHROMATOGRAPHY	CODEN: ZACFAU. ISSN: 0016-1152
109(22):203943b	Jaber, A. M. Y.; Moody, G. J.; Thomas, J. D. R.	Studies on lead ion-selective electrodes based on polyalkoxylates.	ion, electrodes, polyalkoxylates, membranes, tetraphenylborates, analysis, potentiometric, potentiometry, polyoxyethylene, ethers, tetraphenylborate, salt, dioctylphenyl, phosphonate, dipentylpentyl, plasticizer	Analyst (London), 113(9), 1409-13 (Eng) 1988.	ELECTROCHEMICAL	CODEN: ANALAO ISSN: 0003-2654. OTHER SOURCES: CJRSC
109(19):158153w	Lightfoot, J. A.; Toon, G.	A computer controlled, high performance, neutron coincidence counting system.	computer, neutron, coincidence, [illegible], radiation, detectors, radioactive, wastes, plutonium, analysis	Nucl. Instrum. Methods Phys. Res., Sect. A, A271(3), 636-43 (Eng) 1988.	RADIOCHEMICAL	CODEN: NIMAER ISSN: 0168-9002
109(17):148428h	Aleksandrova, A. M.; Rapoport, L. A.	Rapid method for the determination of potassium in soils.	potassium, soils, soil, analysis, ionometry	Khim. Sel'sk. Khoz. (6), 54-6 (Russ) 1988.	ELECTROCHEMICAL	CODEN: KSKHAT

CA NO.	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
109(14):121801q	Scott, Raymond P. W.; Katz, Elena	Ionization detectors for gas chromatography.	ionization, detectors, gas, chromatography, glass, oxide, helium, gases, borosilicate, chromatographs, alkali, metals, salts, lithium, nitrate, argon, benzene, analysis, pentane, tetrahydrofuran, hexadecane, tridecane, tetradecane, dibutylphenol, detector	Eur. Pat. Appl. EP 249714 A2 23 Dec 1987, 13 pp.	CHROMATOGRAPHY	DESIGNATED STATES: R: DE, FR, GB, IT, NL, SE. (Eng). CODEN: EPXXDW. CLASS: ICM: G01N027-62 APPLICATION: EP 87-105713 16 Apr 1987. PRIORITY: US 86-852489 16 Apr 1986; US 87-4810 5 Jan 1987.
109(14):121751y	Hudson, M. Keith; Busch, Kenneth W	Flame infrared emission detector for gas chromatography.	flame, infrared, emission, detector, gas, chromatography, hexane, carbon, detection, spectrometers, detectors, burner, spectrochemical, analysis, chromatographs, spectrometric, tetrachloride, trifluoroethane, pentane, hexane, dioxide	Anal. Chem., 60(19), 2110-15 (Eng) 1988.	CHROMATOGRAPHY	CODEN: ANCHAM. ISSN: 0003-2700. OTHER SOURCES: CJACS
109(13):109328h	Cai, Hongbo; Zhang, Ruiqu	Preparation of PVC tubular flow-through potassium ion-selective electrode and its application in flow injection analysis.	preparation, tubular, flow, potassium, ion, electrode, injection, analysis, soil, electrodes	Fenxi Huaxue, 16(4), 330-3 (Ch) 1988.	ELECTROCHEMICAL	CODEN: FHHHDT. ISSN: 0253-3820
109(12):103696v	Campbell, Donald N.; Davis, Robert C., Jr.; Schmidt, John C.	Amperometric gas sensor containing a solid electrolyte.	amperometric, gas, sensor, solid, electrolyte, analysis, lithium, salts, potassium, rubidium, sodium, cesium, francium, sulfate, phosphorus, air, toluene, malathion	PCT Int. Appl. WO 8800701 A1 28 Jan 1988, 23 pp	ELECTROCHEMICAL	DESIGNATED STATES: W: JP; RW: AT, BE, CH, DE, FR, GB, IT, LU, NL, SE. (Eng) CODEN: PIXXD2. CLASS: ICM: G01N027-46 APPLICATION: WO 87-US1045 5 May 1987. PRIORITY: US 86-884583 11 Jul 1986.
109(12):103647x	Hey, Wolfgang	Possibilities and limitations for the detection of unknown substances at hazardous waste sites using detector tubes.	detection, hazardous, waste, detector, tubes, hazard, toxic, wastes, air, analysis, soil, disposal	Manage. Hazard. Toxic Wastes Process Ind., [Int. Congr.], 221-31. Edited by: Kolaczkowski, S. T.; Crittenden, B. D. Elsevier Appl. Sci.: London, UK. (Eng) 1987.	GENERAL	CODEN: 56CIAP.
109(10):85473y	Fabian, Gerd; Schierhorn, Matthias; Diestelhorst, Martin; Fadsch, Gunther; Balzer, Inge; Taschke, Horst	Gas chromatography detector containing piezoelectric material.	gas, chromatography, detector, piezoelectric, siloxanes, silicones, chromatographs, detectors, coated, tetrachloromethane, analysis, ethanol, methanol, trichloromethane, dichloromethane, detection	Ger. (East) DD 250179 A1 8 Oct 1987, 5 pp. (Ger)	CHROMATOGRAPHY	CODEN: GEXXA8. CLASS: ICM: G01N030-62 APPLICATION: DD 86-292724 24 Jun 1986
109(8):72697j	Wang, Jian; Farrell, R. E.; Scott, A. D.	Potentiometric determination of potassium Q/I relationships.	potentiometric, potassium, soil, analysis, ion, electrode, electrodes, soils, biological	Soil Sci. Soc. Am. J., 52(3), 657-62 (Eng) 1988.	ELECTROCHEMICAL	CODEN: SSSJD4. ISSN: 0361-5995.
109(8):66327z	Gurka, Donald F.; Pyle, Steven M.	Qualitative and quantitative environmental analysis by capillary column gas chromatography/lightpipe Fourier-transform infrared spectrometry.	environmental, analysis, capillary, gas, chromatography, lightpipe, infrared, spectrometry, chromatographs, spectrometers, chromatograph, optical, light, pipes, nitrosodimethylamine, acenaphthene, phthalate, phenanthrene, fluorene, naphthalene, tetrachlorobenzene, bromophenyl, phenyl, ether, chloroethyl, chloroethoxy, methane, ethyl, anthracene, trichlorobenzene, pyrene, fluoranthene, nitrosodipropylamine, chlorophenyl, chloroisopropyl, detection	Environ. Sci. Technol., 22(8), 963-7 (Eng) 1988.	CHROMATOGRAPHY	CODEN: ESTHAG. ISSN: 0013-936X. OTHER SOURCES: CJACS.
109(8):62890g	Atakan, Yuksel	Stack gas radioactivity monitoring in a nuclear plant in the Federal Republic of Germany.	gas, radioactivity, nuclear, plant, republic, germany, radioelements, analysis, radiation, detectors, health, physics, radioactive, wastes, gaseous, reactors, plants, yttrium, strontium, rubidium, cesium	Nucl. Saf. (3), 367-75 (Eng) 1988.	RADIOCHEMICAL	CODEN: NUSAAZ. ISSN: 0029-5604.

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109(7):51023a	Varlen, T. D.; Christian, G. D.; Ruzicka, J.	Flow-injection analysis as a diagnostic technique for development and testing of chemical sensors.	flow, injection, analysis, chemical, sensors, biosensors, urease, immobilization, biosensor, fiber, optic, sensor, dialysis, urea, dialyzate, spectrochemical, reflection, immobilized	Anal. Chim. Acta, 204(1-2), 7-28 (Eng) 1988.	GENERAL	CODEN: ACACAM ISSN: 0003-2670
109(6):42740z	Adams, Martin; Collins, Mark	Sensitive portable gas(chromatograph with data retrieval and communications capability for remote surveillance of toxic gases and vapors in plant.	sensitive, portable, gas, chromatograph, toxic, gases, vapors, plant, alarm, air, automation, vapor, analysis, automated, chromatographs, photoionization, detector, formaldehyde, vinyl, chloride, dichloromethane, carbon, disulfide, ethylene, oxide, vinylidene, trichloroethylene, styrene, aniline, acrylonitrile, glycol, ethyl, methoxy, acetate, trichloroethane	Anal. Proc. (London), 25(6), 190-1 (Eng) 1988	CHROMATOGRAPHY	CODEN: ANPRDI ISSN: 0144-557X
109(4):28790n	Bhanu, A. V.; Kalsi, P. C.; Sahoo, K.; Iyer, R. H.	Assay of uranium in scrap and waste produced at natural uranium metal production and fuel fabrication plants.	uranium, scrap, waste, metal, fuel, plants, energy, agglomerates, fused, melts, glass, oxide, radioactive, yellow, cake, slags, solids, wastes, solid, analysis, streams, calcium, fluoride, slag	J. Radioanal. Nucl. Chem., 121(1), 39-43 (Eng) 1988.	RADIOCHEMICAL	CODEN: JRNCDM ISSN: 0236-5731
108(24):215581z	Posch, Hermann E.; Wolfbeis, Otto S.; Pusterhofer, Johannes	Optical and fiber-optic sensors for vapors of polar solvents.	optical, fiber, optic, sensors, vapors, polar, solvents, alcohols, analysis, esters, ethers, ketones, detection, detectors, solvent, spectrochemical, sensor, thermal, reflection, diffuse, ether, ethanol, methanol, acetone, butanol, tetrahydrofuran, dioxane, ethyl, acetate	Talanta, 35(2), 89-94 (Eng) 1988.	FIBER-OPTIC	CODEN: TLNTA2 ISSN: 0039-9140.
108(22):194609k	Zhang, Hoaiguo; Tao, Wenyuan	Experimentation on continuously monitoring tritium oxide from the stack of the experimental heavy water reactor.	experimentation, continuously, tritium, oxide, experimental, water, reactor, energy, nuclear, reactors, sealed, emission, radioactive, wastes, analysis	Yuanzineng Kexue Jishu, 21(5), 578-8 (Ch) 1987.	RADIOCHEMICAL	CODEN: YKJIEL
108(21):185635z	Davydov, M. G.; Kishel'gof, V. V.; Magera, V. G.; Naumkin, S. A.	Multielement gamma-activation analysis of soils.	multielement, gamma, activation, analysis, soils, mineral, elements, soil, radiochemical, ray, neodymium, samarium, scandium, thorium, yttrium	297-302 (Russ) 1988.	RADIOCHEMICAL	CODEN: ZAKHA8. ISSN: 0044-4502
108(20):179329z	Calanca, Leonard J.; Hieftje, Gary M.	Universal detection of ions by replacement-ion chromatography employing an anion-replacement method and an ultraviolet-visible spectrophotometric detector.	detection, ions, ion, chromatography, employing, anion, spectrophotometric, detector, spectrochemical, analysis, cations, liquid, nitrate, iodate, monovalent, lithium, potassium, sodium, ammonium, cation	Anal. Chem., 60(10), 996-1002 (Eng) 1988.	CHROMATOGRAPHY	CODEN: ANCHAM. ISSN: 0003-2700. OTHER SOURCES: CJACS
108(20):173784w	Cap, Lubomir; Hrabovsky, Ivo	AFID for selective detection of halogenated compounds.	afid, detection, halogenated, chromatographs, gas, detectors, flame, ionization, alkali, metal, halocarb, water, gases, rubidium, sulfate, disodium, potassium, bromide, detector, halocarbs, trichloroethylene, analysis, bromobenzene, chlorobenzene, iodobenzene	Acta Univ. Palacki. Olomuc., Fac. Rerum Nat., 88(Chem. 26), 103-8 (Eng) 1987.	CHROMATOGRAPHY	CODEN: AUPCAO ISSN: 0472-9605
108(16):134887e	Nolan, Sharon L.; Ryan, Jeffrey V.; Bridge, Richard, Jr.	Real-time monitoring of a hazardous waste incinerator with a mobile laboratory.	hazardous, waste, incinerator, flue, gases, incineration, wastes, volatile, incinerators, gas, analysis, benzene, carbon, dioxide, monoxide, oxygen	Proc.-APCA Annu. Meet., 80th(Vol. 2), 87/21.5, 13 pp. (Eng) 1987.	GENERAL	CODEN: PAMEE3 ISSN: 0197-9448

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108(14):121055p	Geyer, Martina; Malzke, Elisabeth; Kowsz, Werner	Determination of EDTA and its behavior in radioactive waste solutions using HPLC.	radioactive, waste, solutions, wastes, photolysis, uranium, photochem, analysis, copper	Fresenius' Z. Anal. Chem., 329(1), 50-4 (Eng) 1987.	RADIOCHEMICAL	CODEN: ZACFAU ISSN: 0016-1152.
108(14):120801q	Haas, E. W.; Wimmer, V.	Autoradiography-sensor of radioactivity.	autoradiography, sensor, radioactivity, radioactive, autoradiog, environmental, health, physics, radiography, potassium, analysis, radium, thorium, cesium, uranium	CLB, Chem. Labor Betr., 39(1), 16, 18-20 (Ger) 1988	RADIOCHEMICAL	CODEN: CCLBEV ISSN: 0722-6764
108(14):119158j	Wang, Ruiying	Catalytic sensor for detecting methane in mines.	catalytic, sensor, methane, mines, etc, analysis, catalysts, platinum, palladium, thorium, potassium	Faming Zhuanli Shenqing Gongkai Shuomingshu CN 85105450 A 9 Jul 1986, 19 pp. (Ch)	ELECTROCHEMICAL	CODEN: CNXXEV CLASS. IC: G01N025-32; G01N027-30. APPLICATION: CN 85-105450 18 Jul 1985
108(14):115357m	Stein, K.; Santiago-Aviles, J. J.	A twisted pair optical fiber refractometric sensor.	twisted, optical, fiber, refractometric, sensor, electrochem, lubricating, oils, optic, refractometer, refractometers, multimode, fibers, solvents, refractometry, water, analysis, ethyl, alcohol, trichloroethane, ethylene, glycol, pentane, hexane, refraction	Proc. Electrochem. Soc., 87-9(Proc. Symp. Chem. Sens.), 495-501 (Eng) 1987.	FIBER-OPTIC	CODEN: PESOD5. ISSN: 0161-6374
108(13):104653t	Murray, A. S.; Marten, R.; Johnston, A.; Martin, P.	Analysis for naturally occurring radionuclides at environmental concentrations by gamma spectrometry.	analysis, radionuclides, environmental, gamma, spectrometry, rivers, algae, grass, plant, radioelements, ray, epiphytic, geological, sediments, mussel, freshwater, nuclear, spectrometers	J. Radioanal. Nucl. Chem., 115(2), 263-88 (Eng) 1987	SPECTROMETRY	CODEN: JRNCDM ISSN: 0236-5731
108(12):101655u	DeWit, Jos S. M.; Jorgenson, J. W.	Photoionization detector for open-tubular liquid chromatography.	photoionization, detector, tubular, liquid, chromatography, ketones, pesticides, detection, analysis, liq, chromatographs	J. Chromatogr., 411, 201-12 (Eng) 1987.	CHROMATOGRAPHY	CODEN: JOCRAM. ISSN: 0021-9673.
108(12):102804j	Smirnova, G. F.; Kuznetsova, G. A.	Method for determining iodine-131 in water and milk by using a scintillation counter.	iodine, water, milk, scintillation, analysis, radioactive, wastes, radiation, detectors, plant, anion, exchanger, sodium, hypochlorite, elution, exchange, carbon, tetrachloride, column	Radiats. Bezop. Zashch. AES, 11, 114-16 (Russ) 1986.	RADIOCHEMICAL	CODEN: RBZADI ISSN: 0131-0057
108(12):102495f	Bondarev, V. V.; Zaikov, Y. B.; Vasyukov, N. S.; Stolyarov, B. N.	Study of the form of radioactive iodine in the ventilation and auxiliary systems of a nuclear power plant wi WWER reactor.	radioactive, iodine, ventilation, nuclear, plant, reactor, apparatus, radioisotope, plants, air, radioiodine, wastes, gaseous, radioisotopes, analysis, isotopes	Radiats. Bezop. Zashch. AES, 11, 131-6 (Russ) 1986	RADIOCHEMICAL	CODEN: RBZADI ISSN: 0137-0057
108(10):87326w	Allen, L. A.; Glass, T. E.; Dorn, H. C.	Direct monitoring of supercritical fluids and supercritical chromatographic separations by proton nuclear resonance.	supercritical, fluids, chromatographic, proton, nuclear, magnetic, resonance, phase, petroleum, alkane, distillates, fluid, spectrometry, fuels, alkanes, analysis, spectrometers, detectors, spectrochemical, detection, chromatographs, gas, lattice, chromatography, acetonitrile, nitrogen, benzene, hexane, dodecane, isooctane, hexadecane, spectrometer	Anal. Chem., 60(5), 390-4 (Eng) 1988.	CHROMATOGRAPHY	CODEN: ANCHAM. ISSN: 0003-2700. OTHER SOURCES: CA

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108(10):86995m	Osaka, Toshiyuki; Nakatani, Tadashi; Honda, Mitsuo	Novel amperometric ammonia sensor.	amperometric, ammonia, sensor, amperometry, sensors, gas, permeable, membrane, gel, electrode, electrodes, ammonium, teflon, analysis, nitrobenzene, crown, tetrabutylammonium, tetraphenylborate	Anal. Sci., 3(6), 521-6 (Eng) 1987.	ELECTROCHEMICAL	CODEN: ANSCEN ISSN: 0910-6340
108(10):88977g	Yuan, Steve M.; Fry, Robert C.	Ultra-sensitive, simultaneous determination of arsenic, selenium, tin, and antimony in aqueous solution by hydride generation gas chromatography with photoionization detection.	sensitive, arsenic, selenium, tin, antimony, aqueous, solution, hydride, gas, chromatography, photoionization, detection, hydrides, chromatographs, detector, analysis, water, element, stibine, arsenic, dihydride, sodium, borohydride	Anal. Chem., 60(5), 465-72 (Eng) 1988.	CHROMATOGRAPHY	CODEN: ANCHAM. ISSN: 0003-2700 OTHER SOURCES- CJACS
108(10):83785m	Hill, C. W.	Determination of radium-226 in ores, nuclear wastes and environmental samples by high-resolution alpha spectrometry.	radium, ores, nuclear, wastes, environmental, alpha, spectrometry, waste, sands, monazite, soil, analysis, uranium, radioactive, perchlorate, potassium, fluoride, fusion, barium, acetic, acid, diethylenetriaminepentaacetic, hydrochloric, sulfuric, sand, pitchblende, particle	Nucl. Chem. Waste Manage., 7(3-4), 239-56 (Eng) 1987.	SPECTROMETRY	CODEN: NCWMD2 ISSN: 0191-815X.
108(8):60002f	Mori, Masahiro; Nakagawa, Yoichi; Kobayashi, Yoshitaka	Anode characteristics of the thermal ion emission detector for gaseous halides.	anode, thermal, ion, emission, detector, gaseous, halides, anodes, platinum, potassium, doped, ionization, detection, chromatographs, gas, detectors, methylbromide, analysis, trichloroethylene, dichloroethane, bromobenzene, hydrogen, chloride, bromide, sensitivity, carbon, tetrachloride, vinyl, methylene	Bunseki Kagaku, 36(8), 467-72 (Japan) 1987.	ELECTROCHEMICAL	CODEN: BNSKAK ISSN: 0525-1931
108(8):60375g	Hill, Claude W.	Precipitation of actinides as fluorides or hydroxides for high-resolution alpha spectrometry.	precipitation, actinides, fluorides, hydroxides, alpha, spectrometry, waste, radioactive, wastes, transuranium, elements, leaching, particle, spectroscopy, cerous, fluoride, chloride, neodymium, trichloride, perchlorate, trifluoride, ferrous, uranium, cerium, plutonium, americium	Nucl. Chem. Waste Manage., 7(3-4), 201-15 (Eng) 1987.	SPECTROMETRY	CODEN: NCWMD2 ISSN: 0191-815X
108(8):61495h	Nolan, B. L.; Ryan, J. V.; Bridge, E.	Real-time monitoring of a hazardous waste incinerator with a mobile laboratory.	hazardous, waste, incinerator, incineration, wastes, flue, gas, emissions, gases, incinerators	Report, EPA/600/D-87/072; Order No. PB87-179297, 14 pp. Avail. NTIS From: Gov. Rep. Announce. Index (U. S.) 1987, 87((Abstr. No. 735,207 (Eng) 1987.	CHROMATOGRAPHY	
108(8):43985j	Schoenhofer, F.; Henrich, E.	Recent progress and application of low level liquid scintillation counting.	liquid, scintillation, radioelements, analysis, environmental, radiation, detectors, ethanol, carbon, tritium, water, radium, radon, radioelement	J. Radioanal. Nucl. Chem., 115(2), 317-33 (Eng) 1987	RADIOCHEMICAL	CODEN: JRNCDM ISSN: 0236-5731
108(6):43045j	Mierzwinski, Adam; Witkiewicz, Zygfryd	Piezoelectric detectors coated with liquid crystal materials.	piezoelectric, detectors, coated, liquid, crystal, air, analysis, organophosphorus, pesticide, benzene, dichlorobenzene, nitrobenzene, diethylbenzene, toluene, chlorobenzene, phosdrin, cholesteryl, oleylcarbonate, crystals, coating, gaseous, pollutants	Talanta, 34(10), 865-71 (Eng) 1987	PIEZOELECTRIC	CODEN: TLNTA2. ISSN: 0039-9140

CA NO	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
108(4):30915e	Ezheleva, A. E.; Malygina, L. S.; Krylov, V. A.	Use of a photoionization detector in gas-chromatographic determination of volatile inorganic & some organic substances.	photoionization, detector, gas, chromatographic, volatile, inorganic, hydrides, organic, detection, chromatography, hydrocarbons, analysis, benzene, ethylene, carbon, disulfide, butane, toluene, pentane, propylene, carbonyl, sulfide, germane, hydrogen, selenide, arsine, phosphine	Vysokochist. Veshchestva (3), 114-19 (Russ) 1987	CHROMATOGRAPHY	CODEN: VVESEC
108(3):18554e	[illegible], C. M.; Dang, H. S.; Jaiswal, D. D.	Thorium in man and environment: uptake and clearance	thorium, man, environment, health, food, human, hair, anatomical, humans, blood, urine, excretion, bone, metabolism, brain, heart, kidney, liver, muscle, spleen, lung, biological	J. Radioanal. Nucl. Chem., 115(1), 145-58 (Eng) 1987	RADIOCHEMICAL	CODEN: JRNCDM ISSN: 0236-5731
108(2):15474a	Low, Gary K. C.; Batley, Graeme E.; Buchanan, Stephen J.	An interference effect in the use of inductively coupled argon plasma spectrometric detection for high-performance liquid chromatography.	inductively, argon, plasma, spectrometric, detection, liquid, chromatography, energy, chromatographs, detectors, emission, easily, ionizable, element, arsenic, analysis, dimethylarsenic, acid, arsenobetaine, potassium, sodium	Anal. Chim. Acta, 197, 327-33 (Eng) 1987	CHROMATOGRAPHY	CODEN: ACACAM ISSN: 0003-2670
108(2):12936a	Schoenig, Frederick C., Jr.; Glendenning, Sharon G.; Schick, Timothy D.; Untermeyer, Samuel, II	Automated monitoring of fissile/fertile materials in waste containers.	automated, fissile, fertile, waste, electric, radioactive, combustible, radiation, detectors, solid, wastes, combustibles, uranium, analysis	Can. CA 1227287 A1 29 Sep 1987, 31 pp. (Eng)	RADIOCHEMICAL	CODEN: CAXXA4. CLASS: ICM G01T001-167 ICS G21F005-12 APPLICATION: CA 85-472820 16 Jan 1985
108(2):10530b	Nelson, Roger A.	Measurement uncertainties of long-term radon-222 averages at environmental levels using alpha track detectors.	radon, environmental, alpha, track, detectors, uranium, tailings, health, air, analysis, open, mining, radioactive, wastes, mines	Health Phys., 53(5), 447-53 (Eng) 1987.	RADIOCHEMICAL	CODEN: HLTPAO ISSN: 0017-9078
107(26):249138e	Dong, Lanchun; McMahon, T. D.; Ward, N. I.	Determination of 34 elements in Chinese geochemical standard reference materials by instrumental neutron activation analysis.	elements, geochemical, neutron, activation, analysis, geochem, soil, geological, sediments, rocks, alkaline, earth, metals, alkali, rare, geol, analytical, radiochemical	J. Radioanal. Nucl. Chem., 113(1), 285-98 (Eng) 1987	RADIOCHEMICAL	CODEN: JRNCDM ISSN: 0236-5731
107(26):224703d	Kostadinov, K.; Yanev, Ya.; Vasilev, B.	Method and equipment for measurement of tritium in waters from nuclear power plant reactors.	tritium, waters, nuclear, plant, reactors, radiation, detectors, geiger, coolants, water, cooled, cooling, acetylene, preparation, radioactive, wastewaters, analysis, iodine, xenon, gaseous	Yad. Energ., 26, 66-71 (Russ) 1987.	RADIOCHEMICAL	CODEN: YAENDH ISSN: 0204-6989
107(22):211113e	Fossumi, Hideyuki; Imato, Toshihiko; Takahashi, Nobuhiko	Anion-selective elektrode for high-performance liquid chromatography detector based on oleophilic anion-exchange resin membrane.	anion, elektrode, liquid, chromatography, detector, oleophilic, exchange, resin, membrane, electrodes, anions, chromatographs, detectors, potentiometric, electrode, dichlorobenzene, nitrobenzene, phosphate, nitrophenyloctyl, ether, impregnated, thiocyanate, analysis, nitrate, perchlorate, chlorate, iodate, bromate, iodide, bromide	Anal. Sci., 3(4), 319-24 (Eng) 1987.	ELECTROCHEMICAL	CODEN: ANSCEN
107(22):211078y	Vachachausis, V.; Tautkus, A.; Svidnere, Z. N.; Kazlauskas, R.; Petrukhin, O. M.	Determination of cadmium in cyanide solutions by using ion-selective electrodes	cadmium, cyanide, solutions, ion, electrodes, membrane, sulfide, silver, tetracyanocadmate, tetradecylphosphonium tetracyanocadmate, electroplating, baths, potentiometry, analysis, cyanides	Zh. Anal. Khim., 42(5), 856-60 (Russ) 1987	ELECTROCHEMICAL	CODEN: ZAKHA8 ISSN: 0044-4502

CA NO	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
107(20):150185a	Yoshikawa, Kazuo; Yamada, Kenjiro; Nagara, Masanobu; Yamada, Shigeru	Determination of volatile chlorinated organic compounds in soil and sediment by hexane extraction and gas chromatography	volatile, chlorinated, organic, soil, sediment, hexane, extraction, gas chromatography, sediments, soils, analysis, hydrocarbons, geological, marine, river, carbon, tetrachloride trichloroethane, tetrachloroethane	Kawasaki-shi Kogai Kenkyusho Nempo (13), 39-40 (Japan) 1986	CHROMATOGRAPHY	CODEN: KKKKDT
107(18):158844w	Lopez-Avila, Viorica; Heath, Nicki; Hu, Alice	Determination of purgeable halocarbons and aromatics by photoionization and Hall electrolytic conductivity detectors connected in series	halocarbons, aromatics, photoionization, electrolytic, conductivity, detectors, soil, analyses, volatile, gas, trap, chromatography, detector, alkanes, aromatic, hydrocarbons, carbon, tetrachloride, chloroform, benzene, trichloroethane, bromomethane, chloromethane, dibromomethane, chloroethane, vinyl, chloride, dichloromethane, bromoform, bromodichloromethane, dichloroethane, dichloroethylene, dichlorodifluoromethane, trifluorochloromethane, dichloropropane, trichloroethylene tetrachloroethane, xylene, chlorotoluene, dichlorobenzene, trichloropropane, ethylbenzene, bromobenzene, toluene, chlorobenzene, chloroethyl, ether, dibromochloromethane, tetrachloroethylene, chlorohexane, dichloropropylene, water	J. Chromatogr. Sci., 25(8), 354-63 (Eng) 1987	ELECTROCHEMICAL	CODEN: JCHSBZ ISSN 0021-9665
107(18):165061r	Tsao, Yulan	Application of the portable photoionization gas chromatograph in environmental monitoring	portable, photoionization, gas, chromatograph, environmental, petroleum, gases, liquefied, air, analysis, benzene, alkylbenzene, detection, hydrocarbons, volatile, hydrocarbon, chromatographs, detector, toluene, dimethylbenzene, hydrogen, sulfide, muddy, water, ethane, propane, isobutane, isopentane, butane, propylene, butene	Sepu 5(3), 204-7 (Ch) 1987	CHROMATOGRAPHY	CODEN: SEPUER
107(18):168173w	Khanna, S. K.; Lambe, J.; Leduc, H. G.; Thakoor, A. P.	Thin-film chemical sensors based on electron tunneling	chemical, sensors, electron, tunneling, jet, energy, electric, apparatus, metal, insulator, tunnel, electrooptical, reflection, detection, iodine, mercury, ethylene, dibromide, dichloride, analysis, bismuth, nitrogen, dioxide, cobalt, phthalocyanine	Report, DOE/ER/13097-2, JPL-PUB-85-85; Order No. DE87004646, 37 pp. Avail. NTIS From: Energy Res. Abstr. 1987, 12(8), Abstr. No. 17342 (Eng) 1985	ELECTROCHEMICAL	
107(16):143380u	McElroy, R. G. C.; Wong, K. Y.	Tritium-in-air monitoring: a Canadian perspective	tritium, air, energy, ionization, radiation, detectors, nuclear, health, physics, reactors, fusion, analysis, water, cooled, hydrogen	Nucl. Saf., 28(3), 334-40 (Eng) 1987	GENERAL	CODEN: NUSAAZ ISSN: 0029-5604
107(14):125985p	Cai, Zaizhen; Li, Lanfen; Wu, Yi	Study on coated-carbon tetrabromocadmate (CdBr4 2-)-ion selective electrode	coated, carbon, tetrabromocadmate, ion, electrode, selective, cadmium, potentiometry, electrodes, analysis	Gaodeng Xuexiao Huaxue Xuebao, 8(1), 79-80 (Ch) 1987	ELECTROCHEMICAL	CODEN: KTHPDM ISSN 0251-0790
107(12):108553e	Gurka, Donald F.; Titus, Richard	Hazardous waste analysis by direct-linked fused silica capillary column gc chromatography/Fourier transform infrared/mass spectrometry	hazardous, waste, analysis, fused, silica, capillary, gas, chromatography, infrared, spectrometry, energy, wastes, chlorinated, hydrocarbon, herbicide, pesticide, spectroscopy, geological, sediments, mixed, sludges, herbicides, pesticides, soils, dyes soil, hydrocarbons, chromatographs, spectrochemical, phosphorus	Anal. Chem. Instrum., Proc. Conf. Anal. Chem. Energy Technol., 28th, Meeting Date 1985, 17-2 Edited by: Lyons, W. S. Lewis: Chelsea, Mich. (Eng) 1986	CHROMATOGRAPHY	CODEN: 55YWAE

CA NO.	AUTHOR	TITLE	KEYWORDS	CITATION	SOURCE TYPE	OTHER
107(12):108282d	Huang, Le Quan; Jiang, Shiuh Jen; Houk, R. S.	Scintillation-type ion detection for inductively coupled plasma mass spectrometry.	scintillation, ion, detection, inductively, plasma, spectrometry, isotopes, spectroscopy, isotope, spectrometers, detectors, cobalt, analysis, niobium, cerium, ratio, copper, rubidium, thallium, zinc, terbium, arsenic, yttrium, europium, zirconium, chromium, strontium, samarium, neodymium, molybdenum	Anal. Chem., 59(18), 2316-20 (Eng) 1987.	SPECTROMETRY	CODEN: ANCHAM. ISSN: 0003-2700. Other Sources: CJACS
107(10):88858p	Jin, Quhan; Yang, Guangde; Gao, Zhankun; Yu, Aiming; Liu, Jun	Some observations on the development of a gas chromatographic microwave plasma ionization detector.	gas, chromatographic, microwave, plasma, ionization, detector, chemical, detectors, chromatographs, sensitivity, carbon, tetrachloride, analysis, ethyl, ether, ethanol, methanol, chloroform, benzene, methane, acetylene, iodomethane, acetonitrile, dichloromethane, disulfide, nitromethane, acetate, dimethylbenzene, ethylbenzene, styrene, ethane, bromobenzene, toluene, chlorobenzene, pentane, diethylamine, tetrahydrofuran, hexane, cyclohexane, pyridine, triethylamine, dioxide, heptane, nitrogen, water, oxygen	Microchem. J., 35(3), 281-7 (Eng) 1987	CHROMATOGRAPHY	CODEN: MICJAN. ISSN: 0026-265X
107(10):83821q	Chudyk, Wayne; Kenny, Jonathan; Jarvis, Gregor; Pohlig, Kenneth	Monitoring of groundwater contaminants using laser fluorescence and fiber optics.	groundwater, laser, fluorescence, fiber, optics, aromatic, optic, detector, water, analysis, ground	Intech, 34(5), 53-7 (Eng) 1987.	FIBER-OPTIC	CODEN: INTCDD. ISSN: 0192-303X.
107(8):63987a	Lee, J. H.; Que Hee, S. S.; Clark, C. S.	Additivity of detector responses of a portable direct-reading 10.2 eV photoionization detector and a flame ionization gas chromatograph for atmospheres of multicomponent organics: use of PID/FID ratios.	additivity, detector, portable, reading, photoionization, flame, ionization, gas, chromatograph, atmospheres, multicomponent, organics, ratios, air, analysis, sensitivity, photo, detectors, chromatographs, gases, ethanol, trichloroethane, acetonitrile, methylene, chloride, ethyl, ketone, benzaldehyde, toluene, trichlorobenzene	Am. Ind. Hyg. Assoc. J., 48(5), 437-41 (Eng) 1987.	CHROMATOGRAPHY	CODEN: AIHAAP. ISSN: 0002-8894.
107(7):57480u	Farrell, R. E.; Scott, A. D.	Ion-selective electrode determinations of exchangeable potassium in soils.	ion, electrode, exchangeable, potassium, soils, soil, analysis, electrodes	Soil Sci. Soc. Am. J., 51(3), 584-8 (Eng) 1987.	ELECTROCHEMICAL	CODEN: SSSJD4. ISSN: 0361-5995
107(6):54970q	Megumi, Kazuko; Fan, Seung Yeol; Kimura, Shojiro; Tsujimoto, Tadashi; Oka, Takashi; Katsurayama, Kosuke	Concentration of natural radioactive nuclides and mineral composition in soil in relation to their sizes.	radioactive, nuclides, mineral, soil, feldspar, minerals, soils, ray, diffraction, particle, analysis, radioelements, gamma, spectrometry, uranium, anorthite, albite, potassium, radium, thorium	Hoken Butsuri, 21(3), 163-90 (Japan) 1986.	GENERAL	CODEN: HOKBAQ. ISSN: 0367-6110.
107(6):48833t	Coleman, C. J.; Dewberry, R. A.; Lethco, A. J.; Denard, C. D.	Analytical methods and laboratory facility for the Defense Waste Processing Facility.	analytical, waste, river, energy, radioactive, wastes, vitrification, glass, oxide, sodium, tetraphenylborate, cesium	Anal. Chem. Instrum., Proc. Conf. Anal. Chem. Energy Technol., 28th, Meeting Date 1985, 337-43. Edited by: Lainy, W. R. Lewis: Chelsea, Mich. (Eng) 1986.	SPECTROMETRY	CODEN: 55YNAF
107(8):65799y	Fuhr, Herbert; Grosche, Michael; Meyer, Hans Hubert	Measuring problems in hazardous waste incineration.	hazardous, waste, incineration, flue, gases, wastes, solids, hydrogen, chloride, analysis, oxygen	Brennst.-Waerme-Kraft, 39(1-2), M146-8, M151-3 (Ger) 1987.	ELECTROCHEMICAL	CODEN: BRWKAY. ISSN: 0006-9612
107(1):2856x	Eiceman, G. A.; Fleischer, M. E.; Leasure, C. S.	Sensing of petrochemical fuels in soils using headspace analysis with photoionization-ion mobility spectrometry.	sensing, petrochemical, fuels, soils, headspace, analysis, photoionization, ion, spectrometry, soil, pollution, petroleum, diesel, gasoline, kerosine, petroleum	Int. J. Environ. Anal. Chem., 28(4), 279-96 (Eng) 1987	SPECTROMETRY	CODEN: IJEAA3. ISSN: 0306-7319.

CA NO	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
107(4):32301h	Zorzos, Fizzmetta; Ratay, Gyorgy	Potentiometric sensor based on tin dioxide films, usable in the analysis of special steels.	potentiometric, sensor, tin, dioxide, analysis, steels, metals, titrimetric, steel, manganese, chromium, cobalt, vanadium	Rev. Chim. (Bucharest), 37(10), 903-5 (Rom) 1986	ELECTROCHEMICAL	CODEN: RCBUAU
107(4):30015d	Fong, B. B.; Chatt, A.	Characterization of deep sea sediments by INAA for radioactive waste management purposes.	sea, sediments, radioactive, waste, purposes, geological, neutron, activation, disposal, wastes, radiochemical, analysis, burial, aluminum, iron, lanthanum, lutetium, magnesium, manganese, mercury, molybdenum, neodymium, nickel, platinum, potassium, rhenium, rhodium, rubidium, samarium, scandium, silicon, silver, sodium, strontium, tantalum, terbium, thorium, thulium, tin, titanium, tungsten, antimony, arsenic, barium, cerium, cesium, chromium, cobalt, europium, gadolinium, gallium, hafnium, uranium, vanadium, ytterbium, zinc, zirconium, calcium, indium, selenium, atomic, bromine, iodine, chlorine	J. Radioanal. Nucl. Chem., 110(1), 135-45 (Eng) 1987	RADIOCHEMICAL	CODEN: JRNCDM ISSN: 0236-5731
107(2):14997m	Baumbach, J. I.; Popp, P.; Leonhardt, J.	Use of a high-frequency electron-capture detector.	frequency, electron, detector, superimposed, detection, chromatographs, gas, detectors, hydrocarbons, analysis, tetrachloroethane, chloroform, dichlorodifluoromethane, trichloroethylene, chlorobenzene, sulfur, dioxide, oxygen, nitrogen, oxide	ZfI-Mitt., 121, 81-96 (Ger) 1986	CHROMATOGRAPHY	CODEN: ZIMIDC ISSN: 0323-8776
107(2):10240b	Yatim, Sofyan	Investigation on the environmental radioactivity of the proposed location of the nuclear power plant station in Ujung Watu area, central Java.	environmental, radioactivity, nuclear, plant, radioelements, analysis, reactors, plants, tritium, cesium, strontium	Maj. BATAN, 18(4), 1-8 (Indonesian) 1985	GENERAL	CODEN: MBTNAJ ISSN: 0303-3074
106(26):226640v	Ravi, P. M.; Iyer, M. R.; Sahasrabudhe, S. G.; Subramanian, N. S.; Somasundaram, S.	A method for quick estimation of iodine-129 by low-energy photon spectrometry.	iodine, energy, photon, spectrometry, health, radioactive, wastes, fuel, plants, analysis	J. Radioanal. Nucl. Chem., 109(2), 99-108 (Eng) 1987.	SPECTROMETRY	CODEN: JRNCDM ISSN: 0236-5731
106(21):176316b	Hagendorf, U.; Leschber, R.; Nerger, M.; Eckard, R.	Determination of readily volatile chlorinated hydrocarbons in soil samples.	readily, volatile, chlorinated, hydrocarbons, soil, pollution, analysis, soils, chromatography, gas, headspace, trichloroethylene, tetrachloroethylene, trichloroethane	Fresenius' Z. Anal. Chem., 326(1), 33-9 (Ger) 1987.	RADIOCHEMICAL	CODEN: ZACFAU ISSN: 0016-1152
106(20):168103c	Imagawa, Takeshi; Hayasaki, Akira	Formation of hexachlorobenzene and related compounds from chloroform in a flame ionization detector.	hexachlorobenzene, chloroform, flame, ionization, detector, chlorinated, hydrocarbon, combustion, gases, gas, spectrometry, spectroscopy, hydrocarbons, chromatography, analysis, halogenated, detectors, chromatographs, tetrachloromethane, methylenedichloride, trichloroethylene, dichloroethane, hexachloroethane, hexachlorobutadiene, pentachlorobenzene, octachloronaphthalene, tetrachlorobenzene, octachlorostyrene, heptachloronaphthalene	Bunseki Kagaku, 36(2), 118-20 (Japan) 1987	CHROMATOGRAPHY	CODEN: BNSKAK ISSN: 0525-1931

CA NO	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
104(20):184037a	Hoenen, Friedrich	Development and optimization of spherical ionization chambers for the determination of ion temperatures in fusion plasmas.	optimization, spherical, ionization, ion, fusion, plasmas, nuclear, radiation, detectors, reactor, fuels, proton, bombardment, tritium, deuterium, neutron, spectroscopy, helium, pulse, methane, plasma, pulsed	Ber. Kernforschungsanlage Juelich, Juel-2037, 92 pp. (Ger) 1986.		CODEN: KFJBAS ISSN: 0366-0885
104(19):155147c	Staniszewski, J.; Wierzchos, J.; Jedrzejczuk, G.	Method of measurement of soil pH eliminating suspension effect.	soil, eliminating, analysis, electrometric, elimination	Zesz. Probl. Postepow Nauk Roln., 316, 333-42 (Pol) 1986.	ELECTROCHEMICAL	CODEN: ZPPNAN ISSN: 0084-5477
104(18):148582f	Labrecque, J. J.; Rosales, P. A.	Application of an Apple IIe microprocessor for data acquisition and analysis in instrumental neutron activation analysis with a low energy photon detector.	microprocessor, acquisition, analysis, neutron, activation, energy, photon, detector, rare, earth, metals, geol, computerized, geological, thorium, uranium, radiochemical, lanthanum, lutetium, neodymium, samarium, terbium, thulium, cerium, europium, gadolinium, holmium, ytterbium	J. Radioanal. Nucl. Chem., 102(2), 377-84 (Eng) 1986.	RADIOCHEMICAL	CODEN: JRNCDM ISSN: 0236-5731
106(17):133456t	Kralova, Marie; Dvorak, Karel; Brueckmann, Pavel	Determination of nitrates in the soil by a CRYTUR ion-selective electrode.	nitrates, soil, crytur, ion, electrode, analysis, nitrate	Rostl. Vyroba, 33(1), 57-61 (Czech) 1987.	ELECTROCHEMICAL	CODEN: ROVYAH. ISSN: 0370-663X.
106(15):118546y	Ryabkov, T. F.; Akssmov, I. I.; Bogdanova, V. B.; Shchedrina, N. S.	Ionometric determination of nitrates in plant and soil samples.	ionometric, nitrates, plant, soil, analysis, nitrate, plants, soils	Khim. Sel'sk. Khoz. (1), 71-2 (Russ) 1987	ELECTROCHEMICAL	CODEN: KHSKAH. ISSN: 0023-1185.
106(14):105791e	Kuroda, Masami; Kushibara, Kenji; Owara, Hisao	Tritium determination in radioactive waste gases.	tritium, radioactive, waste, gases, electric, wastes, gaseous, water, electrolysis, analysis, gas	Jpn. Kokai Tokkyo Koho JP 61191979 A2 26 Aug 1986 Showa, 5 pp. (Japan).	RADIOCHEMICAL	CODEN: JKXXAF. CLASS: ICM: G01T001-167 ICS: G01N031-00, ICA: G01N027-26. APPLICATION: JP 85-206806 2 Dec 1984
106(14):105785x	Nishi, Hideaki	Determination of tritium in waste gases.	tritium, waste, gases, atomic, radioactive, wastes, gaseous, water, analysis	Jpn. Tokkyo Koho JP 61033365 B4 1 Aug 1986 Showa, 4 pp. (Japan).	RADIOCHEMICAL	CODEN: JAXXAD. CLASS: ICM: G01N001-02 ICS: G21C017-00. APPLICATION: JP 78-120835 21 Sep 1978.
106(14):109650v	Harvey, B. R.; Sutton, G. A.	The properties of neptunium-235 as a tracer and yield monitor in studies of the environmental behavior of neptunium.	neptunium, environmental, fish, food, isotope, valence, environment	Nucl. Instrum. Methods Phys. Res., Sect. A, A254(1), 172-81 (Eng) 1987.	RADIOCHEMICAL	CODEN: NIMAER. ISSN: 0168-9002
104(12):95103a	Tao, Zhouzhou; Yao, Shouzhuo; Nie, Lihua	Internal electrolytic determination of mercury in aqueous solution with a gold-plated piezoelectric detector.	electrolytic, mercury, aqueous, solution, gold, plated, piezoelectric, detector, analysis, electrolysis, detection	Fenxi Huaxue, 14(10), 729-34 (Ch) 1986.	PIEZOELECTRIC	CODEN: FHHHDT ISSN: 0253-3820.
104(12):92154g	Wallace, R. G.; Reed, A. P.; Polzin, J. L.; Wilson, G. T.	Correlation between gamma radiation levels and soil radium concentrations at the Edgemont uranium mill site.	gamma, radiation, soil, radium, edgemont, uranium, valley, muscle, energy, area, removal, radioactive, waste, health, physics, decontamination, analysis, wastes, solid	Report, TVA/PE/HP-85/18; Order No. DE86900531, 9 pp. Avail. NTIS From: Energy Res. Abstr. 1986, 11(7), Abstr. No. 12882 (Eng) 1985.	SPECTROMETRY	
104(10):78023k	Frosse, A.; Arrig, R.	Simple determination of volatile halogenated or aromatic hydrocarbons in soil and sludge by head-space gas-chromatography.	volatile, halogenated, aromatic, hydrocarbons, soil, sludge, head, space, gas, chromatography, analysis, wastewater, headspace, soils, sludges, tetrachloromethane, trichloromethane, benzene, trichloroethane, dichloromethane, bromodichloromethane, trichloroethane, xylene, ethylbenzene, dichloroethane, toluene, tetrachloroethane, dichloroethane	Fresenius' Z. Anal. Chem., 325(6), 533-7 (Ger) 1986.	CHROMATOGRAPHY	CODEN: ZACFAU. ISSN: 0016-1152.
104(10):77798f	Perez-Arribas, L. V.; Benton-Delgado, M. J.; Herrera-Vidal, A.; Polo-Diez, L. M.	Preparation of a solid membrane lead(II) diethyldithiocarbamate electrode and its application f indirect anion determination.	preparation, solid, membrane, diethyldithiocarbamate, electrode, anion, electrodes, titration, potentiometric, anions, analysis, potentiometry, ion, oxalate, carbonate, hydrogen, phosphate, sulfate, iodate	Microchem. J., 34(1), 105-12 (Eng) 1986.	ELECTROCHEMICAL	CODEN: MICJAN ISSN: 0026-265X

CA NO	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
106(10):77709d	Hiratani, Kazuhisa; Okada, Tadashiro; Sugihara, Hideki	1,3-Bis(8-quinolyloxy)propane derivatives as neutral carriers for lithium ion selective electrodes	quinolyloxy, propane, neutral, lithium, ion, electrodes, membrane, membranes, phenylphosphonate, potassium, tetrakis, chlorophenyl, borate, nitrophenyl, ether, plasticizer, analysis, potentiometry, hydrogen, quinolyloxy, magnesium, sodium, calcium	Anal Chem, 59(5), 766-9 (Eng) 1987	ELECTROCHEMICAL	CODEN: ANCHAM ISSN: 0003-2700 OTHER SOURCES: CJACS
106(10):76711t	Haecel, Marcel; Mihai, Adrian; Hanrahan, Robert C	Instrument for measuring the concentrations of tritium and tritium oxide in air	tritium, oxides, air, analysis, radiation, detectors, scintillation, environment, environmental	U S US 4618774 A 21 Oct 1986, 9 pp (Eng)	RADIOCHEMICAL	CODEN: USXXAM CLASS: ICM: G01T001/20 ICS: G01T007/02 NCL: 250364000 APPLICATION: US 84 639798 13 Aug 1984
106(10):76423j	Shimizu, Takahiko; Hayashi, Nanai; Akasaw, Ken; Nomura, Tamotsu; Yamato, Aiji; Imai, Makoto	Rapid measurement of strontium-89 and-90 by Cherenkov and liquid scintillation counting	strontium, liquid, scintillation, health, fuel, radiation, detectors, radioactive, wastes, wastewaters, analysis	Hoken Butsuri, 20(2), 139-41 (Japan) 1985	RADIOCHEMICAL	CODEN: HOBUAQ ISSN: 0367-6110
106(10):72112w	Stashler, J	Modular chimney exhaust-air monitoring system of Kalkar and its incorporation in the KFU-NRW (remote nuclear-reactor monitoring system of North Rhine-Westphalia)	chimney, exhaust, air, kalkar, nuclear, reactor, rhine, westphalia, radioelements, analysis, waste, gases, plant, germany, radioactive, wastes, gaseous, radioelement, monitoring, noises, iodine, cesium, cobalt, manganese, sodium, krypton, argon, xenon	LIS-Ber, 96, 77-99 (Ger) 1986	RADIOCHEMICAL	CODEN: LISBD3 ISSN: 0720-8499
106(10):72117a	Yashchun, E B; Voitenko, L I; Gol'dshtein, Zh I; Melik'yan, K A; Saifi, E M; Yakovlev, B A	Hermetic photoionization detector for gas-chromatographic analysis of traces of pollutants in air.	hermetic, photoionization, detector, gas, chromatographic, analysis, pollutants, air, pollutant, acetone, benzene, carbon	Zavod Lab, 52(11), 5-7 (Russ) 1986	CHROMATOGRAPHY	CODEN: ZVDLAU ISSN: 0044-1910
106(10):72056d	Damjantschitsch, H	Requirements for measurement methods with collecting sampling systems and experience from the KFU-NRW (remote nuclear-reactor monitoring system in North Rhine-Westphalia)	experience, nuclear, reactor, rhine, westphalia, radioelements, analysis, waste, gases, plant, radioactive, wastes, gaseous, radioelement	LIS-Ber, 96, 69-75 (Ger) 1986	RADIOCHEMICAL	CODEN: LISBD3 ISSN: 0720-8499
106(8):57606p	Fukuari, Yoshihiro; Goto, Tetsuo	Radioactivity measurement in radioactive wastewaters	radioactivity, radioactive, wastewaters, reactor, nuclear, fuel, atomic, radiochemical, analysis, wastes	Jpn Kokai Tokkyo Koho JP 61204581 A2 10 Sep 1986 Showa, 4 pp (Japan)	RADIOCHEMICAL	CODEN: JKXXAF CLASS: ICM: G01T001-167 APPLICATION: JP 85 41646 7 Mar 1985
106(8):57605n	Fukuari, Yoshihiro; Goto, Tetsuo	Radioactivity measurement in low-level liquid radioactive wastes	radioactivity, liquid, radioactive, wastes, reactor, nuclear, fuel, atomic, radiochemical, analysis, waste	Jpn Kokai Tokkyo Koho JP 61204580 A2 10 Sep 1986 Showa, 7 pp (Japan)	RADIOCHEMICAL	CODEN: JKXXAF CLASS: ICM: G01T001-167 APPLICATION: JP 85 41645 7 Mar 1985
106(8):57604m	Fukuari, Yoshihiro; Goto, Tetsuo	Radioactivity measurement in low-level liquid wastes	radioactivity, liquid, wastes, reactor, nuclear, fuel, atomic, radiochemical, analysis, radioactive, waste	Jpn Kokai Tokkyo Koho JP 61204579 A2 10 Sep 1986 Showa, 7 pp (Japan)	RADIOCHEMICAL	CODEN: JKXXAF CLASS: ICM: G01T001-167 APPLICATION: JP 85 41644 7 Mar 1985
106(7):49143v	Kim, Chungwo; Tang, Zhiyong	Determination of polycyclic aromatic hydrocarbons in soil by high-performance liquid chromatography	polycyclic, aromatic, hydrocarbons, soil, liquid, chromatography, analysis, acenaphthene, phenanthrene, naphthalene, biphenyl, anthracene, pyrene, benzo, perylene, fluoranthene, chrysene	Sepu, 4(3), 133-6 (Ch) 1986	CHROMATOGRAPHY	CODEN: SEPUER
106(4):41127w	Wilson, Bobby L; Gelfars, Melida Gardumo	The determination of lead in water and sediment samples using a lead ion-selective electrode	water, sediment, ion, electrode, soil, analysis, geological, sediments, electrodes	Microchem J, 34(3) 277-83 (Eng) 1986	ELECTROCHEMICAL	CODEN: MICJAN ISSN: 0026-265X
106(4):38128j	Cutter, G A	Speciation of selenium and arsenic in natural waters and sediments Volume 1 Selenium speciation	selenium, arsenic, waters, sediments, energy, selenates, selenites, hydride, combustion, fossil, fuels, waste, aquatic, environment, geological, selenides, water, analysis, sediment	Report, EPRI-EA-4641-Vol 1; Order No TI86920353, 99 pp Avail NTIS, Palo Alto, CA 94303 From Energy Res Abstr 1986 Abstr No 41643 (Eng) 1986	CHROMATOGRAPHY	

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104(4):27173b	D'Ulivo, Alessandro; Papoff, Paolo	Simultaneous detection of alkylselenide, alkyllead, and alkyltin compounds by gas chromatography using a multichannel nondispersive atomic-fluorescence spectrometric detector and a miniature flame as the atomizer	detection, alkylselenide, alkyllead, alkyltin, gas, chromatography, multichannel, nondispersive, atomic, fluorescence, spectrometric, detector, miniature, flame, atomizer, chromatographs, spectrometer, fluorometers, chromatograph, selenide, diselenide, tin, tetraethyltin, analysis, selenium	J Anal At Spectrom , 1(6), 479-84 (Eng) 1986	CHROMATOGRAPHY	CODEN: JASPE2
104(4):27133q	Josowicz, Mira; Janata, Jiri; Ashley, Kevin; Pons, Stanley	Electrochemical and ultraviolet-visible spectroelectrochemical investigation of selectivity potentiometric gas sensors based on polypyrrole.	electrochemical, spectroelectrochemical, potentiometric, gas, sensors, polypyrrole, sensor, salt, potentiometry, electrochem, spectroelectrochem, nitromethane, analysis, voltammetry, cyclic, transistors, gate, sensitive, electrochemistry, spectro, nitrotoluene, nitrobenzene, toluene, transistor, nitromethane, coated	Anal Chem , 59(2), 253-8 (Eng) 1987	ELECTROCHEMICAL	CODEN: ANCHAM ISSN: 0003-2700 OTHER SOURCES: CJACS
104(4):32501y	Loper, G. L.; Gelbwachs, J. A.; Beck, S. M.	Carbon dioxide-laser photoacoustic spectroscopy applied to low-level toxic-vapor monitoring.	carbon, dioxide, laser, photoacoustic, spectroscopy, toxic, vapor, air, analysis, detector, vinylidenechloride, trichloroethylene, hydrazine, dimethylhydrazine	Can J Phys , 64(9), 1124-31 (Eng) 1986	SPECTROMETRY	CODEN: CJPHAD ISSN: 0008-4204
104(4):22477v	Mierzwinski, Adam; Witkiewicz, Zygfryd	Piezoelectric detectors of air impurities with liquid-crystalline coated materials.	piezoelectric, detectors, air, impurities, liquid, crystalline, coated, crystals, vapor, analysis, crystal, coating	Chem Anal (Warsaw), 30(3), 429-41 (Pol) 1985	PIEZOELECTRIC	CODEN: CANLAO ISSN: 0009-2223
104(1):4197m	Khashimov, F. Kh.; Aroshev, D. M.; Tashlitskaya, F. D.; Nastsakaryan, L. V.	A method for potentiometric determination of nitrate nitrogen in soils	potentiometric, nitrate, nitrogen, soils, soil, analysis	Agrokhimiya (10), 117-19 (Russ) 1986	ELECTROCHEMICAL	CODEN: AKNYAY ISSN: 0002-1881
106(1):4116j	Hrncirova, V.	Determination of nitrates in water, soil extracts and in agriculture by a nitrate ion-selective electrode	nitrates, water, soil, agriculture, nitrate, ion, electrode, plant, analysis, electrodes, nutrition	Cesk Hyg , 31(6), 355-60 (Czech) 1986	ELECTROCHEMICAL	CODEN: CEHYAN ISSN: 0009-0573
105(25):226146v	Anon	Nitrate in soil samples, plants, and fertilizers.	nitrate, soil, plants, fertilizers, fertilizer, analysis, plant, ion, electrodes, soils	Mit. Schweiz. Lab -Z , 43(10), 378, 380 (Ger) 1986	ELECTROCHEMICAL	CODEN: [illegible] ISSN: 0253-5211
105(25):220125a	Kathore, M. K.; Gupta, K.; Khan, M. A.	Pressure capillary spot-test for the detection of pollutants in crops, vegetation and environment	capillary, detection, pollutants, crops, vegetation, environment, chemicals, coconut, oil, detergents, grease, inorganic, kerosine, ligroine, proteins, resin, acids, resins, soaps, synthetic, fibers, chlorophylls, analysis, carbohydrates, sugars, biological, carboxylic, hydrocarbons, phenols, environmental, plant, wheat	Anal Lett , 19(15-16), 1545-60 (Eng) 1986	GENERAL	CODEN: ANALBP ISSN: 0003-2719
105(24):213483h	Berglund, Birgitta; Berglund, Ulf; Johansson, Ingegerd; Lindvall, Thomas	Research equipment for sensory air quality studies of nonindustrial environments.	sensory, air, nonindustrial, environments, analysis, alkanes	Environ Int , 12(1-4), 189-94 (Eng) 1986	GENERAL	CODEN: ENVIDV ISSN: 0160-4120
105(22):202650b	Berezkin, Viktor G.; Arnold, Gerd; Popp, Peter	Expanding the linear dynamic range of detectors.	expanding, dynamic, detectors, gas, analysis, expanded, chromatography	Ger (East) DD 233201 A1 19 Feb 1986, 3 pp (Ger)	CHROMATOGRAPHY	CODEN: GEXXA8 CLASS: ICM G01N030-62 APPLICATION: DD 84-265335 17 Jul 1984
105(22):202546e	Berezkin, V. G.; Arnold, Gerd; Popp, Peter	Arrangement for expanding the linear dynamic range of detectors for gas analysis.	arrangement, expanding, dynamic, detectors, gas, analysis, expanded, chromatography	Ger (East) DD 233202 A1 19 Feb 1986, 4 pp (Ger)	CHROMATOGRAPHY	CODEN: GEXXA8 CLASS: ICM: G01N030-62 APPLICATION: DD 84-265336 17 Jul 1984
105(22):202168g	Carey, W. Patrick; Kowalski, Bruce R.	Chemical piezoelectric sensor and sensor array characterization	chemical, piezoelectric, sensor, acoustic, transducers, detection, methacrylate, coating, analyte, analysis, sensors	Anal Chem , 58(14), 3077-84 (Eng) 1986	PIEZOELECTRIC	CODEN: ANCHAM ISSN: 0003-2700 OTHER SOURCES: CJACS

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105(22):190551f	Wolfrum, P. W.; Atkins, A. G	The testing and performance of iodine absorption plants at CEGB nuclear power stations 1983-85.	iodine, absorption, plants, nuclear, gaseous, apparatus, radioiodine, charcoal, activated, removal, air, plant, radiation, detectors, gamma, ray, germanium, radioactive, wastes, detector, purity, radio, impregnated, isotopes	EUR, EUR 10600, Gaseous Effluent Treat. Nucl. Install., 654-62 (Eng) 1986.	ELECTROCHEMICAL	CODEN: CECEDP.
105(20):182885j	Rotin, V. A.; Gal'man, B. G.	Certain aspects of the theory and the prospects for the development of ionization chromatographic detection and identification of substances.	aspects, ionization, chromatographic, detection, alcohols, analysis, alkanes, ethers, flame, detector, gases, detectors, helium, gas, chromatography, neon, sensitivity	J. Chromatogr., 365, 297-307 (Eng) 1986.	CHROMATOGRAPHY	CODEN: JOCRAM ISSN: 0021-9673.
105(20):180175d	Moss, C. E.; Caldwell, J. T.	Assay of TRU wastes containing (alpha,n) sources.	wastes, alpha, radiochemical, analysis, gamma, ray, neutron, transuranic, radioactive, particle, emitting, preparation, neutrons, radioelements, bombardment, elements	Nucl. Mater. Manage., 15(Proc. Issue), 427-32 (Eng) 1986.	RADIOCHEMICAL	CODEN: NUMMDS ISSN: 0362-0034
105(20):178800j	Wei, Aixue; Zhao, Guodong; Liu, Xiaohong; Xie, Junying	Analysis of organic pollutants in groundwater.	analysis, organic, pollutants, groundwater, gas, ground	Huanjing Huaxue, 5(2), 47-53 (Ch) 1986.	GENERAL	CODEN: HUHUDB ISSN: 0254-6108
105(18):164951a	Guo, Zhen; Guo, Renqi	Development of a thermoplastic-antimony ammonia sensing electrode and its application.	thermoplastic, antimony, ammonia, sensing, electrode, soil, analysis, nitrogen, electrodes, membrane	Chengdu Keji Daxue Xuebao (2), 73-8 (Ch) 1986.	ELECTROCHEMICAL	CODEN: CKDXEB ISSN: 0253-2263
105(16):134933a	Kawata, Kuniaki; Ozaki, Kunio; Yokoyama, Hiroshi	Gas chromatographic (ECD) determination of volatile halogenated hydrocarbons in soil and sediment.	gas, chromatographic, volatile, halogenated, hydrocarbons, soil, sediment, health, analysis, halocarbons, chromatography, geological, sediments, halocarbon, soils, hexane	Eisei Kagaku, 32(2), 128-31 (Japan) 1986.	CHROMATOGRAPHY	CODEN: ESKGA2, ISSN: 0013-273X.
105(16):126210y	Babenko, N. L.; Blokh, M. Sh.; Medvedeva, E. V.	Ionometric method for determination of sodium in nonferrous-metallurgical products.	ionometric, sodium, nonferrous, metallurgical, vanadates, copper, ores, analysis, phosphates, potentiometry, minerals, rocks, slimes, sludges, salt, glass, electrode, metallurgy, potentiometric, residuals, leaching	Kompleksn. Ispol'z. Miner. Syr'ya (5), 29-32 (Russ) 1986.	ELECTROCHEMICAL	CODEN: KISODD
105(14):122745b	Kaneko, Masao; Kawachi, Kyozo; Wataka, Hiroaki	A circulation-type coulometric analysis apparatus.	circulation, coulometric, analysis, apparatus, coulometers, uranium, plutonium, radioactive, waste, wastes, circulatory	Jpn. Kokai Tokkyo Koho JP 61050057 A2 13 Mar 1986 Showa, 4 pp. (Japan).	ELECTROCHEMICAL	CODEN: JKXXAF CLASS: ICM- G21C019-46 APPLICATION: JP 84-171578 20 Aug 1984
105(12):107304u	Wang, T. C.; Lenahan, R. A.; Kadlec, T.	Environmental monitoring of volatile organics by purge-closed loop gas chromatograph.	environmental, volatile, organics, gas, chromatograph, water, oyster, tissues, sediments, chromatography, geological, wells, analysis	Proc.-AWWA Water Qual. Technol. Conf., Volume Date 1985, 13, 143-57 (Eng) 1986	CHROMATOGRAPHY	CODEN: PWQCD2 ISSN: 0164-0755.
105(12):104493r	Kuroda, Masami; Yamahara, Kenji; Osawa, Hideo	Determination of tritium concentration.	tritium, electric, radioactive, wastes, gaseous, electrolysis, analysis, electrolytic	Jpn. Kokai Tokkyo Koho JP 61075281 A2 17 Apr 1986 Showa, 5 pp. (Japan).	ELECTROCHEMICAL	CODEN: JKXXAF CLASS: ICM- G01T001-167
105(10):90508h	Gurka, Donald F.; Titus, Richard	Rapid nontarget screening of environmental extracts by directly linked gas chromatography/Fourier transform infrared/mass spectrometry.	screening, environmental, gas, chromatography, infrared, spectrometry, dyes, herbicides, wastes, soil, analysis, spectroscopy, spectrometers, chromatograph, spectrometer, acids, alcohols, aldehydes, alkanes, alkenes, amides, amines, aromatic, hydrocarbons, esters, ethers, ketones, spectrochemical, herbicide	Anal. Chem., 58(11), 2189-94 (Eng) 1986.	CHROMATOGRAPHY	CODEN: ANCHAM, ISSN: 0003-2700 OTHER SOURCES: CJACS

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104(14):88473u	Berezkin, V. G.; Andronikashvili, T. G.; Tsitsishvili, G. V.; Osmanidzeni, I. A.	The use of carbon monoxide and water gas as the flame-forming agent in the thermionic detector.	carbon, monoxide, water, gas, flame, agent, thermionic, detector, petroleum, chromatography, detectors, agents, fuel, gases, analysis, detection	Chromatographia, 22(1-6), 95-8 (Eng) 1986	CHROMATOGRAPHY	CODEN: CHRGB7. ISSN: 0009-5893
105(8):68790b	Nagy, Gy.; Fabac, Istvan; German, Endre; Nemeky, J.	Summary of the Paks reactor cold-and warm-water coolant continuous monitoring.	reactor, warm, water, coolant, pollution, radioactive, wastewater, plant, river, health, physics, nuclear, radiation, detectors, gamma, ray, sodium, iodide, thallium, activated, wastes, wastewaters, analysis, radioactivity, detector	Hung. Acad. Sci., Cent. Res. Inst. Phys., KFKI, KFKI-1986-06/K, 40 pp. (Hung) 1986.	RADIOCHEMICAL	CODEN: KFKRAA. ISSN: 0368-5330
105(8):68679v	Nemeth, T.; Szabari, P.; Urban, J.; Andrasi, A.; German, E.; Nemenes, L.	Calibration and test of a portable semiconductor gamma-ray spectrometer for in-situ dosimetry.	portable, semiconductor, gamma, ray, spectrometer, dosimetry, urban, computer, spectrometry, environmental, pollution, nuclear, reactor, spectrometers, semiconductive, reactors, plants, environment, analysis, metastable, plant, germanium, drifted, lithium, sodium, iodide, activated, thallium	Hung. Acad. Sci., Cent. Res. Inst. Phys., KFKI, KFKI-1986-14/K, 50 pp. (Hung) 1986.	SPECTROMETRY	CODEN: KFKRAA. ISSN: 0368-5330
105(6):48700s	Milanovich, Fred P.; Garvis, Darrel G.; Angel, S. Michael; Klainer, Stanley M.; Eccles, Lawrence	Remote detection of organochlorides with a fiber optic based sensor.	detection, organochlorides, fiber, optic, sensor, Lawrence, optics, fluorometric, sensors, chloroorg., water, spectrochemical, analysis, fluorometry	Anal. Instrum. (N. Y.), 15(2), 137-47 (Eng) 1986.	FIBER-OPTIC	CODEN: ANINDS. ISSN: 0743-5797
105(6):48680k	Takeda, Ichiro	Simple method of determination for trace amounts of trichloroethylene and 1,1,1-trichloroethane in water by detector tube.	trichloroethylene, trichloroethane, water, detector, tube, hydrocarbons, analysis, gas, chlorinated, hydrocarbon	Bunseki Kagaku, 35(9), 747-749 (Japan) 1986	GENERAL	CODEN: BNSKAK. ISSN: 0525-1931
105(4):34772e	Pisarova, Marie; Novak, Josef; Ulrich, Roman; Vyhlidka, Pavel	Determination of nitrites in mixtures with nitrates by using a nitrate-selective electrode.	nitrites, mixtures, nitrates, nitrate, electrode, soil, analysis, electrodes, wastewaters, ion, nitrite, waste	Chem. Listy, 80(3), 328-31 (Czech) 1986.	ELECTROCHEMICAL	CODEN: CHLSAC. ISSN: 0009-2770
105(4):33639t	Bertolini, G.; Prosdocimi, A.; Tocino, V.	Spontaneous fission rate measurements by means of fast time-of-flight multiplicity analyser (FA TZ MA).	spontaneous, fission, rate, flight, multiplicity, analyser, fissile, nuclear, radioactive, wastes, isotope, radiation, detectors, scintillation, plastic, plutonium, analysis, dioxide	Eur. Appl. Res. Rep., Nucl. Sci. Technol. Sect., 7(1), 111-50 (Eng) 1986.	RADIOCHEMICAL	CODEN: EARRDP. ISSN: 0379-4229
105(3):23527o	Lyubimova, I. N.	Determination of potassium and sodium concentrations in saline soils and natural waters using ion-selective electrodes.	potassium, sodium, saline, soils, waters, ion, electrodes, soil, analysis, water	Agrokhimiya (4), 105-8 (Russ) 1986.	ELECTROCHEMICAL	CODEN: AGKYAU. ISSN: 0002-1881.
104(26):230646g	Tanyolac, Necmi; Labows, John N.	Methods and apparatus for detection and identification of volatile materials and odors	apparatus, detection, volatile, odors, odor, odorous, detector, membrane, soil, pollution, air, analysis, disease, health, mammals, albicans, corynebacterium, bovis, microsporum, pseudomonas, aeruginosa, staphylococcus, aureus, electric, insulators, dielectrics, gas, fruits, cellulose, acetate, nitrate	U.S. US 4563093 A 14 Jan 1986, 11 pp. (Eng)	GENERAL	CODEN: USXXAM. CLASS: IC: G01N033-46. NCL: 073023000. APPLICATION: US 83-487878 22 Apr 1983.
104(26):233963x	Giuliani, J. F.; Hsu, E. H.; Butler, J. E.	Fabrication of an integrated optical waveguide chemical vapor microsensor by photopolymerization of a bifunc oligomer.	integrated, optical, waveguide, chemical, vapor, microsensor, photopolymerization, bifunctional, oligomer, polymers, photopolymd, acrylic, waveguides, sensor, analysis, detection, polymeric	Appl. Phys. Lett., 48(19), 1311-13 (Eng) 1986.	FIBER-OPTIC	CODEN: APPLAB. ISSN: 0003-6951

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104(25):221370x	Pollard, N.	Determination of d(3)-beryllium and d(4)-beryllium neutron spectra using a recoil proton spectrometer.	beryllium, neutron, spectra, proton, spectrometer, muscle, dosimetry, tissue, phantoms, nuclear, spectrometers, deuteron, bombardment, biological, spectral	Phys. Med. Biol., 31(2), 139-44 (Eng) 1986	SPECTROMETRY	CODEN: PHMBA7 ISSN: 0031-9155
104(26):219173u	Alexander, Peter W.; Haddad, Paul R.; Trojanowicz, Marek	Response characteristics of a potentiometric detector with a copper metal electrode for flow-injection and chromatographic determinations of metal ions.	potentiometric, detector, copper, metal, electrode, flow, injection, chromatographic, ions, metals, analysis, flowing, ligands, chromatography, liquid, detectors, electrodes	Anal. Chim. Acta, 177, 183-95 (Eng) 1985	ELECTROCHEMICAL	CODEN: ACACAM ISSN: 0003-2670
104(24):214957k	Baba, Katsumi; Watanabe, Kazuhisa	Incineration system for the disposal of iodine-125 radioimmunoassay test tube wastes-confirmation of iodine-125 decay in wastes.	incineration, disposal, iodine, radioimmunoassay, tube, wastes, radioisotopes, radiation, detectors, gamma, ray, ware, tubes, analysis	Radioisotopes, 34(1), 15-23 (Japan) 1985.	RADIOCHEMICAL	CODEN: RAISAB ISSN: 0033-8303
104(20):212279p	Guilbault, G. G.	Study of gas solid reactions using coated piezoelectric detectors.	gas, solid, coated, piezoelectric, detectors, pollutant, air, analysis, crystals	Report, ARO-17654 4-CH; Order No. AD-A153047, 17 pp. Avail. NTIS Gov. Rep. Announce. Index (U. S.) 1985, 85(15), Abstr. No. (Eng) 1985.	PIEZOELECTRIC	
104(23):r199350p	Sievers, Robert Eugene; Nyarady, Stefan Alex	Selective conversion of organic compounds and their detection by gas chromatography and chemiluminescence	organic, detection, gas, chromatography, chemiluminescence, perfumes, detector, aromatic, alcohols, analysis, aldehydes, amines, hydrocarbons, carboxylic, acids, esters, phenols, spectrochemical, catalyst, analysis	Eur. Pat. Appl. EP 174093 A1 12 Mar 1986, 26 pp.	CHROMATOGRAPHY	DESIGNATED STATES: R: AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE (Eng) CODEN: EPXXDW. CLASS: ICM: C07B033-00 ICS: C07C047-00; C07C049-00; C07C019-08; C07C005-42; C07C041-29; G01N031-16; G01N015-00; G01N021-52 APPLICATION: EP 85-305476 31 Jul 1985 PRIORITY: US 84-637505 3 Aug 1984
104(22):198192h	Cunningham, Mark; Tay, S. T.; Ang, K. P.	Automated mercury film electrode for flow injection analysis and high-performance liquid chromatography detection.	automated, mercury, electrode, flow, injection, analysis, liquid, chromatography, detection, radge, amperometry, electrodes, quinones, amperometric, microprocessor, per, detectors, aromatic, microprocessor	Anal. Chem., 58(7), 1578-80 (Eng) 1986	ELECTROCHEMICAL	CODEN: ANCHAM ISSN: 0003-2700 OTHER SOURCES: CJACS
104(22):190054q	Cheng, Shenh Shing	Measurement of uranium and thorium concentrations in rock samples using gamma spectrometry.	uranium, thorium, rock, gamma, spectrometry, soil, analysis, ray, rocks, soils	Ho Tzu K'o Hsueh, 22 277-84 (Ch) 1985	SPECTROMETRY	CODEN: HTKHAB ISSN: 0029-5647
104(2):11762a	Belov, G. Kh.; Kuznetsov, L. P.; Lukhrov, V. G.; Rodin, N. N.; Savast'yanov, Yu. A.	High-sensitivity gamma-ray spectrometric analysis of radionuclides in the air of a nuclear p plant	sensitivity, gamma, ray, spectrometric, analysis, radionuclides, air, nuclear, plant, pollution, spectroscopy, radioactive, wastes, gaseous, reactors, plants, untestable, spectrometry, spectra, reactor, irradiated	Radiats. Bezop. Zashch. AES, 9, 266-73 (Russ) 1986	SPECTROMETRY	CODEN: RBZADJ ISSN: 0139-0057
104(16):t141653d	Wang, Naiyu; Xie, Yuelin	Microwave plasma photoionization detector operating at atmospheric pressure	microwave, plasma, photoionization, detector, atmospheric, chemical, helium, gas, chromatography, detectors, analysis	Sepu, 2(5) 265-7 (Ch) 1985.	CHROMATOGRAPHY	CODEN: SEPUER
104(16):141376q	Rice, G. W.; D'Silva, A. P.; Fassel, V. A.	A new helium discharge-afterglow and its application as a gas chromatographic detector	helium, afterglow, gas, chromatographic, detector, rare, halogens, emission, spectrometric, detection, electric, detectors, chromatography, analysis	Spectrochim. Acta, Part B, 40B(10-12), 1573-84 (Eng) 1985	CHROMATOGRAPHY	CODEN: SAASBH ISSN: 0584-8547
104(16):141173m	Nakamura, Toshio; Ogasawara, Kazuyuki; Izutsu, Kosuke; Rechnitz, G. A.	Behavior of polyacrylamide-acrylic poly(oxyethylene)-coated ion-selective electrodes solvents	polyacrylamide, acrylic, oxyethylene, coated, ion, electrodes, nonaqueous, solvents, metal, analysis, polymer, conjugation	Bull. Chem. Soc. Jpn., 58(11), 3009-10 (Eng) 1985	ELECTROCHEMICAL	CODEN: BCSJA8 ISSN: 0009-2673

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104(16):141173j	Pellaux, J.; Fabry, P.; Durante, P.	Design and testing of a potentiometric chlorine gage.	potentiometric, chlorine, gage, gas, analysis, sensor, sensors, gases, potentiometry	Sens. Actuators, 7(4), 245-52 (Eng) 1985.	ELECTROCHEMICAL	CODEN: SENCDY ISSN: 0250-6874
104(16):141095a	Edmonds, T. E.	Chemical sensing in the environment: the challenge to the analytical chemist.	chemical, sensing, environment, analytical, atmosphere, rocks, sensors, air, analysis, environmental, soil	TrAC, Trends Anal. Chem. (Pers. Ed.), 4(9), 220-4 (Eng) 1985.	GENERAL	CODEN: TTAEDJ ISSN: 0165-9936.
104(16):137070u	Fleissner, J. G.; Oertel, C. P.; Garrett, A. G.	A high count rate gamma-ray spectrometer system for plutonium isotopic measurements.	rate, gamma, ray, spectrometer, plutonium, isotopic, nuclear, reactor, fuels, fuel, elements, radioactive, wastes, spectrometers, analysis, isotopes, bulk, scrap, radiation, detector	Nucl. Mater. Manage., 14(3), 45-56 (Eng) 1986.	SPECTROMETRY	CODEN: NUMMDK ISSN: 0362-0034
104(16):137771r	Strauss, M. G.; Sherman, I. S.; Roche, C. T.; Pehl, R. H.	Si(Li)-NaI(Tl) sandwich detector array for measurements of trace radionuclides in soil samples.	sandwich, detector, radionuclides, soil, sample, residues, actinide, radioactivity, lithium, drifted, silicon, thallium, activated, sodium, iodide, actinides, radiation, detectors, soils, analysis, nuclear, spectrometers, ray, plutonium	Nucl. Instrum. Methods Phys. Res., Sect. A, A242(3), 387-94 (Eng) 1986.	RADIOCHEMICAL	CODEN: NIMAER
104(12):95198v	Schneider, Gerhard	System for detecting oil pollution in groundwaters.	oil, pollution, groundwaters, petroleum, underground, tanks, pipelines, detector, water, analysis, ground	Ger. Offen. DE 3426836 A1 23 Jan 1986, 8 pp. (Ger)	GENERAL	CODEN: GWXXBX. CLASS: ICM: G01M003-16 APPLICATION: DE 84-3426836 20 Jul 1984.
104(12):95115u	Chen, Letian; Liu, Rena	Ion chromatographic determination of bromide, sulfite, fluoride, chloride, nitrate and sulfate.	ion, chromatographic, bromide, sulfite, fluoride, chloride, nitrate, sulfate, analysis, anion, sea, ground, rain, amperometric, detectors, waters	Sepu, 2(4), 207-8 (Ch) 1985.	CHROMATOGRAPHY	CODEN: SEPUER.
104(12):94377u	Underdown, Alan W.; Colford, Martha J. Townshend	Development of a person-portable analytical system.	portable, analytical, spills, air, analysis, hazardous, flame, ionization, photoionization, detectors, detection	Proc. Tech. Semin. Chem. Spills, 2nd, 344-59. Environ. Prot. Serv.: Ottawa, Ont. (Eng) 1985.	SPECTROMETRY	CODEN: 54GOAD
104(12):101884y	Anderegg, Robert J.	A selenium-selective chromatographic detector based on isotope clusters.	selenium, chromatographic, detector, isotope, computer, detection, spectrometry, spectroscopy, gas, chromatography, detectors, spectrometric, amino, acids, analysis, selenomethionine, acid	Anal. Chim. Acta, 176, 175-81 (Eng) 1985.	CHROMATOGRAPHY	CODEN: ACACAM ISSN: 0003-2670.
104(12):101635g	Colson, Tomm H.	Flame ionization detectors and high-end linearity.	flame, ionization, detectors, gas, fuel, alkanes, analysis, alkenes, hydrocarbons, sensitivity, chromatography, gases	Anal. Chem., 58(2), 337-44 (Eng) 1986.	SPECTROMETRY	CODEN: ANCHAM. ISSN: 0003-2700 OTHER SOURCES: CJACS.
104(12):101404f	Chen, Zhaoming	Ultrasensitivity photoionization detector for portable gas chromatography.	photoionization, detector, portable, gas, chromatography, plant, aromatic, hydrocarbons, analysis, air, detection, detectors, water	Sepu, 2(4), 234 (Ch) 1985.	CHROMATOGRAPHY	CODEN: SEPUER
104(10):81672a	Liu, Puling; Qi, Tianqing; Deng, Caizhi	Use of preseparation and thallium-activated sodium iodide detector for the neutron activation determination of rare earth elements.	thallium, activated, sodium, iodide, detector, neutron, activation, rare, earth, elements, soil, water, metals, analysis, rocks	He Dianzixue Yu Tance Jishu, 5(5), 311-13 (Ch) 1985.	RADIOCHEMICAL	CODEN: HDYUEC
104(7):50700m	Yu, T. R.	Application of ion-selective electrodes in soil science.	ion, electrodes, soil, electrode, analysis	Ion-Sel. Electrode Rev., 7(2), 165-202 (Eng) 1985.	ELECTROCHEMICAL	CODEN: ISERDR ISSN: 0191-5371
104(7):50286j	Yu, Tianren	Application of ion-selective electrodes in soil science.	ion, electrodes, soil, analysis, ions	Turangxue Jinzhan, 13(4), 1-23 (Ch) 1985.	ELECTROCHEMICAL	CODEN: TUJIEY. ISSN: 0254-010X
104(6):46026v	Cai, Lashen; Du, Meiling; Ma, Beiying	PVC matrix membrane chromium(VI)-selective electrodes based on ethyl violet or Victoria Blue.	membrane, chromium, electrodes, ethyl, membranes, analysis, waste, potentiometry, potentiometric, ion, electrode	Shanxi Daxue Xuebao, Ziran Kexueban, 24, 83-7 (Ch) 1984	ELECTROCHEMICAL	CODEN: SDXKDT ISSN: 0253-2395.

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104(5):41808d	Anon.	Method and apparatus for measuring the plutonium concentration in a stream of treated liquid.	apparatus, plutonium, stream, liquid, nuclear, fuels, reactor, fuel, streams, radioactive, wastes, analysis	Belg. BE 902481 A1 16 Sep 1985, 19 pp. (Fr).	RADIOCHEMICAL	CODEN: BEXXAL. CLASS: ICM: G01T. ICS: G21F. APPLICATION: BE 85-215857 3 May 1985. PRIORITY: GB 84-11336 23 May 1984.
103(26):226713r	Driscoll, J. N.; Wilshire, A. G.; Wodenrader, J. W.	New continuous monitoring systems for measurement of hazardous pollutants.	hazardous, pollutants, ambient, air, analysis, environmental, soil, hydrocarbons, waste, chromatography, gas, ionization, photo, detectors, wastes, pollutant	U. S. Environ. Prot. Agency, Res. Dev., [Rep.] EPA, EPA/600/9-84/019, Proc.-Natl. Symp. Recent Adv. Pollut. Monit. Ambient Air Stationary Sources, 1984, 87-9 (Eng) 1984	CHROMATOGRAPHY	CODEN: XPARD6. ISSN: 0092-9054
103(26):220180t	Krepaian, Marek K.; Elias, Lorne	Automated sampling and analysis of flue gases from plasma pyrolizer.	automated, analysis, flue, gases, plasma, pyrolizer, ambient, air, incineration, hazardous, wastes, gas, waste, incinerator, automatic, incinerators, torch, toxic, adsorbent	U. S. Environ. Prot. Agency, Res. Dev., [Rep.] EPA, EPA/600/9-84/019, Proc.-Natl. Symp. Recent Adv. Pollut. Monit. Ambient Air Stationary Sources, 1984, 152-60 (Eng) 1984	CHROMATOGRAPHY	CODEN: XPARD6. ISSN: 0092-9054
103(22):189540a	Body, P. E.; Steinberys, P.; Moleskey, G. B.	A potentiometric sensing system for lead.	potentiometric, sensing, body, potentiometry, flow, electrolytic, analysis, sensor, element, lauric, acid, laurate	Anal. Lett., 18(A8), 911-27 (Eng) 1985.	ELECTROCHEMICAL	CODEN: ANALBP. ISSN: 0003-2719
103(20):171183m	Harrison, Roy M.; Hewitt, C. N.	Development of sensitive GC-AAS instrumentation for determination of organometallic species in the environment.	sensitive, organometallic, environment, environmental, gas, absorption, spectrometric, air, analysis, gasoline, tetraalkyllead, chromatography, spectrometer, spectrometers, chromatograph, spectrometry	Int. J. Environ. Anal. Chem., 21(1-2), 89-104 (Eng) 1985.	CHROMATOGRAPHY	CODEN: IJEAA3. ISSN: 0306-7319.
103(20):168346e	Yamakoshi, Hisao	Simple formula for expression of dose rate distributions around spent fuel shipping cask.	dose, rate, fuel, shipping, cask, dosimetry, reactor, nuclear, fuels, elements, radioactive, wastes	J. Nucl. Sci. Technol., 22(9), 697-709 (Eng) 1985	GENERAL	CODEN: JNSTAX. ISSN: 0022-3131.
103(17):140816r	Moreira-Nordemann, L. M.; Lecht, L. A. M.; Mumic, R. P. A.	Photoacoustic spectroscopy and surface temperature measurements of tropical soils.	photoacoustic, spectroscopy, tropical, soils, soil, heat, biological, absorption, iron, oxide, organic, analysis, spectrochemical	Soil Sci., 139(4), 338-48 (Eng) 1985.	SPECTROMETRY	CODEN: SOSCAK. ISSN: 0038-075X
103(16):134178g	Finenes G., G.	Determination of cesium-137 in environmental samples by high resolution gamma-ray spectrometry.	cesium, environmental, gamma, ray, spectrometry, grass, vegetable, analysis, soil, spectrometric	Nucleotecnica, 4(9), 10-18 (Span) 1985.	SPECTROMETRY	CODEN: NUCLEQ
103(16):128198h	Ohita, Toshiichi	Importance of remote sensing in the studies of environmental pollution.	sensing, environmental, pollution, soil, moisture, lidar, air, analysis, pollutant, absorption, flow, gas, water	Keiseisha Kogai Kenkyusho Kenkyu Hokoku, 77, 1-4 (Japan) 1985.	GENERAL	CODEN: KKOHD6
103(14):115344e	Gvelesiani, S. A.; Berezkin, V. G.; Poshemanskii, V. M.; Andronikashvili, T. G.	Some characteristics of the mechanism of ion formation in a thermionic detector with carbon monoxide as a flame generator.	ion, thermionic, detector, carbon, monoxide, flame, ionization, gases, detectors, chromatography, gas, analysis, detection, hydrogen	Soobshch. Akad. Nauk Gruz. SSR, 117(2), 305-8 (Russ) 1985.	SPECTROMETRY	CODEN: SAKNAH. ISSN: 0002-3167.
103(14):109256b	Barker, Nicholas J.; Leveson, Richard C.	A miniaturized direct-reading photoionization detector for air analysis.	miniaturized, reading, photoionization, detector, air, analysis, normethane, hydrocarbon, portable, detection	Anal. Instrum. (Research Triangle Park, N. C.), 21, 171-9 (Eng) 1985.	ELECTROCHEMICAL	CODEN: AINEBB. ISSN: 0570-0000
103(12):90114h	Savina, G. A.	Use of a gas chromatographic column with PMS-100 polymethylsiloxane for sanitary-hygienic studies.	gas, chromatographic, polymethylsiloxane, sanitary, hygienic, alcohols, analysis, esters, hydrocarbons, ketones, environment, air, environmental, chromatography, siloxanes, silicones, hygiene	Gig. Sanit. (5), 50-2 (Russ) 1985.	CHROMATOGRAPHY	CODEN: GISAAA. ISSN: 0016-9900.
103(12):97971y	Hiraki, Kenju; Nakaguchi, Yuzuru; Morita, Michitaka; Hajjai, Nobuyuki	Determination of metal ions with polarized Zeeman effect and optical temperature sensor and control system flame atomic absorption spectrophotometry.	metal, ions, polarized, zeeman, optical, sensor, flameless, atomic, absorption, spectrophotometry, metals, analysis, spectrometry, spectrometric, thermoregulators, spectrometers, spectrochemical, sensitivity	Kinki Daigaku Rikogakubu Kenkyu Hokoku (20), 77-84 (Japan) 1984.	SPECTROMETRY	CODEN: KDRKAB

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103(12):92308t	Vedach, A. B ; Mees, C. F.	Radon-222 concentration measurements in soil using liquid scintillation and track etch	radon, soil, liquid, scintillation, track, health, analysis, indoor, air, pollution	Health Phys , 48(6), 805-8 (Eng) 1985	SPECTROMETRY	CODEN: HLTPAO ISSN: 0017-9078
103(22):98780p	Ogawa, Hiroaki; Ohsuka, Tsukuhiko; Yamamoto, Tadatoshi; Nadachi, Yoshiki	Nondestructive measurement of the distribution of radionuclide concentrations in the soil column measurement of one-dimensional distribution	nondestructive, radionuclide, soil, dimensional, energy, analysis, cesium	Oyo Butsuri, 54(7), 738-44 (Japan) 1985	GENERAL	CODEN: OYBSA9 ISSN: 0369-8009
103(11):85613y	Zyrin, N G ; Kovalevskii, E F ; Kozlyakov, M P ; Ryabkovskii, A V ; Semenov, A N	Determination of arsenic and antimony in plants	arsenic, antimony, plants, plant, analysis, neutron, activation, wheat, grain, spike, soil, pollution, crop	Tad -Fiz Metody Anal Kontrole Okrzh Sredy, Tr Vses Soveshch , 2nd, Meeting Date 1982, 228-31 Edited by Izrael, Yu A. Gidrometeoizdat: Leningrad, USSR (Russ) 1985	SPECTROMETRY	CODEN: 53IQAL
103(10):78032y	Sirlpiron, Lopchai	The determination of plutonium isotopes in environmental samples	plutonium, isotopes, environmental, soil, analysis, isotope, health, physics, solvent	Report, INIS-mf-9575, 54 pp Avail INIS From INIS Atomindex 1985, 16(9), Abstr No 16:036190 (Thai) 1983	RADIOCHEMICAL	
103(10):75766q	Randle K ; Hartmann, E H	Extraction and neutron activation analysis of humic substances	extraction, neutron, activation, analysis, humic, humus, soil, metal, toxic, waste, wastes, disposal	J Radioanal Nucl Chem , 90(2), 109-15 (Eng) 1985	RADIOCHEMICAL	CODEN: JRNCDM
103(9):70266m	Pridvorova, V. G ; Arsent'eva, N M ; Gryzlova, T B	Use of ion-selective nitrate electrodes to determine nitrification capacity of soils	ion, nitrate, electrodes, nitrification, soils, electrode soil, analysis	Respub Sovesch Metodov Anal Pochv, Rast Udobr , 13-15 Edited by: Derzhavin, L M Tsentr Inst Agrokhim Obsluzhivaniya Sel'sk Khoz Moscow, USSR (Russ) 1983	ELECTROCHEMICAL	CODEN: 53MTAF
103(8):64121t	Nyarady, Stefan A ; Barkley, Robert M ; Sievers, Robert E	Redox chemiluminescence detector: application to gas chromatography	chemiluminescence, detector, gas, chromatography, oils, lemon, aromatic, alcohols, analysis, aldehydes, alkenes, amines, carboxylic, acids, ketones, sulfides, thiols, detection, catalysts, gold, detectors, nitrogen, dioxide, ozone, oil analyte, catalyst	Anal Chem , 57(13), 2074-9 (Eng) 1985	CHROMATOGRAPHY	CODEN: ANCHAM ISSN: 0003-2700 Other Sources: CJACS
103(8):61133m	Sacher, A ; Corry, J ; Lame, J	Absolute and intrinsic response probabilities of scintillators presenting straight truncated cylindrical geoms to photons emitted by sources of the same shape	scintillators, cylindrical, photons, emitted, shape, radioactive, wastes, gamma, ray, spectrometry, radiation, detectors, scintillation	Report, CEA-R-5280, 56 pp Avail INIS From INIS Atomindex 1985, 16(8), Abstr No 16:027340 (Fr) 1984	SPECTROMETRY	
103(6):47286r	Gur'ev, I A ; Kalachev, N. R ; Kalugin, A. K.; Kiryakova, N V ; Fedotova, O N	Comparative study of liquid and film membrane nitrate-selective electrodes	liquid, membrane, nitrate, electrodes, cucumber, onion, soil, analysis, wheat, clays, potentiometry, ion	Zh Anal Khim , 40(4), 689-93 (Russ) 1985	ELECTROCHEMICAL	CODEN: ZAKHA8 ISSN 0044-4502
103(6):47371g	Pietrzykowski, Andrzej; Malkowicz, Adam; Baranski, Andrzej	ALPHA-I electrolyzer for deposition of ultrathin films of alpha-radioactive elements for spectrometric measurements	alpha, electrolyzer, radioactive, elements, spectrometric, environmental, analysis, particle, spectrometry, electrolytic, radiochemical, actinides, radioelements, environment, radioelement, uranium	Postepy Fiz Med , 19(3), 265-9 (Pol) 1984	SPECTROMETRY	CODEN: PFMDAR
103(6):41700s	Stetter, J R ; Zaromb, S ; Findlay, M W , Jr	Monitoring of electrochemically inactive compounds by amperometric gas sensors	electrochemically, amperometric, gas, sensors, aromatic, hydrocarbons, analysis, air, heated, noble, metal, filament, preexposure, toxic, biological, electrodes, gold, platinum, vapor	Sens Actuators, 6(4) 269-88 (Eng) 1984	ELECTROCHEMICAL	CODEN: SEACDX ISSN 0250-6874
103(4):29077u	Schoenig, Frederick Carl, Jr ; Glendenning, Sharon Gail; Tunnell, George William; Sacher, Martin Samuel	Apparatus for determining the fissionable and fertile material content of ashing residues in a container.	apparatus, fissionable, fertile, ashing, residues, electric, radioactive, wastes, fissile, nuclear, reactor, fuels, fuel, elements, tubes, radiation, detectors, gamma, ray, chemical, radiochemical, analysis, neutron, activation	Ger Offen DE 3430859 A1 14 Mar 1985, 17 pp (Ger)	RADIOCHEMICAL	CODEN: GWXXBX CLASS: ICM G01T001-167 ICS G21F009-32 APPLICATION: DE 84-3430859 22 Aug 1984 PRIORITY: US 83-526182 24 Aug 1983

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101(4):25354d	Dubrovin, V. N.	Experimental use of an RL-1 portable laboratory for solving hydrogeochemical problems	experimental, portable, solving, hydrogeochemical, waters, ground, analysis	Deposited Doc., VINITI 3425-84, 6 pp. Avail. VINITI (Russ) 1984.	ELECTROCHEMICAL	
101(3):10270b	Bagrov, Yu. G.; Malik, L. A.; Bryzga, E. A.; Talmakovich, N. D.	Determination of residual quantities of herbicidal diphenyl ethers in soil, plants and essential oils.	residual, herbicidal, ethers, soil, plants, oils, pollution, nitrochlor, preforan, gas, ecge, detoxication	Agrokhimiya (4), 110-15 (Russ) 1984.	GENERAL	CODEN: AGKYAU ISSN: 0002-1881
102(26):230918r	Tiefenthaler, K.; Lukosz, W.	Integrated optical humidity and gas sensors.	integrated, optical, humidity, gas, sensors, fiber, analyzers, detectors	Proc. SPIE-Int. Soc. Opt. Eng., 514(Conf. Proc. OFS 84, Int. Conf. Opt. Fiber Sens. 2nd), 215-18 (Eng) 1984	FIBER-OPTIC	CODEN: PSISDG ISSN: 0277-786X
102(22):197661j	Zhuravleva, E. Yu.; Gavrilov, F. F.; Smirnov, V. Ya.	Use of microtron bremsstrahlung for elemental analysis of soils for lead and tantalum.	microtron, bremsstrahlung, elemental, analysis, soils, tantalum, soil, gamma, ray, activation	Radiats.-Stimul. Yavleniya Tverd Telakh, 5, 124-7 (Russ) 1983.	RADIOCHEMICAL	CODEN: RSYTD7
102(22):193712w	Goupaux, Jackie	Device and method for determining volumetric activity and estimation of the plutonium contained in wastes.	activity, plutonium, wastes, radioactive, (UK), analysis, waste	Fr. Demande FR 2547061 A1 7 Dec 1984, 46 pp. (Fr).	ELECTROCHEMICAL	CODEN: FRXXBL. CLASS: ICM: G01T001-167 ICS: G01T001-00; G21C019-42 APPLICATION: FR 83-9050 1 Jun 1983.
102(22):193525f	Bouga, C.	Theoretical study of physical characteristics of plutonium contaminated solid waste reference monitor for passiv neutron measurements.	plutonium, solid, waste, passive, neutron, radiation, detectors, radioactive, wastes, analysis	Report, LYCEN-8221, 130 pp. Avail. INIS From: INIS Atomindex 1985, 16(3), Abstr. No. 16:011227 (Fr) 1982.	RADIOCHEMICAL	
102(22):193526g	Baron, J. L.	Models for measuring actinides by gamma spectrometry: choice of a reference monitor.	actinides, gamma, spectrometry, radioactive, wastes, plutonium, actinide, ray, spectroscopy, waste, radiation	Report, LYCEN-8222, 100 pp. Avail. INIS From: INIS Atomindex 1985, 16(3), Abstr. No. 16:01 [illegible] (Fr) 1982.	SPECTROMETRY	
102(20):178432e	Rice, G. W.; D'Silva, A. P.; Fassel, V. A.	An atmospheric-pressure, argon-afterglow detector for gas chromatography.	atmospheric, argon, afterglow, detector, gas, chromatography, rare, plasma, chemical, element, detection, pesticides, detectors, halogen, analysis, spectrometric	Anal. Chim. Acta, 166, 27-38 (Eng) 1984.	CHROMATOGRAPHY	CODEN: ACACAM. ISSN: 0003-2670
102(18):154757r	Furrer, Juergen; Wilhelm, Hans Georg	Device for detecting iodine isotopes.	iodine, isotopes, sorption, detection, waste, gases, air, nuclear, radiation, detectors, gas, isotope, radioactive, wastes, gaseous, analysis, insolubles, impregnated	Ger. Offen. DE 3324633 A1 17 Jan 1985, 13 pp. (Ger)	RADIOCHEMICAL	CODEN: GWXXBX. CLASS: ICM: G01T001-24 ICS: G01T001-167; G01T007-04. APPLICATION: DE 83-3324633 7 Jul 1983
102(18):154664y	Lo, J. G.; Fan, K. M.; Yeh, W. J.	Determination of low level krypton-85 concentration in radioactive liquid waste.	krypton, radioactive, liquid, waste, wastes, analysis	Hua Hsueh, 42(3), 83-9 (Ch) 1984.	RADIOCHEMICAL	CODEN: HUHHAI ISSN: 0441-3768
102(18):153960u	Hanai, Toshinichi; Katou, Tetsuo; Iizuka, Tetsuya	Automatic analysis of halogenated hydrocarbons in the air.	automatic, analysis, halogenated, hydrocarbons, air, halohydrocarbon, chromatography, gas, detectors, electron	Yokohama Kokuritsu Daigaku Kankyo Kagaku Kenkyu Senta Kiyo, 11(1), 17-27 (Japan) 1984.	CHROMATOGRAPHY	CODEN: YKDKDA.
102(16):141336n	Hoshino, A.; Bohm, G.	A new measurement system for IAEA inspectors. The Compact K-edge Densitometer.	inspectors, densitometer, densitometers, plutonium, analysis	Nucl. Mater. Manage., 13(Proc. Issue), 273-6 (Eng) 1984.	SPECTROMETRY	CODEN: NUMMDS ISSN: 0362-0034
102(14):119644r	Jones, Ruby H.; Adams, Robert E.; Finkel, Joseph M.; Miller, Herbert C.; Johnson, Larry D.	Evaluation of analytical methods for the determination of POHC in combustion products.	analytical, combustion, flue, gases, incineration, waste, solids, spectroscopy, gas, hazardous, chromatography, spectrometry, wastes, liquid, analysis, detection, esters, flame, ionization, detector	Proc.-APCA Annu. Meet., 77th(Vol. 1), 84-18.5, 25 pp. (Eng) 1984.	CHROMATOGRAPHY	CODEN: PAAMEI ISSN: 0193-9688

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102(14):118637r	Barsky, J. B.; Hee, S. S. Que; Clark, C. S.	An evaluation of the response of some portable, direct-reading 10.2 eV and 11.8 eV photoionization detectors, and a flame ionization gas chromatograph for organic vapors in high humidity atmospheres.	portable, reading, photoionization, detectors, flame, ionization, gas, chromatograph, organic, vapors, humidity, atmospheres, air, analysis, vapor, detection	Am. Ind. Hyg. Assoc. J., 46(1), 9-14 (Eng) 1985.	CHROMATOGRAPHY	CODEN: AIHAAP. ISSN: 0002-8894
102(13):112147j	Gorbuneva, R. O.	Device for electrometry use in determining toxic elements in soils, plants, and natural waters.	electrometry, toxic, elements, soils, plants, waters, plant, analysis, soil, electrometric, alkalinity, salinity, cation, sodium, ion, electrodes	Khim. Sel'sk. Khoz. (1), 69-70 (Russ) 1985.	ELECTROCHEMICAL	CODEN: KSKZAN ISSN: 0023-1185
102(10):90415j	Warden, B. W.; Crawford, R. J.; Knighton, W. B.; Grimsrud, E. P.	Effect of pulse parameters on analyses by tandem-cell gas-phase coulometry.	pulse, analyses, tandem, gas, coulometry, electron, detectors, ionization, gases, coulometric, detection, halogenated, methanes, chromatography, frequency, methane, analysis, detector	Anal. Chem., 57(3), 659-65 (Eng) 1985	CHROMATOGRAPHY	CODEN: ANCHAM ISSN: 0003-2700. OTHER SOURCE(S): CJACS
102(10):90196p	Hopirtean, Elena; Stefaniga, Eugenia	Analytical applications of a nitrate-selective liquid membrane electrode.	analytical, nitrate, liquid, membrane, electrode, milk, analysis, deproteinized, potentiometry, soil, ion, water	Rev. Chim. (Bucharest), 35(10), 945-7 (Rom) 1984.	ELECTROCHEMICAL	CODEN: RCBUAU
102(10):86104u	Patterson, J. E.	A differential photoacoustic mercury detector.	photoacoustic, mercury, detector, spectrometers, detection, analysis	Anal. Chim. Acta, 164, 119-26 (Eng) 1984.	SPECTROMETRY	CODEN: ACACAM. ISSN: 0003-2670.
102(10):84219m	Marutsky, R. J.; Steele, W. D.; Ray, S. M.; Kosmuka, E.	Surface gamma-ray measurement protocol.	gamma, ray, energy, soil, analysis, radium, uranium, tailing, dosimetry, tailings, radioactive, wastes, radiation, detectors, ores, mines, mining	Report, GJ/TMC-06; Order No. DE84016081, 55 pp. Avail. NTIS From: Energy Res. Abstr. 1984, 9(20), Abstr. No. 41398 (Eng) 1984.	RADIOCHEMICAL	
102(9):77714c	Sykina, G. K.; Matyrova, E. A.	Selectivity of ion-selective electrodes.	ion, electrodes, soil, analysis	Khim. Sel'sk. Khoz. (12), 50-1 (Russ) 1984.	ELECTROCHEMICAL	CODEN: KSKZAN ISSN: 0023-1185.
102(8):70786j	Kato, Kazutoshi	Development of sensors and measurement technology.	sensors, electric, apparatus, magnetic, optical, detectors, gas, analysis, heat, humidity, soil, moisture	Toso Gijutsu, 23(9), 75-82 (Japan) 1984.	GENERAL	CODEN: TOGIBO ISSN: 0372-0365
102(7):61265m	Samokhvalov, S. G.; Prishchukova, V. S.; Arsen'eva, M. N.; Zaporin, A. N.; Borokina, G. N.; Golubtsov, A. I.	Use of flow-type ion-selective electrode for the automatic determination of nitrates in soils and plants.	flow, ion, electrode, automatic, nitrates, soils, plants, plant, analysis, soil, nitrate, electrodes, membrane	Agrokhimiya (12), 105-10 (Russ) 1984.	ELECTROCHEMICAL	CODEN: AGKYAU. ISSN: 0002-1881.
102(6):55179u	Von Seggern, J.; Berger, G.; Urbany, H.; Meier, W. G.	A residual gas analyzer compatible with reactive and radioactive gases.	residual, gas, analyzer, radioactive, gases, spectrometers, detectors, mirror, ion, electron, analysis, spectrometer, detector, detection	J. Vac. Sci. Technol., A, 2(4), 1516-20 (Eng) 1984.	ELECTROCHEMICAL	CODEN: JVTAD6 ISSN: 0734-2101.
102(6):55165p	Farrell, R. E.; Scott, A. D.	Construction and evaluation of a potassium-selective tube-mounted membrane electrode.	potassium, tube, membrane, electrode, soil, analysis, ion, electrodes, silver, chloride, valinomycin	Talanta, 31(11), 1065-7 (Eng) 1984.	ELECTROCHEMICAL	CODEN: TLNTA2. ISSN: 0039-9140.
102(6):50632m	McKee, C. R.; Bumb, A. C.	The importance of unsaturated flow parameters in designing a monitoring system for a hazardous waste site.	unsaturated, flow, hazardous, waste, hazard, wastes, silver, capillarity, aquifer, vadose, capillary, waters, geological, aquifers, aeration, disposal, analysis	Hazard. Wastes Environ. Emerg.: Manage., Prev., Cleanup, Control, [Pap.-Natl. Conf. Exhib.], 50-8. Hazard. Mater. Control Res. Inst.: Silver Spring, Md. (Eng) 1984.	GENERAL	CODEN: 52SMA2.
102(5):44942m	Ertek, C.; Haselberger, N.	Measurement of density and water content of soil using photon multiple scattering.	density, water, soil, photon, multiple, scattering, energy, analysis, moisture	Nucl. Instrum. Methods Phys. Res., Sect. A, 227(1), 182-5 (Eng) 1984	RADIOCHEMICAL	CODEN: NIMAER
102(5):44934e	Derzhavin, L. M.; Ryabchenko, I. F.; Zuhov, K. I.; Efremov, E. N.; Ovsyannikov F.; Khlystova, A. F.; Shmelina, I. S.	Methods for ionometric determination of nitrate and ammonium nitrogen in greenhouse soils.	ionometric, nitrate, ammonium, nitrogen, greenhouse, soils, greenhouses, soil, analysis	Metod. Ukazaniya Ionometricheskomu Opred. Nitratnogo Ammoniinogo Azota Teplichnykh Gruntakh, 15 pp.. Edited by: Derzhavin, L. M. Tsentr. Inst. Agrokhim. Obsluzhivaniya Sel'sk. Khoz.: Moscow, USSR. (Russ) 1985.	ELECTROCHEMICAL	CODEN: 51YAAE

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102(4):35246c	Zhang, Lefeng; Lin, Bingcheng	The study of a nitrogen phosphorus detector. II. Correlation between response and chemical structure for nitrog containing organic compounds.	nitrogen, phosphorus, detector, chemical, organic, heterocyclic, amides, analysis, nitriles, detection, gas, flame, ionization, bond, energy, heat, molecular, organonitrogen, amines, chromatography, detectors, gases	Proc. Sino-West Ger. Symp. Chromatogr., Meeting Date 1981, 263-71. Ed. by: Lu, Pei-Chang; Bayer, Ernst. Sci. Press: Beijing, Peop. Rep. China. (Eng) 1983.	SPECTROMETRY	CODEN: 52HWAL.
102(4):38211u	Cicciolí, Paolo; Hayes, J. M.	Experimental parameters affecting hypercoulometric response in gas-phase coulometry.	experimental, affecting, hypercoulometric, gas, coulometry, electron, detectors, ionization, gases, chromatography, analysis, detector	Anal. Chem., 57(1), 320-8 (Eng) 1985.	RADIOCHEMICAL	CODEN: ANCHAM. ISSN: 0003-2700 OTHER SOURCES: CASCE.
102(4):35180h	Zhang, Lefeng; Wang, Xuetao; Li, Aiying; Gong, Peishong; Lin, Bingcheng	The study of a nitrogen phosphorus detector. I. Response character and its use in qualitative analysis.	nitrogen, phosphorus, detector, analysis, chromatography, gas, detectors, flame, ionization, gases, detection	Proc. Sino-West Ger. Symp. Chromatogr., Meeting Date 1981, 255-62. Edited by: Lu, Pei-Chang; Bayer, Ernst. Sci. Press: Beijing, Peop. Rep. China. (Eng) 1983.	CHROMATOGRAPHY	CODEN: 52HWAL
102(4):35008h	Downey, S. W.; Hoger, R. G.	Intracavity atomic absorption with an inductively coupled plasma atomizer.	atomic, absorption, inductively, plasma, atomizer, photovoltaic, detector, spectrometric, chemical, spectrochemical, analysis, detection	Appl. Spectrosc., 38(6), 876-9 (Eng) 1984	ELECTROCHEMICAL	CODEN: APSPA4. ISSN: 0003-7028.
102(4):38872y	Chen, Liren; Hu, Zhouyao; Wang, Qi; Liu, Wenxing; Fan, Ruwei; Hu, Zhide	Ion exchange chromatograph with coulometric detector for the determination of ionic substances.	ion, exchange, chromatograph, coulometric, detector, ionic, coulometry, detection, ions, alkaline, earth, metals, halides, carboxylic, acids, analysis, rare, chromatography, liquid	Proc. Sino-West Ger. Symp. Chromatogr., Meeting Date 1981, 306-11. Edited by: Lu, Pei-Chang; Bayer, Ernst. Sci. Press: Beijing, Peop. Rep. China. (Eng) 1983.	CHROMATOGRAPHY	CODEN: 52HWAL.
102(4):35189p	Ott, Ivano O. R.	An accurate mercury electrode drop-time measuring instrument based on a piezoelectric transducer.	mercury, electrode, piezoelectric, transducer, electrochem, transducers	J. Electroanal. Chem. Interfacial Electrochem., 175(1-2), 99-106 (Eng) 1984.	PIEZOELECTRIC	CODEN: JEIEBC. ISSN: 0022-0728
102(4):36695f	Suzuki, Takashi; Inokoshi, Yukio; Chiaaka, Haruo	Optimum geometry of a large Marinelli-type vessel and its application to environmental aqueous samples.	optimum, geometry, marinelli, vessel, environmental, aqueous, radioactivity, radioelements, analysis, wastewater, plants, radiation, detectors, gamma, ray, germanium, plant, radioactive, wastes, wastewaters, detector, lithium	Int. J. Appl. Radiat. Isot., 35(11), 1029-33 (Eng) 1984.	GENERAL	CODEN: IJARAY. ISSN: 0020-708X.
102(4):31279b	Turk, Amos; Ott, Lawson K.; Steinberg, Anya K.; Wolf, Toby Bergstein	Assessing the performance of activated carbon in the indoor environment.	activated, carbon, indoor, environment, air, ventilation, heating, heaters, removal	Am. Ind. Hyg. Assoc. J., 45(10), 714-18 (Eng) 1984.	GENERAL	CODEN: AIHAAP. ISSN: 0002-8894
102(4):31054a	Bush, B.; Smith, R. M.; Narang, A. S.; Wang, Chun Swee	Photoionization conductivity detection limits for environmental pollutants with and without chromophores.	photoionization, conductivity, detection, environmental, pollutants, chromophores, health, air, analysis, ionization, photo, detectors	Anal. Lett., 17(A6), 467-74 (Eng) 1984	CHROMATOGRAPHY	CODEN: ANALBP. ISSN: 0003-2719
102(3):23473w	Garwcarz, Wieslaw	Determination of soil pollution by petroleum products with the aid of gas chromatograph.	soil, pollution, petroleum, gas, chromatograph, geol, soils, chromatography, analysis	Gas, Woda Tech. Sanit., 58(6), 55-7 (Pol) 1984	CHROMATOGRAPHY	CODEN: GWTSAV. ISSN: 0016-5352.
102(2):16056w	Grimsrud, E. P.; Valkenburg, C. A.	New schemes for the electron-capture sensitization of aromatic hydrocarbons.	schemes, electron, sensitization, aromatic, hydrocarbons, ionization, gases, detectors, gas, dopant, polycyclic, chromatography, analysis, detector, doped, anthracene	J. Chromatogr., 302, 243-56 (Eng) 1984.	RADIOCHEMICAL	CODEN: JOCRAM. ISSN: 0021-9673.
102(2):15093a	Ishiguro, Nobuharu; Furosawa, Akira	Device and method for measuring uranium isotope enrichment.	uranium, isotope, enrichment, reactor, nuclear, fuel, radiation, detectors, germanium, computer, gamma, ray, chemical, enriched, nitrates, removal, densitometry, absorption, radioactive, wastes, analysis, isotopes	Ger. Offen. DE 3413844 A1 18 Oct 1984, 22 pp. (Ger)	SPECTROMETRY	CODEN: GWXXBX. CLASS: IC- G01N023-00; G21C004-04 APPLICATION: DE 84-3413844 12 Apr 1984. PRIORITY: JP 83-64756 13 Apr 1983

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102(2):12059m	Hirschfeld, T.; Deaton, T.; Milanovich, F.; Klainer, S. M.	Feasibility of using fiber optics for monitoring groundwater contaminants.	fiber, optics, groundwater, lawrence, actinides, pesticides, alcohols, analysis, aldehydes, chlorides, fluorimetric, spectrochemical, fluorometric, laser, fluorimetry	Report, EPA-600/7-84-067; Order No. PB84-201607, 83 pp. Avail. NTIS From: Gov. Rep. Announce. Index (U. S.) 1984, 84(17), 133 (Eng) 1984.	FIBER-OPTIC	
102(2):12494q	Summers, C. W.; Rocha, A. C.; Thrun, K. E.	Use of portable instrumentation for the monitoring of fugitive organic emissions from hazardous waste incinerators.	portable, fugitive, organic, emissions, hazardous, waste, incinerators, volatile, incineration, emission, flue, gases, gas, analysis, wastes	Report, EPA-600/2-84-103; Order No. PB84-204523. 57 pp. Avail. NTIS From: Gov. Rep. Announce. Index (U. S.) 1984, 84(17), 161 (Eng) 1984.	ELECTROCHEMICAL	
102(1):6957g	Zoleboy, [illegible] M.; [illegible], Jonathan M.; Coyle, Stanley A.	X-ray fluorescence determination of trace elements in soil.	ray, fluorescence, elements, soil, spectrometry, analysis, element, geological, sediments, river	Anal. Chim. Acta, 163, 425-6 (Eng) 1984.	CHROMATOGRAPHY	CODEN: ACACAM ISSN: 0003-2670
101(26):239491a	Balacal, [illegible]; [illegible], Jan; Vrbik, Karel; Hajny, Jiri	A flame ionization detector with an alkali cap for the determination of halogenated hydrocarbons on the Chrom 4 and Chrom 5 gas chromatographs.	flame, ionization, detector, alkali, halogenated, hydrocarbons, gas, chromatographs, chromatography, detectors, gases, aromatic, analysis	Sb. Vys. Sk. Chem.-Technol. Praze, Anal. Chem., H18, 53-104 (Eng) 1983.	CHROMATOGRAPHY	CODEN: SVSAAB ISSN: 0556-5324
101(26):235454e	Jones, Philip; Hobbs, Philip J.; Ebdon, Les	Inverse photometric detector, based on Eriochrome Black T, for trace metal determination in high-performance liquid chromatography.	photometric, detector, eriochrome, metal, liquid, chromatography, elements, metals, detection, analysis	Analyst (London), 109(6), 703-7 (Eng) 1984.	CHROMATOGRAPHY	CODEN: ANALAO, ISSN: 0003-2654.
101(24):217873t	Kociwski, [illegible] M.; Franks, L. A.; Caldwell, J. T.; Close, D. A.; Ross, M. E.; Morgado, R. E.; [illegible] J. R.	An electron accelerator based system for assay of transuranic waste barrels.	electron, accelerator, transuranic, waste, barrels, energy, bremsstrahlung, barrel, radiochemical, analysis, radioactive, wastes, transuranium, elements, accelerators	GSI-Rep., GSI-84-11, Proc. Linear Accel. Conf., 427-9 (Eng) 1984.	RADIOCHEMICAL	CODEN: GSIRDG ISSN: 0171-4546
101(24):211753d	Sevcik, J.	Thermal desorption of environmental samples.	thermal, desorption, environmental, charcoal, adsorption, microwave, desorber, air, analysis, soil, chemical, chromatography, gas, capillary, tenax	Am. Lab. (Fairfield, Conn.), 16(7), 48, 50-4, 56-7 (Eng) 1984.	CHROMATOGRAPHY	CODEN: ALBYBL, ISSN: 0044-7749.
101(24):213638w	Suleiman, A. A.; Guilbault, G. G.	Mercury displacement in the determination of sulfur dioxide with a piezoelectric crystal detector.	mercury, sulfur, dioxide, piezoelectric, crystal, detector, air, analysis, mercurous, nitrate, detection, electric, apparatus, piezo, gold, coated, disproportionation, preparation	Anal. Chem., 56(14), 2964-6 (Eng) 1984.	PIEZOELECTRIC	CODEN: ANCHAM ISSN: 0003-2700. OTHER SOURCES: CJACS
101(22):203632j	Baim, Michael A.; Hill, Herbert H., Jr.	Effects of contamination on ion mobility detection after gas chromatography.	ion, detection, gas, chromatography, detectors, analysis, hexachloroethane, naphthalene	J. Chromatogr., 299(2), 309-19 (Eng) 1984.	CHROMATOGRAPHY	CODEN: JOCRAM, ISSN: 0021-9673.
101(22):203393a	Patterson, J. E.	Construction of a photoacoustic mercury detector.	photoacoustic, mercury, detector, spectrometers, detection, analysis	Rep.-N. Z., Dep. Sci. Ind. Res., Chem. Div., CD 2339, 38 pp. (Eng) 1984.	PIEZOELECTRIC	CODEN: RDCRAJ ISSN: 0149-6750
101(20):183115n	Kotte, M.; Pavlonsky, D.; Havens, P.; Lipsky, V.	Conductometric detector for liquid chromatography.	conductometric, detector, liquid, chromatography, electric, conductivity, conduction, detectors	Acta Fac. Rerum Nat. Univ. Comenianae, Chim., 32, 101-13 (Eng) 1984.	CHROMATOGRAPHY	CODEN: AFRCAQ ISSN: 0524-2317
101(20):179671y	Ohsaki, Toshihiko; Yamamoto, Tadatoshi; Wadachi, Yoshiki	A non-destructive method for determining the distribution of soil water content by measuring fast neutron transmission using an NE-213 organic scintillator.	soil, water, neutron, organic, scintillator, energy, analysis, chemical	Jpn. J. Appl. Phys., Part 1, 23(8), 1124-8 (Eng) 1984	RADIOCHEMICAL	CODEN: JAPNDE
101(20):174890c	Ge, Jingxia; Wu, Rongzhou	Charged alpha card measuring system.	alpha, card, soil, analysis, polonium, particle, dosimetry, track, detectors, uranium, area, survey, activity, soils	He Dianzixue Yu Tance Jishu, 6(4), 245-52 (Ch) 1984.	RADIOCHEMICAL	CODEN: HDYUEC

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101(10):162961t	Kollotzek, D.; Oechsle, D.; Kaiser, G.; Tschoepel, P.; Toelg, G	Application of a mixed-gas microwave induced plasma as an on-line element-specific detector in high-performance liquid chromatography	mixed, gas, microwave, plasma, element, detector, liquid, chromatography, chemical, detection, soil, analysis, organomercury, spectrometric, spectrometry, emission, detectors	Fresenius' Z. Anal. Chem., 318(7), 485-9 (Eng) 1984	CHROMATOGRAPHY	CODEN: ZACFAU ISSN: 0016-1152
101(18):162810v	Hirayama, Fumio; Tsuda, Toshiyuki; Tani, Akira; Naito, Makoto; Miyamura, Fumio	A method for rapid radiochemical analyses of transuranium elements in nuclear facilities	radiochemical, analyses, transuranium, elements, nuclear, reactor, environmental, radioactive, element, wastes	Nucl. Instrum. Methods Phys. Res., Sect. A, 223(2-3), 188-93 (Eng) 1984	RADIOCHEMICAL	CODEN: NIMAER
101(18):162749g	Kuwata, Shigeki; Miura, Norio; Yamazoe, Noboru; Seiyama, Tetsuro	Potentiometric oxygen sensor with fluoride ion conductors operating at lower temperatures.	potentiometric, oxygen, sensor, fluoride, ion, conductors, fluorides, solid, electrolytes, sensors, electrolytic, potentiometry, analysis, electrolyte, electrodes, bismuth, silver, tin	Nippon Kagaku Kaishi (8), 1232-6 (Japan) 1984	RADIOCHEMICAL	CODEN: NKAKB8 ISSN: 0369-4577
101(18):159931e	Balik, Jan; Hejtman, Jiri; Retver, Vaclav	Apparatus for automated determination of trace concentrations of radioactive compounds in solutions by concentrating on a solid sorbent.	apparatus, automated, radioactive, solutions, solid, sorbent, uranium, ores, wastewaters, radiochemical, analysis, wastes	Czech. CS 215583 B 15 Apr 1984, 8 pp. (Czech)	RADIOCHEMICAL	CODEN: CZXXA9 CLASS: IC: G01N023-00 APPLICATION: CS 80-1549 6 Mar 1980
101(18):159844e	Kuznetsov, Yu. V.; Romyanov, N. P.; Vinogradova, V. E.	Results of the determination of iodine-129 in a power reactor coolant and waste.	iodine, reactor, coolant, waste, radioactive, wastes, nuclear, reactors, plants, coolants, cooling, analysis	Radiokhimiya, 26(4), 573-5 (Russ) 1984	RADIOCHEMICAL	CODEN: RADKAU ISSN: 0033-8311
101(14):121335t	Velickovic, D.; Miric, E.; Petrovic, D.; Gvozdanic, R.	Determination of the mean content of uranium in different soils by solid state track detectors.	uranium, soils, solid, track, detectors, soil, analysis	Teh. Fiz., 25, 30-37 (Eng) 1983	ELECTROCHEMICAL	CODEN: TEFIDJ ISSN: 0350-0594
101(14):143004p	Cui, Hongbo; Zhu, Zhaohai; Feng, Zhaolun	Determination of cyanide in soil and water by flow-injection analysis.	cyanide, soil, water, flow, injection, analysis, ion, electrodes, soils	Huanjing Huaxue, 3(1), 49-53 (Ch) 1984	ELECTROCHEMICAL	CODEN: HUHUDB ISSN: 0254-6108
101(14):143956n	Tirts, J.; Jasz, G.; Rombos, P.; Sahre, P.; Winter, G	Gamma-ray spectrometric investigations of soils and atmospheric aerosols by means of lithium-activated germanium and germanium x-ray detectors	gamma, ray, spectrometric, soils, atmospheric, aerosols, lithium, activated, germanium, detectors, radioelements, analysis, basalt, environmental, rocks, trace, soil, radioisotopes, spectrometry	Phys. Appl., 8(Low-Level Counting), 395-402 (Eng) 1983	SPECTROMETRY	CODEN: PHAPDQ ISSN: 0138-9963
101(16):142961e	Tai-Pow, J.; Lee, J.; Sitenga, J. M.	A scintillation detector system for the measurement of low levels of radon and radium in environme samples	scintillation, detector, radon, radium, environmental, uranium, ores, mining, air, analysis, geological, sediments, soil, radiation, detectors, mine, sulfide, environment	Phys. Appl., 8(Low-Level Counting), 109-14 (Eng) 1983	RADIOCHEMICAL	CODEN: PHAPDQ ISSN: 0138-9963
101(16):143050u	Saari, Linda A.; Seitz, W. Rudolf	Optical sensor for beryllium based on immobilized morin fluorescence	optical, sensor, beryllium, immobilized, fluorescence, analysis, detection	Analyst (London), 109(5), 655-7 (Eng) 1984	SPECTROMETRY	CODEN: ANALAO ISSN: 0003-2654
101(15):129487z	Oda, Masayuki; Suzuki, Yoshihiko; Kaimura, Kiyoshi	Ion-selective electrode method for rapid determination of soil elements	ion, electrode, soil, elements, vegetable, crops, analysis, electrodes	Yasai Shikenjo Hokoku, A (11), 161-76 (Japan) 1983	ELECTROCHEMICAL	CODEN: YSHADH ISSN: 0387-6667
101(14):119050y	Barr, D. B.; McManus, G. J.	Iodine-129 process control monitor for evaporator off-gas streams	iodine, evaporator, gas, streams, energy, radiation, detectors, constituents, radioactive, wastes, gaseous, analysis, stream, constituent	Report, WINCO-1001; Order No. DE84009270, 41 pp. Avail. NTIS From: Energy Res. Abstr. 1984, 9(11), Abstr. No. 19792 (Eng) 1984	GENERAL	
101(11):109057x	Schmidt, Beate; Schwedt, Georg	Comparison of an HPLC procedure to determine nitrate in vegetable foods with photo-and potentiometric analyses	nitrate, vegetable, foods, photo, potentiometric, analyses, cabbage, food, analysis, kohlrabi, lettuce, plant, soil, spinach, potentiometry, vegetables	Dtsch. Lebensm.-Rundsch., 80(5), 137-40 (Ger) 1984	CHROMATOGRAPHY	CODEN: DLRUAJ ISSN: 0012-0413

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101(12):103337k	Komura, Tadahisa; Sakanoue, Masanobu; Yamamoto, Masayoshi	Determination of plutonium-240/plutonium-239 ratio in environmental samples based on the measurement of Lx/alpha-ray activity ratio.	plutonium, ratio, environmental, alpha, ray, activity, health, goods, fishing, gear, isotope, soil, analysis, geological, sediments, lithium, spectrochemical, spectrophotometric, isotopes	Health Phys., 46(6), 1213-19 (Eng) 1984	SPECTROMETRY	CODEN: HLTPAO. ISSN: 0017-9078
101(12):103161m	Shih, Y. T.; Carr, Peter W	A post-column photochemical detector for use in the determination of trace metals with n-butyl-2-naphthylmethyldithiocarbamate by high-performance chromatography.	photochemical, detector, metals, naphthylmethyldithiocarbamate, liquid, chromatography, analysis, photochem, kinetics, photolysis, metal, butylnaphthylmethyldithiocarbamate, detectors, absorption, fluorescence, spectra, fluorometric, quenching, butylnaphthylmethylamine	Anal. Chim. Acta, 159, 211-28 (Eng) 1984.	CHROMATOGRAPHY	CODEN: ACACAM ISSN: 0003-2670
101(11):89523[illegible]	Gur'ev, I. A.; Kulachev, M. M.; Kotsovskaya, V. V.; Busleeva, N. A.; Gushchina, E. A.	Use of a fluid nitrate-selective electrode in the analysis of agricultural and environmental objects.	fluid, nitrate, electrode, analysis, agricultural, environmental, plant, soil, crystal	Agrokhimiya (4), 105-8 (Russ) 1984.	ELECTROCHEMICAL	CODEN: AGKYAU ISSN 0002-1881
101(10):83090g	Haddad, P. R.; Alexander, P. W.; Trojanowicz, M.	Ion chromatography of magnesium, calcium, strontium and barium ions using a metallic copper electrode as a potentiometric detector.	ion, chromatography, magnesium, calcium, strontium, barium, ions, metallic, copper, electrode, potentiometric, detector, potentiometry, detection, earth, metals, alkaline, electrodes, liquid, analysis	J. Chromatogr., 294, 397-402 (Eng) 1984.	CHROMATOGRAPHY	CODEN: JOCRAM. ISSN: 0021-9673.
101(10):80440h	Danielson, M. J.; Koski, O. H.; Myers, J.	Development of high temperature and pressure Eh and pH sensing instruments.	sensing, waste, geological, radioactive, hydrogen, ion, wastes, electric, ions, analysis	Mater. Res. Soc. Symp. Proc., 26(Sci. Basis Nucl. Waste Manage. 7), 153-60 (Eng) 19[illegible].	GENERAL	CODEN: MRSPDH. ISSN 0272-9172.
101(9):67148b	Moelhave, Lars; Pedersen, Ole F.	Measurements of alveolar concentrations of toluene.	alveolar, toluene, health, lung, alveolar, humans, photoionization, detector, analysis, human, alveoli	Int. Arch. Occup. Environ. Health, 54(1), 65-71 (Eng) 1984.	SPECTROMETRY	CODEN: IAEHDW ISSN: 0340-0131
101(8):47894p	Andrawes, Fikry F.	Analysis of liquid samples by capillary gas chromatography and helium ionization detection.	analysis, liquid, capillary, gas, chromatography, helium, ionization, detection, graphitized, carbon, detector, gases, detectors, activated, solvents, water, coated, carbopack	J. Chromatogr., 290, 65-74 (Eng) 1984	CHROMATOGRAPHY	CODEN: JOCRAM ISSN: 0021-9673
101(4):32612w	[illegible], V. G.; Pavel'skii, I. A.; Leont'eva, S. A.; Grinberg, A. A.	Use of a photoionization detector for identification of components of complex hydrocarbon mixtures.	photoionization, detector, hydrocarbon, mixtures, oil, cycloalkanes, alkanes, analysis, alkenes, aromatic, hydrocarbons, gas, flame, ionization, detectors, chromatography, photo	Zh. Anal. Khim., 39(3), 528-32 (Russ) 1984	ELECTROCHEMICAL	CODEN: ZAKHA8. ISSN: 0044-4502.
101(4):32504n	Akatsu, J.; Kobayashi, T.; Kimura, T.	Nondestructive determination of plutonium-239 in wastes by application of gamma-ray measurement.	nondestructive, plutonium, wastes, gamma, ray, energy, radioactive, alpha, particle, emitting, analysis	J. Radioanal. Nucl. Chem., 85(3), 155-60 (Eng) 1984.	RADIOCHEMICAL	CODEN: JRNCDM.
101(3):22428c	[illegible], G. G.; [illegible], V. G.; Arsen'eva, N. N.; Gvozdeva, T. S.	Ionometric determination of nitrates in soils.	ionometric, nitrates, soils, soil, analysis, nitrate	Pochvovedenie (3), 142-5 (Russ) 1984.	ELECTROCHEMICAL	CODEN: PVDEAZ. ISSN 0032-180X
101(3):16540r	Imasaka, Totaro; [illegible], Tadaaki; Ishibashi, Nobuhiko	Gas chromatographic determination of aromatic molecules by supersonic jet spectrometry with resonance multiphoton ionization.	gas, chromatographic, aromatic, molecules, supersonic, jet, spectrometry, resonance, multiphoton, ionization, detection, hydrocarbons, analysis, chromatography, detectors, laser, nozzle, coal, solvent	Analyst (London), 109(3), 277-9 (Eng) 1984.	CHROMATOGRAPHY	CODEN: ANALAO ISSN 0003-2654
101(2):14379u	[illegible], L.; Schwedt, G.	Element species analysis in soil solutions by gel chromatography and chemical reaction detectors.	element, analysis, soil, solutions, gel, chromatography, chemical, detectors, detection, organically	Fresenius' Z. Anal. Chem., 317(3-4), 394-5 (Ger) 1984.	CHROMATOGRAPHY	CODEN: ZACFAU ISSN: 0016-1152

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101(2):11880j	Deutscher, Manfred; Jaenichen, Barbara	Semiconductor detector for radiation measurement in the surrounding media.	semiconductor, detector, radiation, detectors, barrier, silicon, gold, coated, doped	Ger. (East) DD 201544 A1 20 Dec 1983, 5 pp. (Ger).	ELECTROCHEMICAL	CODEN: GEXXA8. CLASS: IC: G01T001-24; H01L031-00. APPLICATION: DD 81-233571 25 Sep 1981.
101(2):11579a	Clay, Paul F.; Spittler, Thomas M.	Determination of airborne volatile nitrogen compounds using four independent techniques.	airborne, volatile, nitrogen, hazard, waste, silver, hazardous, disposal, etc, analysis, wastes	Natl. Conf. Manage. Uncontrolled Hazard. Waste Sites, 300-4. Hazard. Mater. Control Res. Inst.: Silver Spring, MD (Eng) 1983.	GENERAL	CODEN: 51IZAN.
100(26):215359c	Howe, John R.; Hunt, Alan E.	Swan thyroid glands and river algae as indicators of iodine-125 and iodine-131 in the River Trent and its tributaries.	thyroid, glands, river, algae, iodine, tributaries, fish, food, weed, radioisotopes, water, pollution, sewr, rivers, radioactive, isotopes, gland, cygnus, radioisotope, wastes, biological	Sci. Total Environ., 35(3), 387-401 (Eng) 1984	GENERAL	CODEN: STENDL ISSN: 0048-9697
100(26):214739e	Persson, Ulf; Lundqvist, Stefan; Marthinsson, Bo; Eng, Sverre T.	Computer-automated carbon dioxide laser long-path absorption system for air quality monitoring in the working environment.	computer, automated, carbon, dioxide, laser, absorption, air, environment, lasers, pollutant, analysis	Appl. Opt., 23(7), 998-1002 (Eng) 1984.	GENERAL	CODEN: APOPAI ISSN: 0003-6935
100(24):202781b	DeKok, A.; Geerdink, R. B.; Brinkman, U. A. T.	An improved interface for liquid chromatography/electron-capture detector coupling. Part II.	liquid, chromatography, electron, detector, soil, analysis, herbicide, pesticide, detection, chlorinated, hydrocarbons, pesticides, organochlorine, herbicides, phenylurea, heptafluorobutyryl, aromatic, ionization, gamma, detectors, pentafluorobenzoyl	Chromatographia, 16, 237-41 (Eng) 1982.	CHROMATOGRAPHY	CODEN: CHRGB7 ISSN: 0009-5893
100(24):195552m	Cox, Robert D.	Sample collection and analytical techniques for volatile organics in air.	analytical, volatile, organics, air, toxic, hazardous, waste, sorbent, cryogenic, focusing, capillary, gas, apparatus, steel, analysis, cryogenics, chromatography, flame, ionization, photoionization, detection, wastes	Spec. Conf.: Meas. Monit. Non-Criter. (Toxic) Contam. Air, 101-12. Edited by: Frederick, Edward R. AP Pittsburgh, Pa. (Eng) 1983.	ELECTROCHEMICAL	CODEN: 51CMAG.
100(23):190794r	Ostapenko, M. E.; Petrova, E. N.; Boryskov, O. D.	Distribution of liquid ammonia in the soil.	liquid, ammonia, soil, soils, moisture, fertilizers, ammonium, hydroxide, ion, biological, fertilizer	Agrokhimiya (3), 8-13 (Russ) 1984	ELECTROCHEMICAL	CODEN: AGKYAU ISSN: 0002-1881
100(23):190735e	Brown, James R.; Rice, William C.; Moetto, Gary D.	Soil nitrate measurements for prediction of nitrogen response by corn in a udollic ochraqualf.	soil, nitrate, prediction, nitrogen, corn, ochraqualf, rice, plant, analysis, soils, ochraqualfs, seasonal, residual, fertilizer, fertilizers, biological	Commun. Soil Sci. Plant Anal., 15(3), 339-51 (Eng) 1984.	GENERAL	CODEN: CSOSA2 ISSN: 0010-3624.
100(22):185050a	Patterson, P. L.	New uses of thermionic ionization detectors in gas chromatography.	thermionic, ionization, detectors, gas, chromatography, nitrogen, phosphorus, detection, catalytic, flame, analysis	Chromatographia, 16, 107-11 (Eng) 1982.	CHROMATOGRAPHY	CODEN: CHRGB7 ISSN: 0009-5893
100(22):185051a	Long, Mervyn A.; Carroll, Leonor; Jones, John R.; Tang, Yui S.	Simple modification of a gas chromatograph for radio-assay of tritium-labeled compounds.	gas, chromatograph, radio, tritium, chromatography, radioassay, detectors, flame, ionization, analysis, chromatographs	J. Chromatogr., 287(2), 391-4 (Eng) 1984.	CHROMATOGRAPHY	CODEN: JOCRAM ISSN: 0021-9673.
100(22):183023u	Close, D. A.; Franks, L. A.; Kocimski, S. M.	The application of thermal neutron capture gamma rays to matrix identification in a transuranic waste assay system based on an electron accelerator.	thermal, neutron, gamma, rays, transuranic, waste, electron, accelerator, transuranium, elements, activation, lime, chemical, radioactive, wastes, accelerators, radiochemical, analysis, isotopes, affected	Nucl. Instrum. Methods Phys. Res., Sect. A, 220(2-3), 471-4 (Eng) 1984.	RADIOCHEMICAL	CODEN: NIMRD9

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100(20):167444k	Oliver, B. G.; Bural, K. D.	Gas chromatographic determination of chlorobenzenes and other chlorinated hydrocarbons in environmental samples using fused silica capillary columns.	gas, chromatographic, chlorobenzenes, chlorinated, hydrocarbons, environmental, fused, silica, capillary, water, waters, fish, hydrocarbon, river, chromatography, analysis, geological, sediments	Chromatographia, 16, 336-40 (Eng) 1982.	CHROMATOGRAPHY	CODEN: CHRGB7 ISSN: 0009-5893
100(20):167914d	Blades, Arthur T.	The role of thermal decomposition in the determination of organic compounds in the flame ionization detector.	thermal, decomposition, organic, flame, ionization, detector, chromatography, gas, detectors, gases, analysis	J. Chromatogr. Sci., 22(3), 120-3 (Eng) 1984.	CHROMATOGRAPHY	CODEN: JCHSB2 ISSN: 0021-9665
100(19):153493k	Bowman, Robert S.	Analysis of soil extracts for inorganic and organic tracer anions via high-performance liquid chromatography.	analysis, soil, inorganic, organic, anions, liquid, chromatography, water, soils	J. Chromatogr., 285(2), 467-77 (Eng) 1984.	CHROMATOGRAPHY	CODEN: JOCRAM ISSN: 0021-9673
100(16):124326w	Leveson, Richard C.; Barker, Nicholas J.	Selective photoionization gas chromatograph detector system.	photoionization, gas, chromatograph, detector, air, analysis, aromatic, alkanes, detectors, chromatography, benzene, toluene, xylene	Can. CA 1158087 A1 20 Dec 1983, 20 pp.	CHROMATOGRAPHY	CODEN: CAXXA4 CLASS: IC: G01N031-08 APPLICATION: CA 81-387059 1 Oct 1981 PRIORITY: US 81-258576 29 Apr 1981
100(16):114272w	Aliev, T. B.	Photoionization method and an instrument for analysis of gases.	photoionization, analysis, gases, gas, detector, chromatography, detectors, detection	Zh. Anal. Khim., 39(1), 71-4 (Russ) 1984.	SPECTROMETRY	CODEN: ZAKHA8 ISSN: 0044-4502
100(14):100193v	Andersson, Per; Persson, Ulf	Absorption coefficients at carbon dioxide laser wavelengths for toluene, m-xylene, o-xylene, and p-xylene.	absorption, coefficients, carbon, dioxide, laser, wavelengths, toluene, xylene, aromatic, hydrocarbons, air, spectroscopy, analysis, hydrocarbon, solvents, radiation, chemical	Appl Opt., 23(2), 192-3 (Eng) 1984.	SPECTROMETRY	CODEN: APOPAI. ISSN: 0003-6935
100(13):102212p	Inskeep, William P.; Baham, John	Competitive complexation of cadmium(II) and copper(II) by water-soluble organic ligands and sodium-montmorillonite.	cadmium, copper, water, soluble, organic, ligands, sodium, montmorillonite, soil, adsorption, ligand, forest, litter, coniferous, soils, peat, wastewater, sludge	Soil Sci. Soc. Am. J., 47(6), 1109-15 (Eng) 1983	ELECTROCHEMICAL	CODEN: SSSJD4 ISSN: 0361-5995.
100(13):202107z	Alexandrova, A. M.; Rappoport, L. A.	Direct measurement of soil potassium potential.	soil, potassium, analysis, solvents, soils	Agrokhimiya (1), 84-8 (Russ) 1984.	ELECTROCHEMICAL	CODEN: AKNGAE. ISSN: 0002-1881.
100(12):93213k	Smith, K. D.; Seliga, M.	Distribution of alpha activity from neptunium on rock fissures.	alpha, activity, neptunium, rock, fissures, geological, radioactive, waste, adsorption, granite, wastes, fissure, plastic, track, detector, plutonium, radiation, detectors, tubes	Nucl. Tracks Radiat. Meas., 7(4), (15-6) (Eng) 1983.	RADIOCHEMICAL	CODEN: NTRMDE. ISSN: 0735-245X
100(12):93124d	Shook, E. A.; Atencio, J. D.; Atwater, H. F.; Bernard, W.; Biers, J. R.; Caldwell, J. T.; Franks, S. W.; Hastings, R. D.; Herrera, G. C.; Kunz, W. E.	Assay system to measure crate-size bulk transuranic waste.	bulk, transuranic, waste, transuranium, elements, radioactive, wastes, radiation, detectors, neutron, analysis	Nucl Mater. Manage., 12(Proc. Issue), 80-4 (Eng) 1983.	RADIOCHEMICAL	CODEN: JNMMAN. ISSN: 0362-0034
100(12):103773e	Shmurina, A. Ya.; Shilova, O. A.; Khatrova, J. A.; Kravchenko, L. V.; Kertes, M.; Horvath, A.; Vagner, T.; Dashenko, M.	Comparative study of polycyclic aromatic hydrocarbons in air and soil pollutants by modified techniques of low-temperature spectrofluorimetry and liquid chromatography.	polycyclic, aromatic, hydrocarbons, air, soil, pollutants, spectrofluorimetry, liquid, chromatography, analysis, spectrofluorometry, spectrochemical, fluorimetry	Gig. Sanit. (7), 58-60 (Russ) 1983.	CHROMATOGRAPHY	CODEN: GISAAA ISSN: 0016-9900
100(10):79170w	Rosiak, Janusz; Lasa, Jan; Sliwka, Ireneusz	Detection by solute switching and synchronous demodulation of the electron-capture detector signal.	detection, solute, electron, detector, signal, air, analysis, carbon, tetrachloride, gas, ionization, gases, detectors, chromatography	J. Chromatogr., 280(1), 1-16 (Eng) 1983	CHROMATOGRAPHY	CODEN: JOCRAM. ISSN 0021-9673
100(8):57095z	Kiselev, G. G.; Lichko, K. P.; Makhbeev, T. A.	Ion-Selective Electrodes: Application to the Study of Chemical and Physicochemical Properties of Soils (Ionoselektivnye Elektrody: Primenenie dlya Issledovaniya Khimicheskikh i Fiziko-Khimicheskikh Svoistv Pochv).	ion, electrodes, chemical, physicochemical, soils, ionoselektivnye, elektrody, primenenie, issledovaniya, fiziko	(NTsBI AN SSSR: Pushchino, USSR). 56 pp. Rub 0.40. (Russ) 1983.	ELECTROCHEMICAL	

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100(5):33801j	Ben-Yaakov, S.; Ben-Asher, J.	A method for estimating potassium and nitrate uptake rate in hydroponics by a four-electrode conductivity sensor.	potassium, nitrate, rate, hydroponics, electrode, conductivity, sensor, tomato, hydroponic, soils, analysis	Sci. Hortic. (Amsterdam), 21(2), 113-22 (Eng) 1983.	ELECTROCHEMICAL	CODEN: SHRTAH. ISSN: 0304-4238.
100(4):27210w	Haebel, K.; Huettner, H.	Anti-Compton spectrometry for the determination of radioactivity concentration in surface water.	spectrometry, radioactivity, water, nuclear, radiation, detectors, waters, radioactive, wastes, wastewaters, analysis	Fachverb. Strahlenschutz, (Ber.) FS, FS-83-30-T, Strahlenschutz-Messtechnik, 381-4 (Ger) 1983.	SPECTROMETRY	CODEN: FBFSDJ.
100(2):14266t	Hess, Charles T.; Smith, Charles W.; Pearce, Bryan R.	Radionuclide concentrations in estuarine sediments: comparison of measured and calculated values.	radionuclide, estuarine, sediments, wastes, water, pollution, radioelements, sediment, geological, radioactive, analysis	Wastes Ocean, Volume 2, 269-85. Edited by: Park, P. Kilho. Wiley: New York, N. Y. (Eng) 1983.	GENERAL	CODEN: 50OGAS.
100(3):12311y	Burchill, Paul; Herod, Alan A.; Marsh, Karen M.; Pritchard, Ernest	Gas chromatography in water analysis. II. Selective detection methods.	gas, chromatography, water, analysis, detection, coal, herbicides, detectors, haloform, herbicide, detector	Water Res., 17(12), 1905-16 (Eng) 1983.	CHROMATOGRAPHY	CODEN: WATRAG ISSN: 0043-1354
99(26):224305h	Peachey, D.; Nicholson, R. A.; Bell, T. E.; Hextall, J. P.	Rapid method for estimation of volatile sulfur content in geochemical exploration soil samples.	volatile, sulfur, geochemical, exploration, soil, geol, analysis, ore, gas, evolution, potentiometry, geochem	Trans.-Inst. Min. Metall., Sect. B, 92(Aug.), 162-4 (Eng) 1983.	ELECTROCHEMICAL	CODEN: TIMEAT ISSN: 0371-7453.
99(26):220749f	Winkelmann, I.; Weimerl, W.	Calibration of a lithium-drifted germanium detector for environmental monitoring.	lithium, drifted, germanium, detector, environmental, soil, analysis, gamma, spectroscopy, radiation, detectors, radioactive, fallout, ray, dosimetry, thorium, uranium	Fachverb. Strahlenschutz, (Ber.) FS, FS-83-30-T, Strahlenschutz-Messtechnik, 357-60 (Ger) 1983.	SPECTROMETRY	CODEN: FBFSDJ
99(26):218254g	Weisshaar, Duane E.	Application of Kelgraph to electrochemical detectors for flow injection analysis and high performance liquid chromatography.	kelgraph, electrochemical, detectors, flow, injection, analysis, liquid, chromatography, electrodes, phenolic, flowing, groundwater, coal, gasification, wastewater, phenols, gas, electrochem, detector, electrode, polymer, graphite, waste	Report, IS-T-1090, CONF-8-003-NDAR(1); Order No. DE83-014928, 80 pp. Avail. NTIS From: Gov. Rep. Announce. Index (U. S.) 1983, 83(20), 4941 (Eng) 1983.	ELECTROCHEMICAL	
99(24):199736e	Tanaka, Toshiyuki; Shimizaki, Makoto	Application of PID gas chromatography to determination of organic vapor pollutants in the atmosphere.	gas, chromatography, organic, vapor, pollutants, atmosphere, air, analysis, photoionization, detector, volatile, detection	Nagai, 10(3), 157-65 (Japan) 1983.	CHROMATOGRAPHY	CODEN: KUAIAR
99(22):186727q	Goode, Scott R.; Chambers, Boyce; Buddin, Norman P.	A critical evaluation of the tangential flow torch microwave-induced plasma detector for gas chromatography.	critical, tangential, flow, torch, microwave, plasma, detector, gas, chromatography, spectrochemical, analysis, emission, detectors, spectrometry, torches, bromine, carbon, chlorides, disulfide, thiophene, dibromoethane, dibromopropane, sulfur	Appl. Spectrosc., 37(5), 439-43 (Eng) 1983	CHROMATOGRAPHY	CODEN: APSPA4 ISSN 0003-7028.
99(22):186585e	Moore, T. M.	Electron microprobe techniques for routine compositional analysis of mercury cadmium telluride.	electron, microprobe, analysis, mercury, cadmium, telluride, epitaxy, automated, solid, ray, scanning, cross, epitaxial, layers	J. Vac. Sci. Technol., A, 1(3), 1651-5 (Eng) 1983.	CHROMATOGRAPHY	CODEN: JVTAD6 ISSN: 0734-2101.
99(18):151456y	Russell, David J.; McDuffie, Bruce	Analysis for phthalate esters in environmental samples: separation from PCB's and pesticides using dual column liquid chromatography.	analysis, phthalate, esters, environmental, pesticides, liquid, chromatography, chlorinated, soil, geological, sediments, water, gas, electron, detector, polychlorinated, biphenyls, wastewaters, landfills	Int. J. Environ. Anal. Chem., 15(3), 165-83 (Eng) 1983	CHROMATOGRAPHY	CODEN: IJEAA3. ISSN 0306-7319

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99(18):151436h	Baram, G. I.; Grachev, M. A.; Komarova, N. I.; Perel'roizen, M. P.; Bolvanov, Yu. A.; Kuz'min, S. V.; Kargal'tsev, V. V.; Kuper, E. A.	Micro-column liquid chromatography with multi-wave-length photometric detection. I. The OB-4 liquid chromatograph.	liquid, chromatography, wave, photometric, detection, chromatograph, amino, acids, analysis, aromatic, hydrocarbons, multiwavelength, detections, blood, urine, acid, human, amines, multicolumns, microcolumns, serum, phenylthiohydantoin, wavelength, isomers	J. Chromatogr., 264(1), 69-90 (Eng) 1983.	CHROMATOGRAPHY	CODEN: JOCRAM ISSN: 0021-9673
99(18):151405f	Ham, Norman S.; McAllister, Trevor	Flame ionization of iron and lead.	flame, ionization, iron, air, pollution, osmium, chromatography, gas, detectors, organometallic, gases, ions, analysis, detection, diffusion, pentacarbonyl, spectroscopy	Aust. J. Chem., 36(7), 1299-304 (Eng) 1983.	SPECTROMETRY	CODEN: AJCHAS ISSN: 0004-9425.
99(18):151179t	Hayakawa, Kazuichi; Hiroki, Hiromu; Miyazaki, Motoichi	A novel ion chromatography using a conventional ion exchange column and a photometric detector.	ion, chromatography, exchange, photometric, detector, halides, alkali, metals, analysis, detection, bromides, chlorides, fluorides, liquid	Bunseki Kagaku, 32(8), 504-6 (Japan) 1983.	CHROMATOGRAPHY	CODEN: BNSKAK. ISSN: 0525-1931.
99(16):128059m	Komura, Kazuhisa; Sakanoue, Masanobu	Rapid measurements of radon-222 and other radionuclides in water by in situ lithium-activated germanium spectrometry.	radon, radionuclides, water, lithium, activated, germanium, spectrometry, radioactive, wastes, nuclear, analyses, waste	Nat. Radiat. Environ., Proc. Spec. Symp. Nat. Radiat. Environ., 2nd, Meeting Date 1981, 376-83. Edited by: Vohra, K. G. Wiley: New York, N. Y. (Eng) 1982.	SPECTROMETRY	CODEN: 50OTAI.
99(14):115266e	Shafer, Kenneth H.; Griffiths, Peter R.	On-line supercritical fluid chromatography/Fourier transform infrared spectrometry.	supercritical, fluid, chromatography, infrared, spectrometry, liquid, carbon, dioxide, spectrometric, detection, gas, integrated, flame, ionization, spectrometer, analyses, detector	Anal. Chem., 55(12), 1939-42 (Eng) 1983.	CHROMATOGRAPHY	CODEN: ANCHAM. ISSN: 0003-2700 OTHER SOURCES: CJACS
99(14):115093a	Suzuki, Koji; Aruga, Hiroshi; Shirai, Tsuneo	Determination of monovalent cations by ion chromatography with ion-selective electrode detection.	monovalent, cations, ion, chromatography, electrode, detection, alkali, metals, analysis, potentiometric, liquid, detectors, electrochem, membrane, electrodes, cation	Anal. Chem., 55(13), 2011-13 (Eng) 1983.	ELECTROCHEMICAL	CODEN: ANCHAM. ISSN: 0003-2700. OTHER SOURCES: CJACS.
99(12):93529v	Hussmann, Bernd	Analysis for environmental protection. Measurements of chemical contaminants in soil and water samples by means of Draeger tubes.	analyses, environmental, protection, chemical, soil, water, draeger, tubes, ware, detection, pollutants, analysis, pollutant	Draeger Rev., 51, 17-15 (Eng) 1983.	GENERAL	CODEN: DRARAE ISSN: 0340-9910.
99(12):88350y	Kinkeldei, Juergen	Nitrate determination using ion-selective electrodes.	nitrate, ion, electrodes, nitrates, analysis, soil, plant, drinking	LaborPraxis, 7(4), 268, 271-3 (Ger) 1983	ELECTROCHEMICAL	CODEN: LAPRDE ISSN: 0344-1733.
99(12):85578a	Smith, W. J.; Whicker, F. W.	An in situ gross alpha monitoring technique for delineating fugitive mill tailings.	gross, alpha, fugitive, tailings, wastes, uranium, health, physics, soil, pollution, radiation, detectors, soils, analysis, radioactive, ores, portable, thorium, tailing	Manage. Wastes Uranium Min. Milling, Proc. Int. Symp., 421-32. IAEA: Vienna, Austria. (Eng) 1982.	RADIOCHEMICAL	CODEN: 50PEA7
99(10):81703a	Baim, Michael A.; Eatherton, Randy L.; Hill, Herbert H., Jr.	Ion mobility detector for gas chromatography with a direct photoionization source.	ion, detector, gas, chromatography, photoionization, ionization, photo, detectors, aromatic, hydrocarbons, analysis	Anal. Chem., 55(11), 1761-6 (Eng) 1983.	CHROMATOGRAPHY	CODEN: ANCHAM. ISSN: 0003-2700. OTHER SOURCES: CJACS.
99(10):78826r	Anderson, David Franklin	Detector of radioactive gas concentration in a large region.	detector, radioactive, gas, energy, fallout, radiation, detectors, dosimetry, tritium, gaseous, wastes, analysis	Fr. Demande FR 2516665 A1 20 May 1983, 24 pp. (Fr)	RADIOCHEMICAL	CODEN: FRXXBL. CLASS: IC: G01T001-167; G01N027-62. APPLICATION: FR 82-19155 16 Nov 1982. PRIORITY: US 81-321965 16 Nov 1981.
99(10):78633z	Koval'chuk, E. L.; Pomerantsev, V. V.; Tomorov, A. Kh.; Chernykov, V. V.	Background and spectrometric characteristics of detectors based on plastic scintillators.	spectrometric, detectors, plastic, scintillators, radiation, scintillation, analysis, detector	Deposited Doc., SPSTL 384 Khp-D82, 12 pp. Avail. SPSTL (Russ) 1982.	SPECTROMETRY	
99(10):75932h	Ho, Mat H.; Guilbault, George G.; Rietz, Bernd	Portable piezoelectric crystal detector for field monitoring of environmental pollutants.	portable, piezoelectric, crystal, detector, environmental, pollutants, air, analysis, toluene	Anal. Chem., 55(11), 1830-2 (Eng) 1983.	PIEZOELECTRIC	CODEN: ANCHAM. ISSN: 0003-2700. OTHER SOURCES: CJACS

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99(8):30040a	Sakamoto, R.; Maruo, T.; Komura, K.	In situ low-level gamma-ray spectrometry and X-ray fluorescence analysis.	gamma, ray, spectrometry, fluorescence, analysis, radioelements, photon, radiochemical, radioactivity, air	Methods Low-Level Counting Spectrom., Proc. Int. Symp., 105-24, IAEA: Vienna, Austria. (Eng) 1981	SPECTROMETRY	CODEN: 49RMAJ.
99(6):47290e	Stachle, Albert; Lee, C. H.; Wentworth, W. E.; Chen, E. C. M.	Constant current linearization for determination of electron capture mechanisms.	electron, ionization, gases, gas, affinity, halogenated, kinetics, dissociation, chromatography, detectors, analysis, detection	Anal. Chem., 55(9), 1556-9 (Eng) 1983	RADIOCHEMICAL	CODEN: ANCHAM ISSN: 0003-2700 OTHER SOURCES: CJACS
99(4):33545t	Kors, [illegible]	Influence of temperature on the response of differential refractometer for quantitative analysis in high-performance liquid chromatography.	refractometer, analysis, liquid, chromatography, refractometers, detector, gel, detectors, refractometric, refractive, detection	J. Liq. Chromatogr., 6(5), 813-24 (Eng) 1983.	CHROMATOGRAPHY	CODEN: JLCHD8 ISSN: 0148-3919
98(26):224984j	Borsaru, Mihai; Holmes, Ralph J.; Mathew, P. Joseph	Bulk analysis using nuclear techniques.	bulk, analysis, nuclear, geological, coal, manganese, ores, iron, soil, shredded, sugar, sugarcane, radiochemical, gamma, ray, scattering, neutron, activation	Int. J. Appl. Radiat. Isot., 34(1), 397-405 (Eng) 1983.	RADIOCHEMICAL	CODEN: IJARAY ISSN: 0020-708X
98(24):209347m	Zhang, Dongfeng; Lin, Bincheng	Study on gas chromatographic detectors for nitrogen and phosphorus-of structural characteristics on responses of N organic compounds.	gas, chromatographic, detectors, nitrogen, phosphorus, chemical, organic, chromatography, thermionic, molecular, analysis, detector	Kexue Tongbao, 27(24), 1500-3 (Ch) 1982.	CHROMATOGRAPHY	CODEN: KHTPAT, ISSN: 0023-074X
98(24):209340d	Zhang, Dongfeng; Wang, Tiantao; Li, Aiying; Cong, Peizhong; Lin, Bincheng	Studies on gas chromatographic nitrogen and phosphorus detectors. I. Response characteristics and qualitative applications.	gas, chromatographic, nitrogen, phosphorus, detectors, chromatography, thermionic, analysis, detection, detector	Kexue Tongbao, 27(22), 1373-5 (Ch) 1982.	CHROMATOGRAPHY	CODEN: KHTPAT, ISSN: 0023-074X
98(24):209258j	Parker, T. W.	Determination of the concentration of uranium in soil and stream sediment samples using a high-resolution energy-dispersive X-ray fluorescence analyzer.	uranium, soil, stream, sediment, energy, dispersive, ray, fluorescence, analyzer, Harwell, ores, spectrometric, portable, analysis, spectrometry, geological, sediments, soils	Int. J. Appl. Radiat. Isot., 34(1), 273-81 (Eng) 1983	RADIOCHEMICAL	CODEN: IJARAY ISSN: 0020-708X
98(24):204240w	Gunnink, R.	Plutonium isotopic analysis of nondescript samples by gamma-ray spectrometry.	plutonium, isotopic, analysis, nondescript, gamma, ray, spectrometry, licensed, energy, computer, pulse, radioactive, wastes, isotope, sealed, spectrometric, calorimetry, waste	Anal. Chem. Nucl. Technol., Proc. Conf. Anal. Chem. Energy Technol., 25 Meeting Date 1981, 25-31. Edited by: Lyon, William S. Ann Arbor Sci.: Ann Arbor, Mich. (Eng) 1982.	RADIOCHEMICAL	CODEN: 49LNAT.
98(24):209205g	Diaz, R. A.; Guerra, V.; Vera, R.	Neutron activation analysis for determining major soil elements.	neutron, activation, analysis, soil, elements, ferrallitic, metal, silicon, soils	Rev. Cubana Fis., 1(2), 29-46 (Span) 1981.	RADIOCHEMICAL	CODEN: RCFIDT
98(23):198995t	Parra, M. A.; Torrent, J.	Rapid determination of the potassium quantity-intensity relationships using a potassium-selective ion electrode.	potassium, ion, electrode, soil, analysis	Soil Sci. Soc. Am. J., 47(2), 335-7 (Eng) 1983.	ELECTROCHEMICAL	CODEN: SSSJD4 ISSN: 0361-5995.
98(22):187784x	Brodzinski, R. L.	In situ subterranean determination of actinides by high-resolution gamma-ray spectrometry.	subterranean, actinides, gamma, ray, spectrometry, spectroscopy, radioactive, wastes, disposal, chemical, actinide, migration, waste, radiation, detectors, germanium, analysis	Methods Low-Level Counting Spectrom., Proc. Int. Symp., 93-103. IAEA: Vienna, Austria (En 1981	SPECTROMETRY	CODEN: 47BRAJ
98(10):80397p	Hutton, Terry W.; Hamilton, Robert D.	Activated charcoal filter counting for radioiodine effluent concentration determination in protein iodinations.	activated, charcoal, radioiodine, protein, iodinations, health, radioactive, wastes, iodine, apparatus, coated, analysis	Health Phys., 43(6), 853-7 (Eng) 1982.	RADIOCHEMICAL	CODEN: HLTPAO ISSN: 0017-9078

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98(10):68029t	Dupuy, G.; Lynch, G. F.; Booth, R. J.; Cuttler, J. M.; Villegas, J. E.; Mokiadka, Y. E.	A high-sensitivity noble gas stack effluent monitor for CANDU power reactors.	sensitivity, noble, gas, reactors, energy, river, nuclear, water, cooled, radioactive, wastes, gaseous, fission, radiation, detectors, scintillation, analysis, detector, sodium, iodide, activated, thallium	C. R., Congr. Annu.-Soc. Nucl. Can., 3rd, 035-039 (Eng) 1982.	SPECTROMETRY	CODEN: CCSTDL
98(8):61499b	Fox, M. C.; Witkowski, R. E.	Instrumentation for liquid alkali metal environments.	liquid, alkali, metal, environments, environment, metals, nuclear, reactors, breeder, coolants, cooling, sodium, analysis	ISA Trans., 21(4), 49-56 (Eng) 1982	GENERAL	CODEN: ISATAZ ISSN: 0019-0578.
98(6):41476v	Rudolph, J.; Jebsen, C.	The use of photoionization, flame ionization and electron capture detectors in series for the determination of low molecular weight trace components in the nonurban atmosphere.	photoionization, flame, ionization, electron, detectors, molecular, atmosphere, photo, detector, gas, air, chromatography, detection, analysis, gases	Int. J. Environ. Anal. Chem., 13(2), 129-39 (Eng) 1982.	SPECTROMETRY	CODEN: IJEAA3. ISSN: 0306-7319.
98(2):10886f	Mamed'yarova, L. A.; Ryazanova, G. V.; Sharifov, R. R.; Zeplatin, M. F.; Yakovishnina, S. M.; Seler'eva, A. V.	Vapor-phase method for the determination of volatile aliphatic organic acids and their chromatographic characteristics.	vapor, volatile, aliphatic, organic, acids, chromatographic, brine, coal, wastes, gas, chromatography, carboxylic, water, analysis, mines, mining, waste, acid	Azerb. Khim. Zh. (1), 104-7 (Russ) 1982.	CHROMATOGRAPHY	CODEN: AZKZAU. ISSN: 0005-2531.
97(26):221404q	Chmelai, Vladimir; Vanel, Josef	Potentiometric determination of the concentration by liquid ion-selective membranes.	potentiometric, liquid, ion, membranes, sulfonic, acids, analysis, membrane, electrode, potentiometry, electrodes, renewable, diazonium, arene, dissociated, toluidine, potassium, calcium	Czech. CS 202200 B 30 Apr 1982, 2 pp. (Czech).	ELECTROCHEMICAL	CODEN: CZXXA9. CLASS: IC; G01N027-46 APPLICATION: CS 78-4878 27 Jul 1978.
97(26):225301u	Kataoka, Toshio; Iwaba, Takinosa; Minato, Susumu; Ishida, Kenji	Detailed evaluation of natural gamma-radiation field due to uranium (238U) series.	gamma, radiation, uranium, health, physics, environmental, ray, soil, analysis, potassium, thorium, radium, spectrometry, environment, radioactive, dosimetry	J. Nucl. Sci. Technol., 19(6), 482-94 (Eng) 1982.	RADIOCHEMICAL	CODEN: JNSTAX. ISSN: 0022-3131.
97(24):207334k	Anon.	Electron capture-type gas concentration detector.	electron, gas, detector, analysis, photoelectric, detectors, chromatography	Jpn. Kokai Tokkyo Koho JP 57096544 A2 15 Jun 1982 Showa, 6 pp. (Japan).	CHROMATOGRAPHY	CODEN: JKXXAF. CLASS: IC; G01N027-64 APPLICATION: JP 80-171148 3 Dec 1980.
97(24):207231x	Fujinaga, Taitiro; Kihara, Seiji; Yoshida, Zenko	Voltammetric interpretation of potential at ion-selective electrodes using current-scan polarography	voltammetric, ion, electrodes, polarography, aqueous, organic, solution, electrolyte, voltammetry.	Bunseki Kagaku, 31(5), E301-E304 (Eng) 1982.	ELECTROCHEMICAL	CODEN: BNSKAK. ISSN: 0525-1931.
97(24):207994r	[illegible], H.; Cate, J. L., Jr.; Rueppel, D. W.	On-line monitoring of toxic materials in sewage at the Lawrence Livermore Laboratory.	toxic, sewage, Lawrence, radioelements, analysis, radioactive, wastewaters, metals, waste	U. S. Environ. Prot. Agency, Off. Res. Dev., [Rep.] EPA, EPA-600/9-81-018, Proc. Symp. Process Meas. Environ. Assess 199-206 (Eng) 1981.	RADIOCHEMICAL	CODEN: EPAROA. ISSN: 0092-6054.
97(22):192357w	Ren, Tianshan; Lin, Lianqin	Gamma-ray spectrometric analysis of uranium, thorium, radium, potassium and cesium-137 in soil.	gamma, ray, spectrometric, analysis, uranium, thorium, radium, potassium, cesium, soil, radiochemical, soils, radioelements, spectrometry, radioelement	Zhonghua Fangshe Yixue Yu Fanghu Zazhi, 2(1), 39-42 (Ch) 1982.	SPECTROMETRY	CODEN: ZFYZDT.
97(20):176083j	Yoshida, Hiroshi; Okuno, Kenji; Naruse, Yuji	Gas chromatographic measurements of hydrogen isotope mixtures by using a catalytic oxidation-type detector.	gas, chromatographic, hydrogen, isotope, mixtures, catalytic, oxidation, detector, fusion, chromatography, detectors, oxidn, analysis	J. Nucl. Sci. Technol., 19(7), 570-86 (Eng) 1982.	CHROMATOGRAPHY	CODEN: JNSTAX. ISSN: 0022-3131
97(18):155590r	Gandelman, Mitchell S.; Birks, John W.	Photooxygenation-chemiluminescence high-performance liquid chromatographic detector for the determination of aliphatic alcohols, aldehydes, ethers and saccharides.	photooxygenation, chemiluminescence, liquid, chromatographic, detector, aliphatic, alcohols, aldehydes, ethers, saccharides, analysis, carbohydrates, sugars, oxidation, photochemical, oxygen, eluates, subsequent, detection, chromatography, detectors, sensitizer, cobalt, catalyzed, luminol, catalyst, oxidn	J. Chromatogr., 242(1), 21-31 (Eng) 1982.	CHROMATOGRAPHY	CODEN: JOCRAM. ISSN: 0021-9673.

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97(16):137953d	Barbashina, V. N.; Chernyak, O. I.	Determination of thiophene in benzene by using a flame photometric detector.	thiophene, benzene, flame, photometric, detector, gas, analysis	Neftepererab. Neftekhim. (Moscow) (7), 32-3 (Russ) 1982	CHROMATOGRAPHY	CODEN: NNNSAF. ISSN: 0028-1190.
97(14):135459s	Bruns, L. E.	Capability of field instrumentation to measure radionuclide limits.	radionuclide, hanford, radioelements, analysis, environment, radiation, radioactivity, health, physics, radioelement, dosimetry, environmental, air	Nucl. Technol., 58(3), 154-69 (Eng) 1982.	GENERAL	CODEN: NUTYBB. ISSN: 0029-5450.
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97(12):100271k	Schmid, E. J.; Lagin, L. J.	Study of the use of a Phoswich detector for aerial radiometric surveys.	phoswich, detector, aerial, radiometric, surveys, radiation, detectors, thorium, ores, uranium, survey, analyses, ground	Report, GJBX-292-81, 199 pp. Avail. INIS; NTIS From: INIS Atomindex (1981), Abstr. No. 664255 (Eng) 1981.	GENERAL	
97(10):81406a	Naoe.	Method for identifying the nuclides present in solidified radioactive waste.	nuclides, solidified, radioactive, waste, transuranium, elements, solid, ray, emission, gamma, chemical, analysis, wastes	Jpn. Kokai Tokkyo Koho JP 57052843 A2 29 Mar 1982 Showa, 2 pp. (Japan).	RADIOCHEMICAL	CODEN: JKXXAF. CLASS: IC: G01N023-22; G21F009-00. APPLICATION: JP 80-127961 17 Sep 1980.
97(10):78054t	Nathwani, Martin E.	Hazardous substances site ambient air characterization to evaluate entry team safety.	hazardous, ambient, air, hazard, waste, silver, disposal, pollution	Manage. Uncontrolled Hazard. Waste Sites, Natl. Conf., 180-4. Hazard. Mater. Control Res. Inst.: Silver Spring, MD. (Eng) 1981.	GENERAL	CODEN: 48OQA3.
97(8):65584u	Velickovic, O.; Miric, I.; Nonic, P.; Bojovic, P.	Determination of natural uranium traces using solid state track detectors.	uranium, solid, track, detectors, soil, analysis, fertilizer, fission	Solid State Nucl. Track Detect., Proc. Int. Conf., 11th, Meeting Date 1981, 601-6. Edited by: Fowler, P. H.; Clapham V. M. Pergamon: Oxford, UK. (Eng) 1982.	RADIOCHEMICAL	CODEN: 47TIAE.
97(8):62734n	Gogolak, Carl V.	In situ methods for quantifying gamma-radiation levels and radionuclide concentrations.	gamma, radiation, radionuclide, energy, radioelements, analysis, soil, air, ionization, environmental, health, physics, radionuclides, dosimetry, ray, detectors, semiconducting, metastable, environment, exposure, rate, methodol	IEEE Trans. Nucl. Sci., NS29(3), 1216-24 (Eng) 1982.	RADIOCHEMICAL	CODEN: IETNAE. ISSN: 0018-9499
97(8):60628h	Pease, Robert W., Jr.; James, Stephen C.	Integration of remote sensing techniques with direct environmental sampling for investigating abandoned hazardous waste sites.	integration, sensing, environmental, hazardous, waste, energy, hazard, silver, metals, analysis, detectors, apparatus, radar, ground, penetrating, seismic, wave, refraction, electric, wastes, disposal	Manage. Uncontrolled Hazard. Waste Sites, Natl. Conf., 171-6. Hazard. Mater. Control Res. Inst.: Silver Spring, MD (Eng) 1981.	GENERAL	CODEN: 48OQA3.
97(8):60089r	Kalinova, V. L.	Study of a parametric method to increase sensitivity of a thermocatalytic sensor.	sensitivity, thermocatalytic, sensor, air, analysis, combustible, gases	Teplofizam Odno-Dvukhfaznykh Sredakh, (Mater. Nauchno-Tekh. Konf. Molodykh Uch. ITTF AN USSR), 10th, Meeting Date 1979, 103-7. Edited by: Gerashchenko, O. A. Izd. Naukova Dumka: Kiev, USSR (Russ) 198.	GENERAL	CODEN: 48CIA8.
97(6):49625h	Marta, Antonio L. M.; Strong, Frederick C., III; Collins, Kenneth E.	Determination of trace amounts of benzene and toluene in ethanol by gas chromatography using a photoionization detector.	benzene, toluene, ethanol, gas, chromatography, photoionization, detector, analysis	Quim. Nova, 4(2), 42-3 (Port) 1981.	CHROMATOGRAPHY	CODEN: QUNODK.

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97(4):32792m	Patterson, J. E.	A sensitive photoacoustic mercury detector.	sensitive, photoacoustic, mercury, detector, acoustic, photo, analysis	Anal. Chim. Acta, 136, 321-7 (Eng) 1982.	SPECTROMETRY	CODEN: ACACAM. ISSN: 0003-2670.
		aqueous/organic solution interfaces.	membrane, electrode, electric, potentiometry			
97(1):3692e	Tanada, Masaaki; Ishiwada, Akira; Hobo, Toshiyuki; Suzuki, Shigetaka; Araki, Shun	Novel chemiluminescence detector for determination of volatile polyhalogenated hydrocarbons chromatography.	chemiluminescence, detector, volatile, polyhalogenated, hydrocarbons, gas, chromatography, luminescence, analysis	J. Chromatogr., 238(2), 347-56 (Eng) 1982	CHROMATOGRAPHY	CODEN: JOCRAM. ISSN: 0021-9673.
96(26):223121x	Gammage, Richard B.	Ceramic beryllium oxide exoelectron dosimeters for tritium and radon monitoring.	ceramic, beryllium, oxide, exoelectron, dosimeters, tritium, radon, health, mask, ridge, analysis	Proc. Int. Symp. Exoelectron Emiss. Appl., 6th, Meeting Date 1979, Volume 2, 151-3. Wilhelm-Pieck-Univ. Rostock: Rostock, Ger. Dem. Rep. (Eng) 1981.	RADIOCHEMICAL	CODEN: 47UJAP.
96(26):223024u	Eder, Erwin; Starke, Hans	Remote monitoring system for exhaust air detection in nuclear power plants.	exhaust, air, detection, nuclear, plants, fission, noble, gases, reactors, radioactive, wastes, gaseous, monitor, analysis	Atomkernenerg./Kerntech., 40(4), 270-4 (Ger) 1982.	GENERAL	CODEN: ATKEDD. ISSN: 0171-5747.
96(25):216618m	Hadjidemetriou, D. G.	Comparative study of the determination of nitrates in calcareous soils by the ion-selective electrode, chromotropic acid, and phenoldisulfonic acid methods.	nitrates, calcareous, soils, ion, electrode, chromotropic, acid, phenoldisulfonic, analysis, soil, nitrate, electrodes, spectrophotometric	Analyst (London), 107(1278), 25-9 (Eng) 1982.	ELECTROCHEMICAL	CODEN: ANALAO. ISSN: 0003-2654.
96(24):210164h	Rudenko, B. A.; Goryachev, N. S.; Gavrilov, V. V.	Use of an electrolytic conductimetric detector during chromatography in a steam flow.	electrolytic, conductimetric, detector, chromatography, steam, flow, alcohols, analysis, gas, water, vapor, detection, conductometric	Zh. Anal. Khim., 37(3), 544-7 (Russ) 1982.	CHROMATOGRAPHY	CODEN: ZAKHA8. ISSN: 0044-4502.
96(23):185454u	Akatsu, J.	Determination of plutonium amount in a waste carton by gamma-ray measurement.	plutonium, waste, carton, gamma, ray, radioactive, wastes, alpha, particle, emitting, spectroscopy, analysis, spectrometry	Nucl. Mater. Manage., 10(4), 22-9 (Eng) 1981.	RADIOCHEMICAL	CODEN: NUMMDP. ISSN: 0362-0034
96(22):186931q	Chiu, Jih Hung; Lin, Hsueh Hsueh; Tsai, Chao Hung	Determination of iodine-129 in radioactive liquid waste by neutron activation analysis.	iodine, radioactive, liquid, waste, neutron, activation, analysis, energy, lung, wastes, radiochemical, reactor, isotope	Ho Tzu K'o Hsueh, 18(3), 116-19 (Ch) 1981.	RADIOCHEMICAL	CODEN: HTKHAB. ISSN: 0034-5447
96(21):179473b	Fernandes, C. P.	Determination of the uranium concentration in soil solutions by the fission track registration technique.	uranium, soil, solutions, fission, track, analysis, soils	Report, IPEN-Pub-6777, 111 pp. Avail. INIS from: INIS Atomindex 13 11(1), Abstr. No. 614935 (Port) 1980.	RADIOCHEMICAL	
96(21):175946v	Kalachev, P. N.	Gas-chromatographic determination of 2,4-dichlorophenol residues of alpha-and gamma-isomers of hexachlorocyclohexane in soil and plants.	gas, chromatographic, dichlorophenol, residues, alpha, gamma, isomers, hexachlorocyclohexane, soil, plants, analysis, plant	Anal. Chromatogr.; Proc. Study, 66-9. Edited by: Tomasov, A. A. Gor'k. Univ., Gorkiy, USSR. (Russ) 1980.	CHROMATOGRAPHY	CODEN: 47XKAG.
96(20):173549w	Evans, Larry G.; Lapides, Jeffrey R.; Trombka, Jacob I.; Jensen, Dal H.	In situ elemental analysis using neutron-capture gamma-ray spectroscopy.	elemental, analysis, neutron, gamma, ray, spectroscopy, silver, soil, geological, water, radiochemical, activation, soils	Nucl. Instrum. Methods Phys. Res., 193(1-2), 353-7 (Eng) 1982.	SPECTROMETRY	CODEN: NIMRD9
96(18):154753m	Rice, John R.; Kissinger, Peter T.	Liquid chromatography with precolumn sample preconcentration and electrochemical detection: determin aromatic amines in environmental samples.	liquid, chromatography, precolumn, preconcentration, electrochemical, detection, aromatic, amines, environmental, rice, soil, analysis, amine, electrochem, water	Environ. Sci. Technol., 16(5), 263-8 (Eng) 1982	CHROMATOGRAPHY	CODEN: ESTHAG. ISSN: 0013-936X

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96(18):151129g	Eyrich, Werner; Boehnel, Klaus; Kuechle, Marko	Apparatus for measuring waste drums.	apparatus, waste, automated, radioactivity, radioactive, radiation, gamma, ray, neutron, detectors, neutron, solid, analysis	Ger. Offen. DE 3028218 A1 18 Feb 1982, 13 pp. (Ger).	RADIOCHEMICAL	CODEN: GWXXBX CLASS: IC: G01T001-167; G21F009-36; B65G069-00 APPLICATION: DE 80-3028218 25 Jul 1980.
96(16):134932w	Bark, D.	Development of techniques for the application of Moessbauer spectroscopy in determining tin and iron from rock samples. Part of a coordinated program on the development of methods for the application of Moessbauer spectroscopy in mineralogy, soil science and the study of ceramics. Final rep for the period 1 August 1977-30 August 1980	spectroscopy, tin, iron, rock, mineralogy, soil, ceramics, ores, analysis, spectrochemical, geol	Report, IAEA-R-2030-F, 9 pp. Avail. INIS From: INIS Atomindex 1981, 12(23), Abstr. No. 63727 (Eng) 1981	SPECTROMETRY	
96(14):114931v	Cassidy, R. M.; Elchuk, S.	Chromatography of uranium on high-performance ion exchangers.	chromatography, uranium, ion, exchangers, river, energy, urine, analysis, ground, waters	Int. J. Environ. Anal. Chem., 10(3-4), 287-94 (Eng) 1981.	CHROMATOGRAPHY	CODEN: IJEAA3. ISSN: 0306-7319
96(16):124960q	Jones, Dilys L.; Moody, G. J.; Thomas, J. D. R.; Birch, B. J.	Barium-polyethoxylate complexes as potentiometric sensors and their applicati the determination of nonionic surfactants.	barium, polyethoxylate, potentiometric, sensors, nonionic, surfactants, birch, detergents, electrode, alcohols, ethoxylated	Analyst (London), 106(1266), 974-84 (Eng) 1981.	ELECTROCHEMICAL	CODEN: ANALAO ISSN: 0003-2654
96(14):109383j	Kaneko, Yoro	High sensitive photoionization detector gas chromatography for direct gas analysis.	sensitive, photoionization, detector, gas, chromatography, analysis, air, chromatograph	Kogyo Yosui Kenkyu, 48(11), 829-36 (Japan) 1981.	CHROMATOGRAPHY	CODEN: NKGKAA ISSN: 0369-3783
96(10):76110p	Parapathy, S.; Gopalakrishnan, K. V.; Dubey, B. P.; Menon, M. R.	A high-resolution lithium-doped germanium gamma-ray spectrometer for environmental monitoring.	lithium, doped, germanium, gamma, ray, spectrometer, environmental, air, atomic, energy, nuclear, spectrometers, detector, drifted	Proc. Nucl. Chem. Radiochem. Symp., Meeting Date 1980, 630-3. India Dep. Atomic Energy: Bombay, India. (Eng) 1981.	SPECTROMETRY	CODEN: 46XAA3.
96(10):75467a	Saha, M.	Investigation of cadmium-107 and-111 decay schemes and their application in neutron activation analysis.	cadmium, schemes, neutron, activation, analysis, birch, gamma, ray, indium, isotopes, radiochemical, isotope, spectrum, trees, nuclear, energy	Report, CNEN-80/E/19, 110 pp. Avail. INIS From: INIS Atomindex 1981, 12(7), Abstr. No. 590740 (Ger) 1980.	RADIOCHEMICAL	
96(8):59581h	Suri, P. K.; Singh, S.; Virk, H. S.	Uranium and radon estimation by plastic track detectors.	uranium, radon, plastic, track, detectors, health, physics, environment, soil, analysis, plant, hydrophytes, waters, abundance	Indian J. Pure Appl. Phys., 19(11), 1171-3 (Eng) 1981.	RADIOCHEMICAL	CODEN: IJOPAU ISSN: 0019-5596
96(8):57062k	Holland, R. C.; Shah, A. R.; Kaiser, A. F.; McGee, J. C.	Experimental studies concerning the drying of voloxidizer off-gases.	experimental, drying, voloxidizer, gases, energy, molecular, sieves, adsorption, tritiated, water, iodine, radioactive, wastes, process, preparation, waste	Report, ORNL/SUB-7164/1, 139 pp. Avail. NTIS From: Energy Res. Abstr. 1981, 6(20), Abstr. No. 30031 (Eng) 1981.	GENERAL	
96(7):46496d	Frei, R. W.	Reaction detectors in high-performance liquid chromatography.	detectors, liquid, chromatography, soil, analysis, pharmaceutical, fluorometric, spectrometric, fluorometric, spectrometric	Chimia, 35(11), 447-55 (Ger) 1981.	CHROMATOGRAPHY	CODEN: CHIMAD ISSN: 0009-4293.
96(6):45584a	Novak, Josef; Hrubes, Ladislav; Pecak, Milos; Benesova, Dagmar	Determination of nitrates	nitrates, analysis, leachates, soils, potentiometric, soil, humus, humic, nitrate, electrodes, membrane, ion, exchange, silver, salt, electrode	Czech. CS 187272 B 15 Mar 1981, 3 pp. (Czech)	ELECTROCHEMICAL	CODEN: CZXXA9. CLASS: IC: G01N027-52 APPLICATION: CS 77-2769 27 Apr 1977
96(6):45416r	Eckhoff, Michael A.; McCarthy, James P.; Caruso, Joseph A.	Sequential slow scanning monochromator as a plasma emission chromatographic detector for determination of volatil hydrides.	slow, scanning, monochromator, plasma, emission, chromatographic, detector, volatile, hydrides, chromatography, gas, detectors, multielement, detection, elements, monochromators, analysis, hydride	Anal. Chem., 54(2), 165-9 (Eng) 1982.	CHROMATOGRAPHY	CODEN: ANCHAM, ISSN: 0003-2700.

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96(2):14793h	Baim, Michael A.; Hill, Herbert H., Jr.	Tunable selective detection for capillary gas chromatography by ion mobility monitoring.	tunable, detection, capillary, gas, chromatography, ion, hydrocarbons, analysis, gasoline, hydrocarbon, detector, detectors, spectrometers, chromatograph	Anal. Chem., 54(1), 38-43 (Eng) 1982.	CHROMATOGRAPHY	CODEN: ANCHAM. ISSN: 0003-2700.
95(26):231243j	Hseng, Te-Bei; Tai, Tse-Hor; Tan, Nai-Hua; Chen, Chang-Hsing; Wang, Ho-Cho	Manufacture of barium-selective membrane electrode.	barium, membrane, electrode, chromates, sulfates, analysis, potentiometric, titrimetric, electrodes, membranes, ion	Fen Hsi Hua Hsueh, 8(6), 514-18 (Ch) 1980	ELECTROCHEMICAL	CODEN: FHHHDT
95(26):227696p	Zacharin, A. V.; Mazaryuk, A. E.; Chekhov, V. V.; Fedorovskii, F. P.; Zhoschik, L. M.	Use of thermoexoemission detectors for monitoring the radioactive contamination of industrial wastewaters.	thermoexoemission, detectors, radioactive, wastewaters, radiation, scintillation, plastic, wastes, thermoemission, analysis	At. Energ., 51(4), 266-7 (Russ) 1981.	RADIOCHEMICAL	CODEN: ATENAB. ISSN: 0004-7163
95(24):211895x	Gutz, Ivano G. R.	Precise determination of drop times with an instrument using a piezoelectric detector.	piezoelectric, detector, polarography, transducers, electrode	An. Simp. Bras. Eletroquim. Eletroanal., 2nd, 105-11. Edited by: Rabockai, Tibor; Neves, Eduardo Almeida. Inst. Quim. Univ. Sao Paulo: Sao Paulo, Brazil. (Port) 1980.	PIEZOELECTRIC	CODEN: 46KRAF
95(24):206718h	Sebulic, Tim V.; Delaney, J. T.	Assessing hazardous waste treatment facility fugitive atmospheric emissions.	hazardous, waste, fugitive, atmospheric, emissions, acids, analysis, organic, air, emission, wastes, vapors	U. S. Environ. Prot. Agency, Off. Res. Dev., (Rep.) EPA, EPA-600/9-80 Symp. Fugitive Emiss. Meas. Control, 4th, PB81-174393, 119-3 (Eng) 1980.	GENERAL	CODEN: XPARDS. ISSN: 0052-8054
95(22):194738u	Kolesnikov, I. A.; Kist, A. A.; Rachmov, I. I.; Fulatov, V. G.; Ismail'dzhanov, A. Kh.	Radioactivation and x-ray fluorescent methods for the determination of certain elements in the ambient air and in water.	radioactivation, ray, fluorescent, elements, ambient, air, water, metals, analysis, environmental, impurity, fluorescence, radiometric, radiochemical, neutron, activation	Zavod. Lab., 47(8), 28-32 (Russ) 1981.	RADIOCHEMICAL	CODEN: ZVDLAU. ISSN: 0044-1910.
95(20):175421b	Umarov, N. U.; Gribanov, B. I.	Simultaneous determination of thorium and uranium in subsurface waters by activation analysis using a semiconductor detector.	thorium, uranium, subsurface, waters, activation, analysis, semiconductor, detector, geol, groundwater, ground	Geofiz. Metody Issled. v Gidrogeol. i Inzh. Geol., (Tashkent) (3), 70-6 From: Ref. Zh., Geol. 1981, Abstr. No. 6V70t (Russ) 1979.	ELECTROCHEMICAL	
95(20):175613a	Ho, Mat H.; Guilbault, George G.; Scheide, Eugene P.	Determination of nanogram quantities of mercury in water with a gold-plated piezoelectric crystal detector.	nanogram, mercury, water, gold, plated, piezoelectric, crystal, detector, coated, detectors, analysis, cobalt	Anal. Chim. Acta, 130(1), 141-7 (Eng) 1981	PIEZOELECTRIC	CODEN: ACACAM. ISSN: 0003-2670
95(20):175041c	Kawamura, Norikazu; Kitano, Tsuyoshi; Mizuno, Chuichi; Aoki, Minoru; Naruki, Kaoru	Determination of nuclear materials in the wastes by coincidence counting.	nuclear, wastes, coincidence, fuel, fissile, radioactive, waste, alpha, particle, emitting, scintillation, reactor, fuels, elements, analysis	Tokai Works Semi-Annu. Prog. Rep., Tojuna Date 1978, NNCT8)1-78-03, 67-72 (Eng) 1979	RADIOCHEMICAL	CODEN: TWSRCX.
95(19):167352t	Hisano, Katsuyuki; Fukuchi, Sadao	Determination of volatile sulfur compounds in soil by gas chromatography.	volatile, sulfur, soil, gas, chromatography, analysis	Nippon Dojo Hiryogaku Zasshi, 52(1), 62-6 (Japan) 1981.	CHROMATOGRAPHY	CODEN: NIDHAX. ISSN: 0029-0610
95(16):143557j	Chimenti, Robert J. L.	Detection of uranium by light-induced luminescence.	detection, uranium, light, luminescence, laser, radiation, chemical, fluorescence, minerals, environment, spectrometers, spectrochemical, analysis, sensor	Can. CA 1103049 16 Jun 1981, 32 pp (Eng)	RADIOCHEMICAL	CODEN: CAXXA4. CLASS: IC: G01N021-52; G01V005-00. PRIORITY: US 77-832036 13 Sep 1977.
95(16):138177f	Sweetman, J. A.; Boettner, E. A.	Detection of brominated and chlorinated organics by a gas chromatographic microcoulometric detector. Effect of pyrolysis tube conditions.	detection, brominated, chlorinated, organics, gas, chromatographic, microcoulometric, detector, pyrolysis, tube, health, chromatography, polluted, waters, analysis	J. Chromatogr., 212(1), 115-20 (Eng) 1981.	CHROMATOGRAPHY	CODEN: JOCRAM. ISSN: 0021-9673
95(14):129810w	Estes, Scott A.; Uden, Peter C.; Barnes, Ramon M.	Microwave-excited atmospheric pressure helium plasma emission detection characteristics in fused silica capillary gas chromatography.	microwave, excited, atmospheric, helium, plasma, emission, detection, fused, silica, capillary, gas, chromatography, halogens, elements, metals, analysis, detector, chemical, detectors, spectrometric, capillaries, plasmas	Anal. Chem., 53(13), 1829-37 (Eng) 1981.	CHROMATOGRAPHY	CODEN: ANCHAM. ISSN: 0003-2700.

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95(14):125523q	Otsuka, Yasuhiko; Suzuki, Hiroshi	Multielement neutron activation analysis of soil and sediment samples using a small computer system	multielement, neutron, activation, analysis, soil, sediment, computer, pollution, geological, sediments, metals, soils, gamma, ray, spectrometry, computerized, radiochemical	Nippon Kankyo Eisei Senta Shoho, 7, 63-7 (Japan) 1980	RADIOCHEMICAL	CODEN: [illegible]
95(12):100019d	Sherwood, Glenn A.; Johnson, Dennis C	A chromatographic determination of nitrate with amperometric detection at a copperized cadmium electrode	chromatographic, nitrate, amperometric, detection, copperized, cadmium, electrode, nitrates, analysis, flow, chromatography, liquid, electrodes, porous, coated, detector, copper	Anal. Chim. Acta, 129(1), 101-11 (Eng) 1981	CHROMATOGRAPHY	CODEN: ACACAM ISSN: 0003-2670
95(11):95567r	Adamovic, G.; Kellner, H.; Mack, Simons, Otto, Christiane	Comparison of different techniques of nitrate determination in soils and vegetables	nitrate, soils, vegetables, bean, carrot, spinach, vegetable, soil, analysis	Ann. Nutr. Aliment., 34(5-6), 877-83 (Fr) 1980	GENERAL	CODEN: ANNLAF ISSN: 0003-4037
95(10):90510b	MacCrehan, William A.; Durst, Richard A	Dual-electrode, liquid chromatographic detector for the determination of analytes with high potentials	electrode, liquid, chromatographic, detector, analytes, chromatography, detectors, electrochem., analysis, detection, eluates	Anal. Chem., 53(11), 1700-4 (Eng) 1981	CHROMATOGRAPHY	CODEN: ANCHAM ISSN: 0003-2700
95(10):90551o	Simpson, Colin F.; Gough, Terry A	Direct quantitative analysis using flame ionization detection. The construction and performance of the FIDOH detector.	analysis, flame, ionization, detection, fidoh, detector, chromatography, gas, detectors, oxygen, hydrogen, gases, hydrocarbons	J. Chromatogr. Sci., 19(8), 275-82 (Eng) 1981	CHROMATOGRAPHY	CODEN: JCHSB2 ISSN: 0021-9665
95(10):90410d	Hassan, Saad S. M.; Habib, M. M	Graphite-silver diethyldithiocarbamate as a new potentiometric sensor for titration of some metals, halides, thiols, and sulfonamides	graphite, silver, diethyldithiocarbamate, potentiometric, sensor, titration, metals, halides, thiols, sulfonamides, egypt, analysis, sodium, ion, electrodes, thiocarbonyl, halogens, oxygen, flask, combustion, electrode	Microchem. J., 26(2), 181-91 (Eng) 1981	ELECTROCHEMICAL	CODEN: MICJAN ISSN: 0026-265X
95(10):85341j	Leveson, Richard C.; Barker, Nicholas J	A portable multicomponent air impurity analyzer having subpart per billion capability without sample preconcentration	portable, multicomponent, air, impurity, analyzer, preconcentration, analysis	Anal. Instrum., 19, 7-13 (Eng) 1981	CHROMATOGRAPHY	CODEN: ALNSBB ISSN: 0570-0000
95(8):72774q	Clemons, Jerry; Lessenburgs, Emory; Spangler, Wayne	Separation and determination of trace sulfur compounds	sulfur, thiols, analysis, gas, flame, photometric, detector, chromatography, detection, flue, gases, air, hydrocarbons, fuel, gasification, benzene, hydrogen, sulfide, thiophene	Anal. Instrum., 19, [illegible] (Eng) 1981	CHROMATOGRAPHY	CODEN: ALNSBB ISSN: 0570-0000
95(8):72760p	Rice, G. W.; Richard, J. J.; D'Silva, A. P.; Fassel, V. A	Atmospheric pressure active nitrogen afterglow as a detector for gas chromatography	atmospheric, nitrogen, afterglow, detector, gas, chromatography, rice, organometallic, hydrocarbons, analysis, detection, detectors, spectrometric, excitation, emission	Anal. Chem., 53(9), 1519-22 (Eng) 1981	CHROMATOGRAPHY	CODEN: ANCHAM ISSN: 0003-2700
95(8):69182v	Hagmann, D	Isotopic correlation in irradiated HTR-fuel	isotopic, irradiated, fuel, laser, radiation, chemical, computer, nuclear, reactor, radioactive, wastes, detectors, silicon, fuels, elements, analysis, cesium, thorium, uranium, spectroscopy	Ber. Kernforschungsanlage Juelich Juel-1700, [illegible] pp. (Ger) 1981	RADIOCHEMICAL	CODEN: BKFJAK ISSN: 0366-0885
95(6):34953p	Gough, Terry Anthony; Simpson, Colin Frederick	Improvements in or relating to gas chromatography	gas, chromatography, aromatic, hydrocarbons, analysis, oxygen, flame, ionization, detection, detectors, flow, rate, gases	Brit. GB [illegible] 18 Feb 1981, 26 pp. (Eng)	RADIOCHEMICAL	CODEN: BRXXAA Class: 1C; G01N031-08; B01D015-08; G01N027-62. APPLICATION GB 77-34961 19 Aug
95(4):34732p	Hausler, D. W.; Taylor, L. T	Nonaqueous on-line simultaneous determination of metals by size exclusion chromatography with inductively coupled plasma atomic emission spectrometric detection	nonaqueous, metals, chromatography, inductively, plasma, atomic, emission, spectrometric, detection, elements, analysis, siloxanes, silicones, atomizers, spectrometer, detector, chemical, gel, eluates, computer, spectrochemical, spectrometers, detectors	Anal. Chem., 53(8), 1223-7 (Eng) 1981	CHROMATOGRAPHY	CODEN: ANCHAM ISSN: 0003-2700

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95(2):17543w	Evans, Larry G.; Trombka, Jacob I.; Lapides, Jeffrey R.; Jensen, Dal H.	Determination of elemental composition in geochemical exploration using a 14-MeV neutron generator. 1. Experimental aspects.	elemental, geochemical, exploration, neutron, experimental, aspects, computer, silver, geological, activation, gamma, ray, spectrometry, metals, analysis, chlorine, water, environment, ore, radiochemical, geol. spectrometric, marine, metal	IEEE Trans. Nucl. Sci., NS28(2), 1626-9 (Eng) 1981	RADIOCHEMICAL	CODEN: IETNAE ISSN: 0018-9499
95(2):14003m	Seliermann, R.; Froehlich, K.; Deutscher, M.	An alpha spectrometer for studying environmental nuclides.	alpha, spectrometer, environmental, nuclides, radiation, nuclear, spectrometers, particle, nuclide, analysis, isotopes, environment	Isotopenpraxis, 17(6), 246-10 (Ger) 1981.	SPECTROMETRY	CODEN: IPRAAS, ISSN: 0021-1915.
95(1):5635g	Schalscha, E. B.; Schirado, T.; Vergara, I.	Flow injection analysis of nitrate in soil extracts-evaluation of a nitrate-selective flow electrode method.	flow, injection, analysis, nitrate, soil, electrode	Soil Sci. Soc. Am. J., 45(3), 446-9 (Eng) 1981	ELECTROCHEMICAL	CODEN: SSSJD4 ISSN: 0361-5995.
94(26):219997x	Ramstad, Tore; Nestrick, Terry J.	A procedure for determining benzene in soil by the purge-and-trap technique.	benzene, soil, trap, analysis, gas	Bull. Environ. Contam. Toxicol., 26(4), 440-5 (Eng) 1981.	GENERAL	CODEN: BECTA6, ISSN: 0007-4861
94(26):219521p	Trujillo, C.; Nyhan, J. W.; Crowell, J. M.	Automated transuranic assay system for soils.	automated, transuranic, soils, energy, transuranium, elements, automation, analyzer, element, soil, radiochemical, analysis	Report, LA-8374-LLMR, 13 pp. Avail. NTIS From: Energy Res. Abstr. 1981, 6(1), Abstr. No. 1130 (Eng) 1980.	RADIOCHEMICAL	
94(26):204033u	Oshara, Akira; Fukushima, Ichiro	Neutron activation analysis of human hair. Multivariate analysis of factors influencing on trace element contents in hair.	neutron, activation, analysis, human, hair, multivariate, element, radioisotopes, elements, environmental, pollution, environment, radiochemical	Radioisotopes, 29(6), 264-71 (Japan) 1980	RADIOCHEMICAL	CODEN: RAISAN ISSN: 0033-8303
94(22):180868h	Benningfield, L. V., Jr.; Mowery, R. A., Jr.	A commercially available dielectric constant detector for liquid chromatography and its applications.	dielectric, detector, liquid, chromatography, automation, gasoline, ethanol, water, detection, molecular, polymers, gel, alcohols, analysis, hydrocarbons, dispersion, fuel, oil, fuels, diesel, detectors, polymer, gasohol	J. Chromatogr. Sci., 19(3), 115-23 (Eng) 1981.	CHROMATOGRAPHY	CODEN: JCHSBZ, ISSN: 0021-9665.
94(22):180378m	Folestad, Staffan; Josefsson, Bjoern	Chlorine-selective detector for liquid chromatography.	chlorine, detector, liquid, chromatography, spectrochemical, analysis, flame, emission, chlorinated, environment, spectrometry, chloroform, water	J. Chromatogr., 203, 173-8 (Eng) 1981.	CHROMATOGRAPHY	CODEN: JOCRAM, ISSN: 0021-9673
94(22):180059y	Aagher, M.; Bander, L.	Passive gamma-ray monitoring of plutonium contaminated waste.	passive, gamma, ray, plutonium, waste, fuels, chemical, radioactive, wastes, radiation, detectors, detector, lithium, drifted, analysis	Comm. Eur. Communities, [Rep.] EUR, EUR 6813, Vol. 2, Group Methods Fuels, Cladding Struct. Mater., 911-19 (Eng) 1980	RADIOCHEMICAL	CODEN: CECED9.
94(20):164449v	Coles, S. W.; Beamer, F. P.	An automated krypton-85 gamma-ray stack monitor.	automated, krypton, gamma, ray, radioactive, wastes, emission, radiation, detectors, nuclear, waste, vitrification, plant, analysis	IEEE Trans. Nucl. Sci., NS28(1), 740-4 (Eng) 1981.	RADIOCHEMICAL	CODEN: IETNAE ISSN: 0018-9499.
94(20):162204u	Crane, T. W.	Measurement of plutonium contamination at the 10-nCi/g level in 55-gallon barrels of solid waste with a californium-252 assay system.	plutonium, gallon, barrels, solid, waste, californium, radioactive, wastes, analysis, passive, nondestructive, scrap	Comm. Eur. Communities, [Rep.] EUR, EUR 6629, Int. Meet. Monit. Pu-contam. Waste Proc., 217-26 (Eng) 1979.	RADIOCHEMICAL	CODEN: CECED9.
94(18):147234d	Crowell, J. M.	A dual germanium detector system for the routine assay of low level transuranics in soil.	germanium, detector, transuranics, soil, transuranium, elements, analysis, radiation, detectors, ray, element, transuranic, radioelements	IEEE Trans. Nucl. Sci., NS28(1), 242-4 (Eng) 1981.	RADIOCHEMICAL	CODEN: IETNAE ISSN: 0018-9499.

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94(18):144769v	Sardat, G ; Pouteton, M.; Bouchard, J	Description of a nondestructive measuring system applied to the management of a storage center for alpha beta & gamma emitters	nondestructive, alpha, beta, gamma, emitters, waste, health, physics, radioactive, radiation, wastes	Comm. Eur. Communities, (Rep.) EUR, EUR 6635, Int. Meet. Monit. Pu-contam. Waste Proc., 533-48 (Fr) 1979.	RADIOCHEMICAL	CODEN: CECEDR
94(18):144501f	Yasuoka, Takashi; Takeno, Jiro; Mitsusaki, Shuhei	Analysis of atmospheric hydrocarbons by photometrically measured ionization potentials. I. Qualitative analysis by irradiation using a hydrogen discharge lamp.	analysis, atmospheric, hydrocarbons, photometrically, ionization, irradiation, hydrogen, lamp, air, pollutant, detection, photoionization, detector	Proc. Fac. Sci. Tokai Univ., Volume Date 1979, 15, 81-8 (Eng) 1980	SPECTROMETRY	CODEN: TUFPBC
94(17):140337n	Benes, Jaroslav; Frana, Jaroslav	Complex chemical analysis and determination of trace elements in soils.	chemical, analysis, elements, soils, neutron, activation, soil, element	Agrochemia (Bratislava), 21(1), 16-19 (Czech) 1981	SPECTROMETRY	CODEN: AGRCB2 ISSN: 0002-1830
94(17):137871v	Iwata, Yutaka; Duneff, Travis M.; Bailey, J. Blair; Vath, Victor; Gunther, Francis A.	Analytical method for nitrapyrin and 6-chloropicolinic acid residues in strawberry fruit and soil	analytical, nitrapyrin, chloropicolinic, acid, residues, strawberry, fruit, soil, food, analysis, nitrapyrin, metabolite, det, strawberries	J. Agric. Food Chem., 29(2), 235-9 (Eng) 1981	GENERAL	CODEN: JAFCAU ISSN: 0021-8561
94(16):131814u	Irlweck, Karl; Fachlmayer, Friedrich	Comparison of mass spectrometry and alpha-counting in analysis of uranium and plutonium isotopes in environmental samples	spectrometry, alpha, analysis, uranium, plutonium, isotopes, environmental, health, physics, radioactive, fallout, particle, spectroscopy, radionuclides, lung, radionuclide, human, spectroscopy, environment, soil, lungs	Adv. Mass Spectrom., 8B, 1473-9 (Eng) 1980	SPECTROMETRY	CODEN: AMSPAN ISSN: 0568-000X
94(16):113767h	Lal, Uma Shankar; Chattopadhyaya, M. C.; Dey, Arun K.	A novel nitrate-selective electrode based on precipitated nitron nitrate	nitrate, electrode, precipitated, nitrates, analysis, ion, electrodes, soil, membrane	Mikrochim. Acta, 2(5-6), 417-21 (Eng) 1980	ELECTROCHEMICAL	CODEN: MIACAQ, ISSN: 0026-3672
94(14):100875c	Mundschenk, H	Sensitivity of a low-level lithium-drifted germanium spectrometer applied to environmental aquatic studies.	sensitivity, lithium, drifted, germanium, spectrometer, environmental, aquatic, radioelements, analysis, gamma, ray, detector, optimization, geological, sediments, radiation, detectors, waters, biological, radioelement, detection, water	Nucl. Instrum. Methods, 177(2-3), 563-75 (Eng) 1980.	SPECTROMETRY	CODEN: NUIMAL ISSN: 0029-554X
94(12):96290n	Matveev, O. I.; Zorov, N. B.; Kuzyakov, Yu. Ya.	Intracavity spectroscopy with a photon detector based on stepwise atom photoionization.	spectroscopy, photon, detector, stepwise, atom, photoionization, spectrochemical, analysis, absorption, laser, spectroscopic	Talanta, 27(11A), 907-8 (Eng) 1980	SPECTROMETRY	CODEN: TLNTA2 ISSN: 0039-9140
94(12):94199n	Tarpley, John L.; Sarmiento, Pedro D.	Investigation of electrical noise in selenium-immersed thermistor bolometers	electrical, noise, selenium, immersed, thermistor, bolometers, space, flight, electric, radiometers	NASA Tech. Memo., NASA-TM-81001, 30 pp. Avail. NTIS From: Sci. Tech. Aerosp. Rep. 1980, 18(22), Abstr. No. N80-31779 (Eng) 1980	SPECTROMETRY	CODEN: NATMA4 ISSN: 0499-9320
94(12):89903h	Valkovic, V	Studies of lead in water and biological materials using x-ray emission spectroscopy	water, biological, ray, emission, spectroscopy, rice, coal, hair, tree, honey, petroleum, spectroscopic, radiation, detectors, semiconducting, lithium, drifted, silicon, chemical, bombardment, analysis, detector	Lead Mar. Environ., Proc. Int. Experts Discuss., Meeting Date 1977, 93-107 Edited by: Branica, Marko; Konrad, Zdenko. Pergamon: Oxford, Engl. (Eng) 1980	SPECTROMETRY	CODEN: 44MQAN
94(12):89080y	Szabo, T.; Nagy, L. G.; Torok, G.; Nagy, D.; Foti, G.	Method and instrumentation for monitoring radioactive concentration in wastewater	radioactive, wastewater, gamma, ray, wastes, analysis, radioactivity, waste	J. Radioanal. Chem., 60(1-2), 385-8 (Ger) 1980	RADIOCHEMICAL	CODEN: JRACBN ISSN: 0022-4081
94(10):71025t	Kubota, Ryoji; Okazaki, Satoshi; Fujinaga, Taitiro	Coulopotentiographic analyzer system using a glassy carbon column electrode as a sensor. Automatic trace analysis of sub-ppb level copper and lead in sea water.	coulopotentiographic, analyzer, glassy, carbon, electrode, sensor, automatic, analysis, copper, sea, water, coulopotentiog, seawater	Nippon Kagaku Kaishi, (10), 1615-20 (Japan) 1980	ELECTROCHEMICAL	CODEN: NKAKB8 ISSN: 0369-4577

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94(8):47647m	Fung, Kochy; Grosjean, Daniel	Determination of nanogram amounts of carbonyls as 2,4-dinitrophenylhydrazones by high-performance liquid chromatography.	nanogram, carbonyls, dinitrophenylhydrazones, liquid, chromatography, environment, air, analysis, carbonyl, ketones, aldehydes, dinitrophenylhydrazone	Anal. Chem., 53(2), 168-71 (Eng) 1981.	CHROMATOGRAPHY	CODEN: ANCHAM. ISSN: 0003-2700.
94(8):54480x	Palmer, H. E.; Anderson, D. P.	Large-area gas-scintillation proportional counters for in vivo measurement of plutonium and americium.	gas, scintillation, proportional, plutonium, americium, health, physics, dosimetry, americium, radiation, analysis	Adv. Radiat. Prot. Monit., Proc. Int. Symp., Meeting Date 1978, 459-67. Edited by: Beck, [illegible] IAEA: Vienna, Austria. (Eng) 1979.	RADIOCHEMICAL	CODEN: 44MWAX
94(8):54595g	Hole, [illegible]; Pearson, [illegible]	Multielement alpha spectrometry. A new method for monitoring individuals and the working environment for actinide contamination.	multielement, alpha, spectrometry, environment, actinide, soil, pollution, water, actinides, bone, lichen, health, physics, analysis, thorium, spectrometric, uranium, pollutants	Adv. Radiat. Prot. Monit., Proc. Int. Symp., Meeting Date 1978, 369-76. Edited by: Beck, [illegible] IAEA: Vienna, Austria. (Eng) 1979.	SPECTROMETRY	CODEN: 44MWAX
94(8):52553m	Saar, Robert A.	Cadmium(II), lead(II), and copper(II) complexation by fulvic acids derived from soil and water: ion-selective electrode and spectrofluorometric studies.	cadmium, copper, fulvic, acids, soil, water, ion, electrode, spectrofluorometric, metals, waters, rivers, soils, river	193 pp. Avail. Univ. Microfilms Int., Order No. 8027800 From: Diss. Abstr. Int. B 1980, 41(6), 2199 (Eng) 1980.	ELECTROCHEMICAL	
94(7):40049u	Hansen, [illegible]	Development of methods for fast simple selective determination of nitrate by ion-selective electrodes. Devel of automated methods for spectrophotometric, fluorometric an potentiometric determinations of nitrogen-containing compoun Final report for the period 1 December 1975-30 November 1979.	nitrate, ion, electrodes, automated, spectrophotometric, fluorometric, potentiometric, nitrogen, nitrates, analysis, electrode, wastewater, soil, plant, fertilizer, membrane, [illegible], polyvinyl, chloride	Report, [illegible], 6 pp. Avail. INIS From: INIS Atomindex 1980, 11(10), Abstr. No. 551852 (Eng) 1980.	ELECTROCHEMICAL	
94(6):40745u	Anon	Coulometric detector for liquid chromatography.	coulometric, detector, liquid, chromatography, alkaline, earth, metals, rare, analysis, detectors, metal, ions, copper, diethylenetriaminepentaacetic, acid, detection, eluates	[illegible] (5), 298-5 (Ch) 1980.	CHROMATOGRAPHY	CODEN: [illegible] ISSN: [illegible]
94(6):35264t	Obrikat, D.; Thiele, J.; Goroshenko, G. G.; Leonov, [illegible]	Experimental evaluation of lithium-drifted germanium-gamma-spectrometry from large volume samples monitoring the environment of nuclear power plants.	experimental, lithium, drifted, germanium, gamma, spectrometry, environment, nuclear, plants, radioactive, fallout, soil, analysis, radionuclides, detectors, veg, radiation, reactor, dosimetry, reactors, thorium, plant	Rep.-SAAS-Staatl. Amt Atomsicherh. Strahlenschutz DDR, SAAS-[illegible]. [illegible] Nauchno-Tekhnicheskoe Sotrudnichestvo Oblasti Radiatsionnoi Bezopasnosti 1978, 299-312 (Ger) 1978.	SPECTROMETRY	CODEN: [illegible] ISSN: [illegible]
93(26):240370v	Dalla Rosa, R.; Marchionni, V.; Testa, C.; Triulzi, C.	Radiochemical determination of plutonium in marine samples by extraction chromatography.	radiochemical, plutonium, marine, extraction, chromatography, [illegible], electrodeposition, alpha, spectrometry, geological, sediments, analysis, organisms, seawater, sediment, sea	Anal. Chim. Acta, 117, 217-24 (Eng) 1980	RADIOCHEMICAL	CODEN: ACACAM. ISSN: 0003-2670.
93(26):250335z	Radic, N.; Milisic, M.	Sulfide ion-selective electrode as potentiometric sensor for lead(II) ion in and nonaqueous medium.	sulfide, ion, electrode, potentiometric, sensor, aqueous, nonaqueous, electrodes, analysis, potentiometry	Anal. Lett., 13(A12), 1013-30 (Eng) 1980.	ELECTROCHEMICAL	CODEN: ANALBP ISSN: 0003-2719.

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93(22):[illegible]	Kakamoto, Michiko	Studies on enhancement of selectivity and sensitivity for chromatography in trace organic analysis.	sensitivity, chromatography, organic, analysis, spectrometers, spectrographs, detector, pesticides, plants, gas, spectroscopy, plant, methylenebenzene, voltammetry, photometers, flame, liquid, benzothiophene, photometric, detection, voltammetric, aniline, benzene, isomers, benzoic, acid, spectrometric, isomer, naphthalene, impurity, nitrobenzene, thiophene	Chuo Daigaku Rikogakubu Kiyo, 22, 371-442 (Japan) 1979	CHROMATOGRAPHY	CODEN: [illegible]
93(22):[illegible]	Chakravarti, S. K.; Lal, Nand; Nagpaul, K. K.	Uranium trace analysis of some materials using solid state nuclear track detectors.	uranium, analysis, solid, nuclear, track, detectors, semiconductor, coal, soaps, tobacco, detergents, soil, blood, plant, pepper, paper, ashes, residues, fly, cement, portland, semiconductive	Solid State Nucl. Track Detect., Proc. Int. Conf., 10th, Meeting Date 1979, 703-11. Edited by: Francois, Henry; Kurosawa, J. P.; Schmitt, R. Pergamon: Oxford, Engl. (Eng) 1980.	RADIOCHEMICAL	CODEN: [illegible].
93(22):[illegible]	Eyrich, W.; Kuechle, M.; Ebeling, H.	A neutron well counter for plutonium assay in 200 L waste barrels.	neutron, well, plutonium, waste, barrels, radioactive, wastes, radiation, analysis	Comm. Eur. Communities, (Rep.) EUR, EUR 6629, Int. Meet. Monit. Pu-contam. Waste Proc., 159-72 (Eng) 1979.	RADIOCHEMICAL	CODEN: CECED9.
93(20):[illegible]	Rosenmayer, Samuel	Solid state detectors for the assay of plutonium, americium and uranium.	solid, detectors, plutonium, americium, uranium, waste, soil, analysis, lithium, drifted, silicon, ray, radiation, hyperpure, germanium, detector	Comm. Eur. Communities, (Rep.) EUR, EUR 6629, Int. Meet. Monit. Pu-contam. Waste Proc., 207-15 (Eng) 1979.	ELECTROCHEMICAL	CODEN: CECED9.
93(20):[illegible]	Bremner, W. B.; Macleod, K. C.	An integrated solid waste measurement system for plutonium fuel reprocessing at Dounreay Nuclear Power Development Establishment.	integrated, solid, waste, plutonium, fuel, nuclear, radiation, detectors, radioactive, reactor, wastes, neutron	Comm. Eur. Communities, (Rep.) EUR, EUR 6629, Int. Meet. Monit. Pu-contam. Waste Proc., 29-40 (E 1979.	RADIOCHEMICAL	CODEN: CECED9.
93(20):[illegible]	Ware, A. S.	Analytical techniques used in the monitoring of radioactive discharges from the CEGB Nuclear Power Stations.	analytical, radioactive, nuclear, wate, plants, analysis, elements, plant	Pergamon Ser. Environ. Sci., 3(Anal. Tech. Environ. Chem.), 427-35 (Eng) 1980.	SPECTROMETRY	CODEN: PSESDJ.
93(18):[illegible]	Stephens, R.	A wavelength specific photoelectric detector.	wavelength, photoelectric, detector, resonance, radiation, photovoltaic, ionization, photo, spectrochemical, analysis, light, detectors, detection	Can. J. Chem., 58(16), 1621-6 (Eng) 1980.	SPECTROMETRY	CODEN: CJCHAG ISSN: 0008-4042.
93(16):[illegible]	Kumagai, Tetsu; Hatsuda, Masakazu; Shigematsu, Tsunenobu	Forced-flow chromatography of alkaline earths using spectrofluorometric detector.	flow, chromatography, alkaline, earths, spectrofluorometric, detector, liquid, fluorometric, detection, earth, metals, fluorescence, spectra, calcein, spectrum, analysis	Bull. Inst. Chem. Res., Kyoto Univ., 58(3), 249-74 (Eng) 1980.	CHROMATOGRAPHY	CODEN: [illegible] ISSN: 0023-6071.
93(14):[illegible]	Seymour, F. G.; Gwilliam, G. F.; Hawthorn, I.	Nuclear electronic instrument systems using the Harwell 6000 series.	nuclear, electronic, harwell, energy, coal, ash, sulfur, spectrometer, apparatus, automatic, radioactive, radiochemical, analysis, cyclotrons, beam, oxygen, radioactivity, ashes, residues, spectrometers, radiation, environmental, air, gamma, ray, wastes, plutonium, chimneys, gas, waste, sea, chemical, detectors, alpha, particle	U. K. At. Energy Res. Estab., Rep., AERE-R 9669, 50 pp. (Eng) 1980.	RADIOCHEMICAL	CODEN: UKARAL. ISSN: 0081-9734.
93(14):[illegible]	Brodzinski, R. L.; Nielson, H. L.	A well logging technique for the in situ determination of strontium-90.	well, logging, strontium, radioactive, wastes, burial, wells, soil, analysis, waste, bremsstrahlung, radiation, sediment	Nucl. Instrum. Methods, 173(2), 299-301 (Eng) 1980.	RADIOCHEMICAL	CODEN: NUIMAL ISSN: 0029-554X
93(11):[illegible]	Wood, Malcolm B.	An application of gas chromatography to measure concentrations of ethane, propane, and ethylene found in interstitial soil gases.	gas, chromatography, ethane, propane, ethylene, soil, gases, wood, oil, analysis	J. Chromatogr. Sci., 18(7), 307-10 (Eng) 1980.	CHROMATOGRAPHY	CODEN: JCHSBZ ISSN: 0021-9665.

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93(13):112847h	Chepina, B. O.; Dubinina, E. I.; Golovin, V. A.; Materova, E. A.; Grekovich, A. A.	Experience to determine nitrate(1-) content in soils using a nitrate-selective electrode.	experience, nitrate, soils, electrode, soil, analysis	Agrokhimiya (5), 134-7 (Russ) 1980.	ELECTROCHEMICAL	CODEN: AKKYAU ISSN 0002-1881.
93(11):113392z	Quinche, J. P.; Dvorak, T.	Determination of nitrates in vegetables, condimental plants and soils by ionometry and gas-liquid chromatography.	nitrates, vegetables, plants, soils, ionometry, gas, liquid, chromatography, corn, legume, vegetable, salad, soil, analysis, plant, lepidium, sativum, anthriscus, cerefolium, nitrate, potentiometry, herbs, potentiometric	Rev. Suisse Vitic., Arboric., Hortic., 12(1), 7-20 (Fr) 1980	CHROMATOGRAPHY	CODEN: RVAHAN ISSN 0375-1430.
93(16):165364w	Chrapan, J.; Sitar, B.; Florek, M.; Gravan, J.; Holy, K.; Benovic, D.	Detectors for measuring the concentration of some radioisotopes in the environment.	detectors, radioisotopes, environment, radioelements, analysis, environmental, radiation, radioelement, detection, nuclear, spectrometers, gamma, ray	Acta Fac. Rerum Nat. Univ. Comenianae, Form. Prot. Nat., 5, 15-23 (Slo) 1979	RADIOCHEMICAL	CODEN: AFRNGO ISSN: 0139-6625
93(5):44193r	Dupuis, M. D.; Hill, H. H., Jr.	Survey of selected hydrides as doping agents for a hydrogen-atmosphere flame-ionization detector.	survey, hydrides, doping, agents, hydrogen, atmosphere, flame, ionization, detector, agent, detectors, gas, organometallic, hydride, chromatography, fuel, selectivity, gases, analysis	J. Chromatogr., 195(2), 211-20 (Eng) 1980.	CHROMATOGRAPHY	CODEN: JOCRAM, ISSN 0021-9673
93(4):37790h	Haraguchi, Hiroki; Takahashi, Junichi; Tanabe, Kiyoshi; Akai, Yasuo; Wasa, Atsushi; Fuwa, Keiichiro	A conventional system for non-dispersive vacuum-ultraviolet atomic absorption spectrometry of mercury.	dispersive, vacuum, atomic, absorption, spectrometry, mercury, photoelectric, potassium, bromide, coated, spectrometers, photocell, nondispersive, analysis, detector, photocells, detectors, spectrometer	Bunseki Kagaku, 29(6), 349-9 (Japan) 1980.	SPECTROMETRY	CODEN: BNSKAK, ISSN: 0525-1931.
93(8):75053a	Burkhoff, U.	Monitoring of plutonium-contaminated solid waste streams. V. Active neutron assay.	plutonium, solid, waste, streams, neutron, radioactive, assay	Comm. Eur. Communities, (Rep.) EUR, EUR 6555, 57 pp. (Eng) 1979.	RADIOCHEMICAL	CODEN: CECED9.
93(6):53400t	[illegible], Lothar; Hochmueller, Kurt; Spangler, Karl	Microcoulometric determination of chlorinated organic compounds in Rhine water.	microcoulometric, chlorinated, organic, rhine, water, chromatography, gas, detectors, halogenated, hydrocarbon, hydrocarbons, analysis, river, detector, halogenated	Vom Wasser, 53, 27-51 (Ger) 1979.	ELECTROCHEMICAL	CODEN: VOWAAU. ISSN: 0083-6915
93(6):52660k	[illegible], I. W.; [illegible], H. O.; Pohl, E. H.	Measurement of trace radionuclides in soil by L x-ray spectrometry.	radionuclides, soil, ray, spectrometry, radioelements, analysis, radionuclide, scintillators, thallium, activated, sodium, iodide, radiation, detectors, semiconducting, lithium, drifted, silicon, spectrometers, rocky, flats, waste, soils	IEEE Trans. Nucl. Sci., NS27(1), 685-703 (Eng) 1980.	SPECTROMETRY	CODEN: IETNAE ISSN: 0018-9499
93(4):36330a	Rathe, M. K.; Lenk, W.	Determination of trace elements in sedimentation dust and soil samples by using energy-dispersive x-ray fluorescence analysis.	elements, sedimentation, soil, energy, dispersive, ray, fluorescence, analysis, element, spectrometry	ZfI-Mitt., 22, Suppl., 146-8 (Ger) 1979.	RADIOCHEMICAL	CODEN: ZIMIDC. ISSN: 0323-8776.
93(4):36294m	Gifford, T. R.; Bruckenstein, Stanley	Separation and determination of volatile hydrides by gas chromatography with a gold gas-porous electrode detector.	volatile, hydrides, gas, chromatography, gold, porous, electrode, detector, detectors, electrochem, electrodes, analysis, hydride	Anal. Chem., 52(7), 1028-31 (Eng) 1980.	CHROMATOGRAPHY	CODEN: ANCHAM. ISSN 0003-2700.
93(4):31324h	Crane, T. W.	Measurement of plutonium contamination at the 10-nCi/g level in 55 gallon barrels of solid waste with a californium-252 assay system.	plutonium, gallon, barrels, solid, waste, californium, energy, radioactive, nuclear, neutron, activation, analysis	Report, LA-UR-79-2419, CONF-790928-1, 19 pp. Avail. NTIS From: Energy Res. Abstr. 1979, 4(20), Abstr. No. 56151 (Eng) 1979.	RADIOCHEMICAL	
93(2):18617m	Hancock, James R.; Flinn, Christopher G.; Aue, Walter A.	Means of distinguishing selenium peaks from sulfur peaks in gas chromatography with a flame photometric detector.	distinguishing, selenium, sulfur, gas, chromatography, flame, photometric, detector, detection, analysis	Anal. Chim. Acta, 116(1), 195-8 (Eng) 1980.	CHROMATOGRAPHY	CODEN: ACACAM ISSN 0003-2670.

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93(2):10659m	Hoeck, Walter	Ion-selective combination electrode for nitrate determination.	ion, electrode, nitrate, nitrates, analysis, water, soil, electrodes	Chem. Tech. (Leipzig), 32(2), 91-2 (Ger) 1980.	ELECTROCHEMICAL	CODEN: CHTEAA ISSN: 0045-6519
93(2):17075n	Gutierrez, Manuel	Capacitance probe sensor device.	capacitance, sensor, soil, moisture, electric	U. S. Pat. Appl. US 48484 30 Mar 1980, 15 pp. Avail. NTIS. (Eng).	ELECTROCHEMICAL	CODEN: XAXXAV APPLICATION: US 79-48484 14 Jun 1979
92(26):226910e	Furuta, Naoki; McLeod, C. W.; Haraguchi, Hiroki; Fuwa, Keiichiro	Evaluation of a silicon-intensified target image detector for inductively coupled plasma emission spectrometer.	silicon, detector, inductively, plasma, emission, spectrometer, alkaline, earth, metals, alkali, analysis, spectrometry, detection, spectrometers, spectrochemical, cameras, television	Appl. Spectrosc., 34(2), 211-16 (Eng) 1980.	SPECTROMETRY	CODEN: APSPA4 ISSN: 0003-7028.
92(24):208522d	Stevens, R. K.; Phillips, M. P.; Berkley, R. E.; Wimmer, M. A.; Bollinger, M. J.; Waite, R. E.; Fehsenfeld, F. C.	Selective electron-capture sensitization.	electron, sensitization, detection, gas, nitrous, oxide, alkanes, analysis, hydrocarbons, sensitized, detector, air, respiratory, hydrogen, methane, chromatography, detectors, gases, human, breath	J. Chromatogr., 186, 3-14 (Eng) 1979	CHROMATOGRAPHY	CODEN: JOCRAM ISSN: 0021-9673
92(24):205596v	Hogman, N. A.; Brodzinski, R. L.; Brown, D. P.	Evaluation of a phoswich detector for the in situ analysis of strontium-90	phoswich, detector, analysis, strontium, sand, wood, glass, fibers, absorber, sediments, radioactive, wastes, radiation, transuranium, elements, detectors, beta, particle, calcium, sulfate, nickel	IEEE Trans. Nucl. Sci., NS27(1), 733-41 (Eng) 1980.	RADIOCHEMICAL	CODEN: IETNAE. ISSN 0018-9499.
92(22):190663g	Stern, A.	An investigation of nuclear reactions useful for the detection of beryllium.	nuclear, detection, beryllium, environment, analysis, environmental	Report, LUTFD2/TFKF-3002/1-59(1977), 59 pp. Avail. INIS From: INIS Atomindex 1979, 10(20), Abstr. No. 493453 (Swed) 1977.	RADIOCHEMICAL	
92(20):173602y	Della Site, A.; Marchionni, V.; Santori, G.	A sensitive method for determining plutonium in environmental samples.	sensitive, plutonium, environmental, environment, alpha, ray, spectrometry, food, analysis, soil, microorganism, geological, sediments, marine	Com. Naz. Energ. Nucl., [Rapp. Tec.] RT/PROT (Italy), RT/PROT(79)2, 40 pp (Ital) 1979.	RADIOCHEMICAL	CODEN: XCNPBW.
92(20):173192t	Oka, Yoshiaki; An, Shigehiro; [illegible], Shigeru	Neutron and gamma-ray penetrations in thick iron.	neutron, gamma, ray, penetrations, iron, penetration, shields, nuclear, reactors, shielding, shield, detectors, rates, sandwich, resonance, foils, spectrum, thermoluminescent, detector, rate	Nucl. Sci. Eng., 73(3), 259-73 (Eng) 1980	SPECTROMETRY	CODEN: NSENAO, ISSN: 0029-5639
92(20):168279w	Stuart, T. P.	Limiting values for radionuclide concentration in the soil from remote spectrometer measurements.	radionuclide, soil, spectrometer, ray, energy, radioelements, analysis, gamma, rays, air, ray, radioelement	Report, EGG-1183-1718, 38 pp. Avail. NTIS From: Energy Res. Abstr. 1979, 4(21), Abstr. No. 53151 (Eng) 1977.	RADIOCHEMICAL	
92(18):148943d	Corfman, L. G.; Johnson, R. J.	Modification of ion chromatograph for analyses of radioactive samples.	ion, chromatograph, analyses, radioactive, Hanford, energy, wastes, chromatography, liquid, ions	Report, RHO-SA-110, CONF-790866-6, 13 pp. Avail. NTIS From: Energy Res. Abstr. 1979, 4(23), Abstr. No. 54318 (Eng) 1979	CHROMATOGRAPHY	
92(16):137416g	Holy, K.; Oravec, J.; Seacev, E.	Possibility of rapid determination of uranium concentration in solid samples by using alpha radiation	uranium, solid, alpha, radiation, particle, radioactive, wastes, particles, analysis, chemical	Acta Fac. Rerum Nat. Univ. Comenianae, Phys., 19, 217-25 (Russ) 1979.	RADIOCHEMICAL	CODEN: AFRNAP ISSN: 0524-2355
92(15):127546n	Reichardt, K.; Libardi, P. L.; Meirelles, N. M. F.; Ferreyra H., F. F.; Zagatto, E. A. G.; Matsui, E.	Extraction and analysis of nitrates in soil solutions	extraction, analysis, nitrates, soil, solutions, soils, nitrate	Rev. Bras. Cienc. Solo, 1(2-3), 130-2 (Port) 1977	ELECTROCHEMICAL	CODEN: RBCSDP
92(10):88585a	Hendricks, J. T.; Close, D. A.	Helium-3 detector design for low-level transuranic waste assay.	helium, detector, transuranic, waste, energy, radiation, detectors, radiochemical, analysis, transuranium, wastes, elements, radioactive, embedded, nondestructive, element, polyethylene	Report, LA-UR-78-336, 6 pp. Avail. NTIS From: Energy Res. Abstr. 1979, 4(22), Abstr. No. (Eng) 1978.	RADIOCHEMICAL	

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92(6):51369b	Senkyr, Jaroslav; Petr, Jiri	Nitrate ion selective electrode.	nitrate, ion, electrode, nitrates, analysis, electrodes, soil, plant, dyes, membranes, waste	Chem. Listy, 73(10), 1097-1106 (Czech) 1979.	ELECTROCHEMICAL	CODEN: CHLSAC. ISSN: 0009-2770.
92(6):45160j	Honda, Yoshihide; Kimura, Yuichiro	Use of TLD (thermoluminescent dosimeter) for radiation monitoring of water.	thermoluminescent, dosimeter, radiation, water, radioelements, environmental, dosimeters, radioactivity, calcium, sulfate, lithium, fluoride, radioactivity, radioactive, wastes, wastewaters, analysis, wastewater, magnesium, doped, terbium	Kyoto Daigaku Genshiro Jikkensho, [Tech. Rep.], KURRI-TR-185, 18-25 (Japan) 1978.	RADIOCHEMICAL	CODEN: KDGHDH
92(4):30762e	McLaughlin, J. E	Instrument calibrations for environmental surveillance.	environmental, energy, radiation, detectors, dosimetry, analysis, detection, thorium, germanium, detector, uranium	Natl. Int. Stand. Radiat. Dosim., Proc. Int. Symp., Meeting Date 1977, Volume 1, 473-90. IAEA: Vienna, Aust. (Eng).	RADIOCHEMICAL	CODEN: 42EQAJ.
92(2):10757r	Chiaki, Mariko; Suzuki, Takashi; Okano, Yasuhiro; Inokoshi, Yukio; Moriguchi, Yasuhiko; Yamamoto, Tatsuo	In situ measurements of radioactivities at a megalopolis waste water treatment plant.	radioactivities, megalopolis, waste, water, plant, radioisotopes, radioelements, analysis, wastewater, solid, detector, pulse, analyzer, sludge, radioactivity, detectable, municipal, radioelement	Radioisotopes, 28(6), 374-6 (Japan) 1979.	RADIOCHEMICAL	CODEN: RAISAS. ISSN: 0033-8303.
91(26):221920r	Bityutskaya, L. V.; Volkov, V. F.; Krasnopol'skaya, N. N.; Losev, N. F.; Losev, V. N.; Lysenko, V. L.; Popov, V. N.; Sinitsyn, V. P	Analysis of ecological objects according to the x-ray radiation emitted by accelerated protons.	analysis, ecological, x-ray, radiation, emitted, accelerated, protons, elements, metals, environmental, proton, emission, spectrometry, environment, element, air, exhaust, gases, sea	Zavod. Lab., 45(9), 811-13 (Russ) 1979.	SPECTROMETRY	CODEN: ZVDLAU. ISSN: 0044-1910
91(20):221799y	Furuta, Naoki; McLeod, Cameron W.; Haraguchi, Hiroki; Fuwa, Keiichiro	Use of a programmable monochromator and a SIT detector in flame atomic emission spectrometry.	monochromator, detector, flame, atomic, emission, spectrometry, alkaline, earth, metals, alkali, analysis, detection, spectrometer, silicon, optical, spectrochem, multielement, spectrochemical, spectrometers, computer, monochromators, spectrometric	Bull. Chem. Soc. Jpn., 52(10), 2911-17 (Eng) 1979.	SPECTROMETRY	CODEN: BCSJA8. ISSN: 0009-2673
91(24):201793m	Hashimoto, T.; Taniguchi, K.; Sugiyama, H.; Sotobayashi, T.	Simultaneous determination of uranium and plutonium isotopes in soils by means of single alpha-spectrometry.	uranium, plutonium, isotopes, soils, alpha, spectrometry, soil, analysis, isotope	J. Radioanal. Chem., 52(1), 131-42 (Eng) 1979.	SPECTROMETRY	CODEN: JRACBN ISSN: 0022-4081
91(22):179314q	Simeonov, V.; Asenov, I.; Dyadov, V.	Determination of nitrate nitrogen in soil using nitrate ion selective electrodes.	nitrate, nitrogen, soil, ion, electrodes, analysis	God. Sofii. Univ., Khim. Fak., Volume Date 1975-1976, 70, Pt. 1, 11-16 (Bulg) 1976.	ELECTROCHEMICAL	CODEN: GSUKAL. ISSN: 0584-0317
91(21):173917m	Anon.	Determination of trace elements in soil by neutron activation analysis.	elements, soil, neutron, activation, analysis, energy, element, soils	T'u Jang Hsueh Pao, 16(2), 165-71 (Ch) 1979	ELECTROCHEMICAL	CODEN: TJHPAE ISSN: 0564-3929.
91(20):165332b	Venkatesan, P. Prasanna; Gurta, P. P.; Manohar, S. B.; Prakash, Satya; Ramaniah, M. V.	A passive gamma scanner for estimation of plutonium in fabrication waste.	passive, gamma, scanner, plutonium, waste, radioactive, wastes, radiation, ray, isotope, analysis, fuel	India, A. E. C., Bhabha At. Res. Cent. (Rep.), B.A.R.C. 985, 18 pp. (Eng) 1979.	RADIOCHEMICAL	CODEN: IABAAA ISSN: 0367-5587
91(20):165311a	Fernandez, S. J.; Pierce, G. D.; Hetzer, D. C.; Motes, B. G.	Methods evaluation for the continuous monitoring of carbon-14, krypton-85, and iodine-129 in nuclear fuel reprocessing and waste solidification facility off-gas.	carbon, krypton, iodine, nuclear, fuel, waste, solidification, gas, energy, radioactive, wastes, reactor, gases, analysis	Report, ICP-1187, 36 pp. Avail. NTIS From: Energy Res. Abstr. 1979, 4(13), Abstr. No. 35069 (Eng) 1979.	RADIOCHEMICAL	
91(18):146190m	McDonald, F. M.; Fernandez, S. J.; Motes, B. G.	Evaluation of plutonium analysis techniques for a continuous alpha monitor.	plutonium, analysis, alpha, energy, radioactive, wastes, nuclear, reactor, fuel, particle, radiation, detectors	Report, ICP-1188, 25 pp. Avail. NTIS From: Energy Res. Abstr. 1979, 4(13), Abstr. No. 35070 (Eng) 1979.	RADIOCHEMICAL	

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91(14):148184m	Eyrich, W.; Kaschle, H.; Shafiee, M.	A neutron well counter for plutonium assay in 200-L waste drums.	neutron, well, plutonium, waste, radioactive, wastes, radiation, analysis	Kernforschungszent. Karlsruhe, (Ber.) KFK, KFK 2790, 30 pp. (Eng) 1979.	RADIOCHEMICAL	CODEN: KFKRAY. ISSN: 0303-4003
91(15):122634j	Nowosielski, Olgierd; Szwonek, E.	Use of an ion-selective electrode for determining nitrates.	ion, electrode, nitrates, soil, analysis, plant, nitrate, plants, soils	Pr. Kom. Nauk. (Pol. Tow. Gleboz.), 2(?), Mater. Semin. "Zastosow. Elektrod Sel. Jonow Glebo"), 3-9 (Pol) 1977.	ELECTROCHEMICAL	CODEN: PKNRDX
91(8):61775m	Winkelmann, I.	Monitoring methods for radioactive noble gases in airborne effluents from nuclear power plants.	radioactive, noble, gases, airborne, nuclear, plants, helium, analysis, wastes, gaseous, waste, gas	Ref. Ser.-I. A. E. A., 46, 29-36 (Eng) 1979.	RADIOCHEMICAL	CODEN: RANEAW ISSN: 0074-1892
91(7):55255a	Maj-Zurawska, Magdalena; Hulanicki, Adam	Determination of nitrates in soil with ion-selective electrodes produced in Poland.	nitrates, soil, ion, electrodes, analysis, nitrate, soils	Pr. Kom. Nauk. (Pol. Tow. Gleboz.), 2(?), Mater. Semin. "Zastosow. Elektrod Sel. Jonow Glebo"), 17-22 (Pol) 1977.	ELECTROCHEMICAL	CODEN: PKNRDX
91(4):27433w	Brenner, D.; Ohls, K.	Inductively coupled plasma flame emission spectrometry as a detector for elemental analysis after gas-chromatographic separation.	inductively, plasma, flame, emission, spectrometry, detector, elemental, analysis, gas, chromatographic, chromatography, gasoline, spectrochemical	Fresenius' Z. Anal. Chem., 295(5), 337-41 (Ger) 1979.	CHROMATOGRAPHY	CODEN: ZACFAU. ISSN: 0016-1152.
91(4):32613g	Kamamoto, Takashi; Matsunaga, Kazuyoshi; Ishida, Tatsuo	Environmental survey of chemicals. Part 5. Determination of nitrobenzene.	environmental, survey, chemicals, nitrobenzene, health, environment, gas, fish, geological, sediments, aquatic, analysis	Okayama-ken Kankyo Hoken Senta Nempo, 3, 144-9 (Japan) 1979.	CHROMATOGRAPHY	CODEN: OKNHDY.
91(2):13988p	Kolesov, G. M.; Surkov, Yu. A.	Neutron-activation determination of uranium and thorium content with respect to neptunium-239 and protactinium-233 in lunar soil.	neutron, activation, uranium, thorium, neptunium, protactinium, lunar, soil, alkali, metals, analysis, rare, earth, anion, exchange, moon, ion, regolith, radiochemical, soils	Radiokhimiya, 21(1), 130-47 (Russ) 1979	RADIOCHEMICAL	CODEN: RADKAU ISSN: 0033-8311
90(26):214746e	Miller, Dennis A.; Grimsrud, Eric P.	Correlation of electron capture response enhancements caused by oxygen with chemical structure for chlorinated hydrocarbons.	electron, oxygen, chemical, chlorinated, hydrocarbons, kinetics, superoxide, alkanes, analysis, alkenes, gas, detector, chromatography, detectors, dopant, halogenated	Anal. Chem., 51(7), 851-9 (Eng) 1979.	RADIOCHEMICAL	CODEN: ANCHAM ISSN: 0003-2700
90(26):214663v	Girard, James E.	Ion chromatography with coulometric detection for the determination of inorganic ions.	ion, chromatography, coulometric, detection, inorganic, ions, bromides, analysis, cyanides, nitrates, sulfates, chlorides, fluorides, exchange, detector, metals, liquid, detectors	Anal. Chem., 51(7), 836-9 (Eng) 1979.	CHROMATOGRAPHY	CODEN: ANCHAM ISSN: 0003-2700
90(25):198712m	Hall, Randall C.; Harris, Donald E.	Direct gas chromatographic determination of carbamate pesticides using Carbowax 20M-modified supports and the electrolytic conductivity detector.	gas, chromatographic, carbamate, pesticides, carbowax, electrolytic, conductivity, detector, health, siloxanes, silicones, soil, analysis, pesticide, residues, chromatography, spectroscopy, carbamates, ionization, spectra, bond	J. Chromatogr., 169, 245-59 (Eng) 1979.	CHROMATOGRAPHY	CODEN: JOCRAM ISSN: 0021-9673
90(22):176857g	Artemenkova, L. V.; Bachurin, A. V.; Kamyshchenko, V. D.; Kovalenko, V. V.; Sakseev, Sotnikov, M. D.	Equipment for monitoring gaseous and liquid radioactive waste.	gaseous, liquid, radioactive, waste, radiation, detectors, wastes, apparatus, fission, nuclear, reactors, plants	Monit. Radioact. Effluents Nucl. Facil., Proc. Int. Symp., Meeting Date 1977, 163-72. IAEA: Vienna, Austria. (Russ) 1978.	RADIOCHEMICAL	CODEN: 40HGAY.
90(20):161762e	Freudenthal, J.	The detection and identification of unknown halogenated compounds in environmental samples.	detection, halogenated, environmental, health, halogen, gas, spectroscopy, environment, adipose, tissue, chromatography, analysis, river, water	Int. J. Environ. Anal. Chem., 5(4), 311-21 (Eng) 1978.	CHROMATOGRAPHY	CODEN: IJEAA3. ISSN: 0306-7319
90(16):127067r	Crane, T. W.; Cowder, L. R.; Jones, D. F.; Martin, E. R.	Assay of fission product contaminated combustible waste at the 10 nCi/g (fiducial).	fission, combustible, waste, fiducial, transuranium, elements, combustible, radioactive, wastes, germanium, detector, element, analysis, radiation, detectors	Nucl. Mater. Manage., 6(3), 444-50 (Eng) 1977.	RADIOCHEMICAL	CODEN: NCMMBO. ISSN: 0362-0034

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90(13):94051e	Wogman, N. A.; Brodzinski, R. L.; Brown, D. P.	An instrument for monitoring the transuranic content of chopped leached hulls from spent nuclear fuel elements.	transuranic, leached, hulls, nuclear, fuel, elements, transuranium, radioactive, wastes, element, reactor, leach	NBS Spec. Publ. (U. S.), 528, 244-8 (Eng) 1978.	RADIOCHEMICAL	CODEN: XNBSAV. ISSN: 0083-1883.
90(12):91409q	Badyvanyuk, A. M.; Polikarpov, V. I.; Fedulkin, I. G.; Tomanov, E. A.; Batunin, I. V.; Ababin, V. E.	Unification and fabrication of devices for preparation of samples and sensors for gaseous waste monitoring systems according to short-lived inert gases.	preparation, sensors, gaseous, waste, lived, inert, gases, radioactive, wastes	Tr. Soyuz. NII Priborostr. (34), 114-24 From: Ref. Zh., [illegible], 1978. Abstr. No. 11D143 (Russ) 1978.	RADIOCHEMICAL	
90(12):91500a	Gunnink, R. C.; Kirby, J. A.	Applications of in situ gamma-ray spectrometry.	gamma, ray, spectrometry, [illegible], energy, radioelements, analysis, soil, nuclear, radioelement, emissions	Report, UCRL-80912, CONF-780542-1, 42 pp. Avail. NTIS From: Energy Res. Abstr. 3(21), Abstr. No. 51041 (Eng) 1978.	SPECTROMETRY	
90(8):63097v	Nielson, K. K.; Brodzinski, R. L.; Wogman, N. A.	In-situ transuranium element measurement technique for wastes associated with power reactor fuels.	transuranium, element, wastes, reactor, fuels, nuclear, fuel, gamma, ray, spectrometric, detection, plutonium, americium, elements, building, germanium, detector, health, physics, buildings, radioactive, spectrometry, radiation, detectors, transuranium, analysis	NBS Spec. Publ. (U. S.), 528, 281-6 (Eng) 1978	RADIOCHEMICAL	CODEN: XNBSAV. ISSN: 0083-1883.
90(4):33554v	Krahenbuehl, U.; Wegmueller, F.	Determination of volatile trace elements in terrestrial minerals and lunar soils by RNAA.	volatile, elements, terrestrial, minerals, lunar, soils, moon, element, neutron, activation, soil, analysis, radiochemical	Radiochem. Radioanal. Lett., 36(1), 31-9 (Eng) 1978.	RADIOCHEMICAL	CODEN: RRALAZ. ISSN: 0079-9483.
90(2):11482c	Mitchell, John, Jr.; Devereux, Harold D.	Determination of traces of organic compounds in the atmosphere: role of detectors in gas chromatography.	organic, atmosphere, detectors, gas, chromatography, analysis, air	Anal. Chim. Acta, 100, 45-52 (Eng) 1978.	CHROMATOGRAPHY	CODEN: ACACAM. ISSN: 0003-2670.
89(26):228497e	Quimby, Bruce D.; Uden, Peter C.; Barnes, Ramon M.	Atmospheric pressure helium microwave detection system for gas chromatography.	atmospheric, helium, microwave, detection, gas, chromatography, halogens, emission, detector, detectors, spectrometric, analysis	Anal. Chem., 50(14), 2112-18 (Eng) 1978	CHROMATOGRAPHY	CODEN: ANCHAM. ISSN: 0003-2700.
89(25):214895n	Kralova, Marie; Drazdak, Karel; Grznsky, Petr; Kubat, Jaromir	Evaluation of methods for determining nitrates and nitrites in soil extracts.	nitrates, nitrites, soil, analysis, nitrate, glucose	Sci. Agric. Bohemoslov., 3(10), 199-60 (Eng) 1978	GENERAL	CODEN: SABHAE. ISSN: 0582-2343
89(22):198539c	Schwarz, Frederick P.; Braun, Walter; Wasik, Stanley P.	Oscillating slit mechanism for the determination of hydrogen isotope ratios in a microwave induced plasma.	oscillating, hydrogen, isotope, ratios, microwave, plasma, hydrocarbons, analysis, ratio, gas, chromatography, detectors, hydrocarbon, deuterium	Anal. Chem., 50(13), 1903-5 (Eng) 1978.	CHROMATOGRAPHY	CODEN: ANCHAM. ISSN: 0003-2700.
89(21):174565w	Valente, I.; Minski, M. J.; Bowen, H. J. M.	Rapid determination of antimony in biological and environmental samples using instrumental neutron activation analysis.	antimony, biological, environmental, neutron, activation, analysis, reading, environment	J. Radioanal. Chem., 45(2), 417-21 (Eng) 1978	RADIOCHEMICAL	CODEN: JRACBN. ISSN: 0022-4081.
89(19):159218w	Yang, Mei-Tung; Su, Kuo-Hung	Study on the use of lead-ion selective electrode in determining lead contents in polluted soils.	ion, electrode, polluted, soils, soil, analysis	Huan Ching K'o Hsueh (2), 42-5, 38 (Ch) 1978	ELECTROCHEMICAL	CODEN: HCKHDV
89(14):120331h	West, L.; Umbarger, C. J.; Dempsey, T.	Germanium detector system for the detection of transuranics at low-activity concentrations in soil.	germanium, detector, detection, transuranics, activity, soil, energy, analysis, americium, plutonium, radiation, detectors, planar, transuranic, soils	Report, LA-UR-78-67, 13 pp. Avail. NTIS From: Energy Res. Abstr. 1978, 3(13), Abstr. No. 31014 (Eng) 1978	SPECTROMETRY	
89(8):65020p	Braman, Robert S.	Molecular forms of arsenic in the environment.	molecular, arsenic, environment, toxic, biota, water, analysis, spectroscopy, seawater, emission	Toxic Biota Met. Forms Met. Water, Proc. Workshop, Meeting Date 1975, 269-81. Edited by: Andrew, Robert W.; Hodson, Peter V.; Konasewich, Dennis E. Great Lakes Res. Off., Int. Jt. Comm.: Windsor, Ont. (Eng) 1976.	SPECTROMETRY	CODEN: 38PLAT

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89(6):46967u	Goehler, V ; Huber, L ; Seifried, F	The use of flame photometric detectors in the analysis of sulfur-containing substances	flame, photometric, detectors, analysis, sulfur, chromatography, gas, hydrocarbons, photometer, detector, fuel, gases, waste, photometry, photometers	GIT Fachz. Lab., 21(11), 937-8, 940, 941, 943 (Ger) 1977	CHROMATOGRAPHY	CODEN: GITFA6 ISSN: 0016-3538
89(4):33404g	Fleischer, Robert L	Noise reduction of uranium prospecting apparatus	noise, uranium, apparatus, membranes, diaphragms, porous, silica, radon, radiation, detector, detectors, alpha, particle, membrane, area	Japan. Kokai JP 53023907 4 Mar 1978 Shows, 4 pp. (Japan)	RADIOCHEMICAL	CODEN: JKXXAF CLASS: IC G01V005 00 PRIORITY: US 76-15325 16 Aug 1976
89(4):30491r	Braman, Robert S ; Tompkins, Michael A	Atomic emission spectrometric determination of antimony, germanium, and methylgermanium compounds in the environment	atomic, emission, spectrometric, antimony, germanium, methylgermanium, environment, particles, airborne, spectrometry, analysis	Anal. Chem., 50(8), 1088-93 (Eng) 1978	SPECTROMETRY	CODEN: ANCHAM ISSN: 0003-2700
89(2):14251q	Gough, T A ; Pringuer, M A ; Woollam, C J	Response of a hydrogen-rich flame ionisation detector to some chlorinated hydrocarbons	hydrogen, flame, ionization, detector, chlorinated, hydrocarbons, alkanes, analysis, gas, chromatography, detectors, gases	J. Chromatogr., 150(2), 533-6 (Eng) 1978	CHROMATOGRAPHY	CODEN: JOCRAM ISSN: 0021-9673
88(26):197326m	Holm, E ; Fukai, R	Method for multi-element alpha-spectrometry of actinides and its application to environmental radioactivity studies	element, alpha, spectrometry, actinides, environmental, radioactivity, monaco, radioactive, wastes, seawater, marine, sediments, ion, exchange, spectrometric, seaweed, radiochemical, analysis, geological, sea, thorium, uranium	Talanta, 24(11), 659-64 (Eng) 1977	SPECTROMETRY	CODEN: TLNTA2 ISSN: 0039-9140
88(23):168851g	Strauss, M G ; Sherman, I S ; Swanson, E J ; Pehl, R H	Considerations in measuring trace radionuclides in soil samples by L x-ray detection	radionuclides, soil, ray, detection, radioelements, analysis, soils, radioelement	IEEE Trans. Nucl. Sci., NS25(1), 740-56 (Eng) 1978	RADIOCHEMICAL	CODEN: IETNAE ISSN: 0018-9499
88(20):141036k	Sakai, Eiji ; Yoshida, Hiroshi ; Terada, Hiromi ; Katagiri, Masaki	In-situ environmental gamma-ray spectrometry using an upward-looking dip-stick type lithium-drifted germanium detector	environmental, gamma, ray, spectrometry, stick, lithium, drifted, germanium, detector, radioelements, analysis, soil, radioelement	IEEE Trans. Nucl. Sci., NS25(1), 404-8 (Eng) 1978	SPECTROMETRY	CODEN: IETNAE ISSN: 0018-9499
88(19):136321t	Hansen, E H ; Ghose, Animesh K ; Ruzicka, J	Flow injection analysis of environmental samples for nitrate using an ion-selective electrode	flow, injection, analysis, environmental, nitrate, ion, electrode, wastewater, air, soil, fertilizer	Analyst (London), 102(1219), 705-13 (Eng) 1977	ELECTROCHEMICAL	CODEN: ANALAO ISSN: 0003-2654
88(10):66580a	Gosink, Thomas A ; Reynolds, Debra J	Selenium analysis of the marine environment, gas chromatography and some results	selenium, analysis, marine, environment, gas, chromatography, plant, aquatic, animal, tissue, sensitivity	Mar. Sci. Commun., 1(2), 101-14 (Eng) 1975	CHROMATOGRAPHY	CODEN: MSCODO
88(6):39341q	Levins, Desmond M ; Glass, Ronald W ; Chilton, Marion W ; Inman, Daniel J ; Watkin, David C	Beta-scintillation monitor for krypton-85 at high pressures	beta, scintillation, krypton, dioxe, oak, ridge, nuclear, reactor, fuel, corrosive, gas, streams, detector, radioactive, wastes, radiation, detectors, analysis, detection, europium, doped	Nucl. Instrum. Methods, 144(3), 517-25 (Eng) 1977	RADIOCHEMICAL	CODEN: NUIMAL
88(4):26987u	Braman, Robert S	Applications of arsine evolution methods to environmental analyses	arsine, evolution, environmental, analyses, health, air, analysis, arsenic, water	Environ. Health Perspect., 19, 1-4 (Eng) 1977	RADIOCHEMICAL	CODEN: EVHPAZ
88(3):18537g	Rossbach, M ; Bruetter, P	Improvement of detection sensitivity in instrumental neutron activation analysis: anti-Compton spectrometry with a central well-type lithium-drifted germanium detector	detection, sensitivity, neutron, activation, analysis, spectrometry, well, lithium, drifted, germanium, detector, elements, spectrometer, blood, radiation, detectors, gamma, ray, radiochemical	Fresenius' Z. Anal. Chem., 288(1), 336-42 (Ger) 1977	RADIOCHEMICAL	CODEN: ZACFAU

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87(17):132831e	Bound, Geoffrey P.	Determination of nitrate in soil pastes by ion selective electrodes.	nitrate, soil, pastes, ion, electrodes, food, analysis, electrode	J. Sci. Food Agric., 28(6), 581-5 (Eng) 1977.	ELECTROCHEMICAL	CODEN: JSFAAE.
87(16):123595n	Ayyrev, M. N.; Maheswaran, P.; Nagy, K.; Cook, P.	Neutron activation techniques in the detection and measurement of environmental pollutants.	neutron, activation, detection, environmental, pollutants, radioelements, analysis, lived, aerosols, isotopes, radiochemical, [illegible]	Meas., Detect. Control Environ. Pollut., Proc. Int. Symp., 171-84. IAEA: Vienna, Austria. (Eng) 1976.	RADIOCHEMICAL	CODEN: 35PIAA.
87(14):104441m	Chiba, Haruo; Suzuki, Takashi; Noriguchi, Yasuhiro; Iwahashi, Yukio; Okuma, Yoi Tomimoto, Tatsuo	Determination of radionuclides in metropolitan waste waters.	radionuclides, metropolitan, waste, waters, radioisotopes, radioelements, analysis, wastewater, sludge, radioelement	Radioisotopes, 26(4), 252-4 (Japan) 1977.	RADIOCHEMICAL	CODEN: RAISAQ.
87(12):103179g	McDonald, B. J.; Fox, G. H.; Brunner, H. G.	Non-destructive measurement of plutonium and uranium in process wastes and residues.	plutonium, uranium, wastes, residues, fuels, radioactive, nondestructive, analysis	Safeguarding Nucl. Mater., Proc. Symp., Meeting Date 1975, Volume 2, 569-97. IAEA: Vienna, Austria. (Eng) 1976.	RADIOCHEMICAL	CODEN: 35KUAI.
87(11):83560m	Sykina, G. M.; Bystritskaya, T. L.; Makarova, N. A.; Grabovich, A. L.	Experiment in the use of ion-selective electrodes for laboratory and field studies of soils.	experiment, ion, electrodes, soils, electrolytes, waters, soil, analysis, activity, electrode	Deposited Doc., VINITI 2364-75, 34 pp. Avail. BLLD (Russ) 1975.	ELECTROCHEMICAL	
87(11):80501y	Brewer, F. P.; Kelley, J. M.; Nolan, R. W.; Fager, J. E.	Measurement of environmental americium-241 and the plutonium/americium-241 ratio by photon spectrometry.	environmental, americium, plutonium, ratio, photon, spectrometry, energy, analysis, spectrometric	Report, BNWL-SA-5781, 37 pp. Avail. NTIS From: ERDA Energy Res. Abstr. 1977, 2(11), Abstr. No. 27137 (Eng) 1976.	SPECTROMETRY	
87(10):72882h	Iyer, R. K.; Ottmer, H.	Assay of plutonium in process wastes from fuel fabrication plants.	plutonium, wastes, fuel, plants, radioactive, gamma, spectrometry, analysis	Report, KFK-2521, 24 pp. Avail. INIS From: INIS Atomindex 1977, 8(7), Abstr. No. 300811 (Eng) 1976.	SPECTROMETRY	
87(8):58785j	Guam, W.; Rouk, J.; Mohr, R.	Low background germanium(lithium) detector with anticoincidence NaI annulus.	germanium, lithium, detector, anticoincidence, annulus, app, energy, radioactivity, environmental, soil, vegetation, analysis, plant, gamma, ray, health, physics, soils, radiation, detectors	Report, EGG-1183-2326(Rev.), 37 pp. Avail. NTIS From: ERDA Energy Res. Abstr. 1977, 2(9), Abstr. No. 22197 (Eng) 1976.	RADIOCHEMICAL	
87(3):21235a	Jackson, Osmy R.; Benedetti, Ernest L.	Cadmium ion activity in soils: evaluation of cadmium ion-selective electrode.	cadmium, ion, activity, soils, electrode, ooh, ridge, soil, analysis, electrochem	Environ. Sci. Technol., 11(6), 593-7 (Eng) 1977.	ELECTROCHEMICAL	CODEN: ESTHAG.
86(25):188357j	Rajkai, Zoltan	Determination of ammonium and nitrate ions by ion-selective membrane electrodes.	ammonium, nitrate, ions, ion, membrane, electrodes, soil, macroorganisms, analysis, plant, potentiometric, membrane	Agrokem. Talajtan, 25(3-4), 415-30 (Hung) 1976.	ELECTROCHEMICAL	CODEN: AKTLAU.
86(24):176716g	Kirby, John A.; Anspaugh, Lynn R.; Phelps, Paul L.; Huckabay, George W.; Markwell, Frank; Barnes, M.	A comparison of in situ gamma soil analysis and soil sampling data for mapping americium-241 and plutonium-239 soil concentrations at the Nevada test site.	gamma, soil, analysis, mapping, americium, plutonium, [illegible], pollution, plutonium	IEEE Trans. Nucl. Sci., NS23(1), 587-90 (Eng) 1977.	RADIOCHEMICAL	CODEN: IETNAE
86(23):169746r	Goodman, D.	Automatic apparatus for the determination of pH and nitrate in soils.	automatic, apparatus, nitrate, soils, soil, acidity, analysis	Analyst (London), 101(1209), 943-8 (Eng) 1976.	ELECTROCHEMICAL	CODEN: ANALAO
86(20):145162w	Aurand, K.	Emission recorder-a valuable instrument for environmental protection measures-illustrated using the γ radioactive wastewaters from nuclear power plants	emission, environmental, protection, radioactive, wastewaters, nuclear, plants, radioactivity, wastewater, gamma, ray, emitters, wastes, analysis, waste	Gesund.-Ing., 97(10), 218-30 (Ger) 1976.	RADIOCHEMICAL	CODEN: GETHAS.
86(20):144087s	Gordbagh, H.; Salman, L.	Neutron activation analysis of airborne inorganic pollutants.	neutron, activation, analysis, airborne, inorganic, pollutants, radioactive, wastes, air, reactor, nonradioactive	Report, [illegible]-75-3, 17 pp. Avail. INIS From: INIS Atomindex 1976, 7(5), Abstr. No. 239507 (Eng) 1975.	RADIOCHEMICAL	
86(18):126223u	Wooten, G. W.	Microwave-induced emission spectroscopy: a new analytical tool for ultratrace element determination of index clinical and environmental interest.	microwave, emission, spectroscopy, analytical, element, environmental, blood, analysis, cadmium, oyster, elements, environment, spectrochemical, scope	Edgewood Arsenal Spec. Publ. (U. S. Dep. Army), ED-SP-76001, Proc. Annu. Symp. "Trace Anal. Detect. Environ.", 6th, 1975, 269-81 (Eng) 1976.	SPECTROMETRY	CODEN: EASPDE.

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86(16):116530w	Paperiello, C. J.	Internal gas-proportional beta-spectrometry for measurement of radioactive noble gases in reactor effluents.	gas, proportional, beta, spectrometry, radioactive, noble, gases, reactor, health, wastes, nuclear, analysis	Noble Gases, (Symp.), Issue CONF-730915, 339-48. Edited by: Stanley, Richard E.; Moghissi, A. Alan. U. S. Environ. Prot. Agency: Las Vegas, Nev. (Eng) 1973.	SPECTROMETRY	CODEN: 34CWAQ.
86(14):95437a	East, L. V.; Cutti, R.; Wawrowski, B.	Automated gamma ray scanning system for waste drum assay.	automated, gamma, ray, scanning, waste, chemical, plutonium, uranium, radioactive, automation, wastes, analysis	Nucl. Mater. Manage., 5(3), 137-40 (Eng) 1976.	RADIOCHEMICAL	CODEN: NUMMDP
86(14):95143t	Nakano, Soukichi; Noshoh, [illegible]; Ueda, Noriaki	The neutron activation analysis of mercury in soil.	neutron, activation, analysis, mercury, soil	Bull. Chem. Soc. Jpn., 49(5), 1437-9 (Eng) 1976.	RADIOCHEMICAL	CODEN: BCSJA8.
86(13):77004a	Nagami, Kazuko; Numero, Tetsuo	Detection of environmental contamination by uranium (3).	detection, environmental, uranium, soil, pollution, spectrochem, analysis	Annu. Rep. Radiat. Cent. Osaka Prefect., 16, 28-34 (Eng) 1975.	RADIOCHEMICAL	CODEN: [illegible]
86(11):65299e	Cuchy, W. L.; Minick, R. G.; May, E. C.	Assays of toxic pollutants by fish blood.	toxic, pollutants, fish, blood, pollutant, biological, pollution	U. S. Environ. Prot. Agency, Off. Res. Dev., [Rep.] EPA, EPA-600/3-76-046, 47 pp. (Eng) 1976	GENERAL	CODEN: EPAROD
86(10):65301e	Haupt, P. H.	Physical phenomena and analytical applications of helium microwave discharges.	phenomena, analytical, helium, microwave, electric, gas, detectors, chromatography, energy, metastable, emission, analysis, detection	Anal. Chim. Acta, 84(1), 129-38 (Eng) 1976.	SPECTROMETRY	CODEN: ACACAM
86(10):58755d	Tanabe, Hiroshi; Morikoshi, Toshinori	Analysis of radionuclides in environmental samples by the gamma-ray spectrometry at Tokai Works, PNC.	analysis, radionuclides, environmental, gamma, ray, spectrometry, radioactive, wastes, fuel, plant, cereal, vegetable, milk, soil, radioelements, radioelement	Tokai Jigyo-sho, Doryoku-ro Kakunenryo Kaihatsu Jigyo-dan, [Rep.], PNCT 831-75-03, 178-85 (Eng) 1975.	SPECTROMETRY	CODEN: TJCRAD.
85(26):197183w	Fernandez, K. H.; Guilbault, G. G.	Detection and measurement of aromatic hydrocarbons in the air by a coated piezoelectric crystal detector.	detection, aromatic, hydrocarbons, air, coated, piezoelectric, crystal, detector, paraffin, film, coatings, chlorocarbonylbis, triphenylphosphin, iridium, analysis, coating, triphenylphosphine	Environ. Lett., 10(3), 237-45 (Eng) 1975.	PIEZOELECTRIC	CODEN: [illegible]
85(22):171344y	Egan, Anthony; Spyrou, Nicholas M.	Detection of lead via lead-207m using cyclic activation and a modified sum-coincidence system.	detection, cyclic, activation, coincidence, radiation, gamma, ray, neutron, environment, radiochemical, analysis, environmental	Anal. Chem., 48(13), 1959-62 (Eng) 1976.	RADIOCHEMICAL	CODEN: ANCHAM.
85(20):153416v	Ishida, Natsumi	Detection limits in emission spectroscopic analysis of iron and steel with photoelectric detectors.	detection, emission, spectroscopic, analysis, iron, steel, photoelectric, detectors, metals, spectrochemical, elements, spectrometers, steels, element	Tetsu to Hagane, 62(6), 749-56 (Japan) 1976	SPECTROMETRY	CODEN: TEHAA2
85(19):141814m	Nielsen, Hans Joergen; Hansen, Elo Harald	New nitrate ion-selective electrodes based on quaternary ammonium compounds in nonporous polymer membranes.	nitrate, ion, electrodes, quaternary, ammonium, nonporous, polymer, membranes, soil, analysis, soils, waters	Anal. Chim. Acta, 85(1), 1-16 (Eng) 1976	ELECTROCHEMICAL	CODEN: ACACAM.
85(18):130787f	Van Loon, J. C.; Radziuk, B.	A quartz "T" tube furnace-atomic absorption spectroscopy system for metal speciation studies.	tube, furnace, atomic, absorption, spectroscopy, metal, coal, metals, analysis, environmental, spectrometry, environment, selenium, soil, waste, water, sludge, mercury, spectroscopic	Can. J. Spectrosc., 21(2), 46-50 (Eng) 1976.	SPECTROMETRY	CODEN: [illegible]
85(16):130097c	Gallman, B. A.	System for measuring the uranium concentration of liquid effluents from the enriched uranium recovery facility at Oak Ridge Y-12 plant.	uranium, liquid, enriched, oak, ridge, plant, radioactive, wastes, analysis, waste	Report, Y-2004, 30 pp. Avail. NTIS From: Nucl. Sci. Abstr. 1976, 33(6), Abstr. No. 13041 (Eng) 1976.	RADIOCHEMICAL	
85(13):92743a	Bartuzi, Jan; Bochnik, Ignacy; Stepniewska, Zofia	Use of selective electrodes for measurement of the activity of chlorides and nitrates in soils.	electrodes, activity, chlorides, nitrates, soils, soil, analysis	Rocz. Glebozn., 27(1), 15-30 (Pol) 1976	ELECTROCHEMICAL	CODEN: ROGLAR

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85(12):86754p	Litman, Robert; Finston, Harmon L.; Williams, Evan T.	Examination of some current procedures for trace mercury determination: The advantage of neutron activation and x-ray counting.	examination, mercury, advantage, neutron, activation, ray, environment, analysis, environmental	Proc. Int. Conf. Nucl. Methods Environ. Res., 2nd, Issue CONF-740701, 81-94. Edited by: Vogt, J. R.; Meyer, W. NTIS: Springfield, Va. (Eng) 1974.	RADIOCHEMICAL	CODEN: [illegible]
85(10):67539t	Lattan, Kenneth R.; Erickson, Gerald L.	Monitoring the effluent from nuclear facilities.	nuclear, energy, radioactive, wastes, reactor, cooling, iodine, continuously, adsorbent, analysis, gas, adsorbents	U.S. Publ. Pat. Appl. B US 526186 17 Feb 1976. 6 pp. (Eng).	RADIOCHEMICAL	CODEN: USXXCP. CLASS. IC: G01T. NCL: [illegible], APPLICATION US 74-526186 22 Nov 1974.
85(10):67425r	Krstulovic, Ante M.; Rosie, Douglas M.; Brown, Phyllis R.	Selective monitoring of polynuclear aromatic hydrocarbons by high pressure liquid chromatography with wavelength detector.	polynuclear, aromatic, hydrocarbons, liquid, chromatography, wavelength, detector, air, analysis, hydrocarbon	Anal. Chem., 48(9), 1383-6 (Eng) 1976.	CHROMATOGRAPHY	CODEN: ANCHAM
85(9):57045p	Cochrane, W. P.; Greenhalgh, R.	Evaluation and comparison of selective gas chromatographic detectors for the analysis of pesticide residues.	gas, chromatographic, detectors, analysis, pesticide, residues, plant, pesticides, coulson, electrolytic, detector, microcoulometric, flame, ionization	Chromatographia, 9(6), 255-65 (Eng) 1976.	CHROMATOGRAPHY	CODEN: CHRGB7.
85(8):50275w	Yoshida, Shigehiko	Measurement of tritium and carbon-14 in environmental samples. II.	tritium, carbon, environmental, radiation, detectors, beta, particle, environment, analysis, detector	Kyoto Daigaku Genshiro Jikkensho Tanki Kenkyukai Hokoku, Volume Date 31 Aug 1974, KURRI-TR-130, 20-22 (Japan) 1975.	RADIOCHEMICAL	CODEN: [illegible]
85(8):55066a	Hughes, G. F.; Chanda, Richard N.; Marlen, Ronald A.	CONRAC and MOBILLE: safeguards and environmental systems.	mobile, environmental, rocky, flats, calorimeters, plutonium, radioactive, wastes, health, physics, analysis, sewage	Nucl. Mater. Manage., 4(3), 480-97 (Eng) 1975	* RADIOCHEMICAL	CODEN: [illegible]
85(2):5766a	Scheide, Eugene P.; Taylor, John K.	Piezoelectric sensor for mercury in air.	piezoelectric, sensor, mercury, air, analysis, crystal, gold, plated, crystals, coated	Prepr. Pap. Natl. Meet., Div. Environ. Chem., Am. Chem. Soc., Volume 14, Issue 1, 324-25 (Eng) 1974.	PIEZOELECTRIC	CODEN: [illegible]
85(2):13465b	Kirby, J. A.; Anspaugh, L. R.; Phelps, P. L.; Huckabay, G. W.; Tonger, F.	A detector system for in-situ spectrometric analysis of americium-241 and plutonium in soil.	detector, spectrometric, analysis, americium, plutonium, soil, lawrence, spectrometers, gamma, detection, ray	IEEE Trans. Nucl. Sci., NS23(1), 481-9 (Eng) 1976.	SPECTROMETRY	CODEN: IETNAE.
85(2):11443c	Hamada, Tatsuji	Measurement of tritium and carbon-14 in environmental samples. I.	tritium, carbon, environmental, rice, proportional, radiation, analysis, environment	Kyoto Daigaku Genshiro Jikkensho Tanki Kenkyukai Hokoku, Volume Date 31 Aug 1974, KURRI-TR-130, 20-5 (Japan) 1975.	RADIOCHEMICAL	CODEN: [illegible]
84(26):180951m	Hinkle, Margaret E.; Learned, George L.	Determination of mercury in natural waters, plants, and soils by a cold-vapor procedure.	mercury, waters, plants, soils, vapor, gold, rocks, soil, analysis, plant, geological, sediments, absorption, environmental	U. S., Geol. Surv., Bull., 1408, 51-63 (Eng) 1975.	GENERAL	CODEN: [illegible]
84(26):178763a	Beech, W. E.; Gunn, W. B.	Separation of soil atmospheric gases by gas chromatography with parallel columns.	soil, atmospheric, gases, gas, chromatography, analysis	Soil Sci. Soc. Am. J., 40(2), 319-21 (Eng) 1976	CHROMATOGRAPHY	CODEN: [illegible]
84(25):178734g	Sakamoto, Takeshi; Kawaguchi, Hiroshi; Mizuike, Atsushi	Gas chromatography of arsenic in soil using the emission spectrometric detector.	gas, chromatography, arsenic, soil, emission, spectrometric, detector, analysis	Bunseki Kagaku, 25(2), 81-5 (Japan) 1976.	CHROMATOGRAPHY	CODEN: [illegible]
84(22):159338p	Morimura, Hisao; Sakamoto, Michiko	Utilization of polarography as a specific detection system for gas chromatography.	polarography, detection, gas, chromatography, polarographic, detector, detectors, polarog., analysis, aniline, benzene, nitrobenzene	Nippon Kagaku Kaishi (1), 114-19 (Japan) 1976	CHROMATOGRAPHY	CODEN: [illegible]
84(22):159876a	Moore, Robert V.; Brecheler, Oliver W.	Comparison of germanium detectors for neutron activation analysis for mercury.	germanium, detectors, neutron, activation, analysis, mercury, radiation, lithium, drifted, environmental, environment, pollution, gamma	U. S. Environ. Prot. Agency, Off. Res. Dev., (Rep.) EPA, EPA-660/2-74-085, 12 pp. (Eng) 1974	RADIOCHEMICAL	CODEN: [illegible]
84(22):155390c	Anbel, T.; Ganivet, M.	Determination of plutonium content in solid waste drums. Experience of the plutonium fuel fabrication facility.	plutonium, solid, waste, experience, fuel, wastes, radioactive, analysis, solids, gamma, spectroscopy, neutron	Proc. Semin. Manage. Plutonium-Contam. Solid Wastes, Meeting Date 1974, 145-54. OECD: Paris, Fr. (Fr) 197[illegible].	RADIOCHEMICAL	CODEN: [illegible]

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84(22):155299j	Birkhoff, G.	Determination of plutonium in solid waste containers by spontaneous fission neutron measurements.	plutonium, solid, waste, spontaneous, fission, neutron, wastes, radioactive, analysis	Proc. Semin. Manage. Plutonium-Contam. Solid Wastes, Meeting Date 1974, 135 Paris, Fr. (Eng) 1975.	RADIOCHEMICAL	CODEN: 31YLAA.
84(20):140744d	Umbarger, C. J.; Cowder, L. R.	Measurement of transuranic solid wastes at the 10 nCi/g activity level.	transuranic, solid, wastes, activity, radiation, gamma, ray, thallium, doped, sodium, iodide, transuranics, radioactive, detectors, radioelement, detection, radioelements, analysis	Nucl. Technol., 27(3), 500-10 (Eng) 1975.	RADIOCHEMICAL	CODEN: NUTYBB.
84(16):119419h	Cattrall, R. W.; Pui, Chin-Poh	Coated wire ion selective electrodes for the determination of mercury(II).	coated, ion, electrodes, mercury, membranes, tricaprylylmethylammonium, halomercurate, membrane, octanamide, salts, analysis	Anal. Chem., 48(3), 552-6 (Eng) 1976	ELECTROCHEMICAL	CODEN: ANCHAM
84(12):83714u	Ogata, Noboru; Takasawa, Akiko	Determination of nitrate by an ion selective electrode.	nitrate, ion, electrode, nitrates, analysis, anion, halides, nitrites, cyanides, sulfides, potentiometric, culture, soil, fertilizer, removal, waste	Nippon Dojo Hiryogaku Zasshi ... Kenkyu Hokoku, 115, 71-4 (Japan) 1974	ELECTROCHEMICAL	CODEN: [illegible]
84(10):64692a	Janssens, M.; Dams, R.; Cafmeyer, R.; Hoste, J.	Determination of uranium, antimony, indium, bromine, and cobalt in atmospheric aerosols using epithermal neutron activation and a low-energy photon detector.	uranium, antimony, indium, bromine, cobalt, atmospheric, aerosols, epithermal, neutron, activation, energy, photon, detector, air, analysis, airborne, particulates	J. Radioanal. Chem., 26(2), 305-15 (Eng) 1975.	RADIOCHEMICAL	CODEN: JRACBN
84(8):47710v	Maksimov, O. P.; Bazunova, M. A.	Use of ion-selective electrodes for determining the concentration of ammonium ions in nutrient solutions in the pre of potassium.	ion, electrodes, ammonium, ions, nutrient, solutions, potassium, soil, analysis	Agrokhimiya (11), 130-5 (Russ) 1975.	ELECTROCHEMICAL	CODEN: AKNHAJ.
84(5):29685r	Willems, Marta	Nitrate determination in soil using a nitrate-selective electrode	nitrate, soil, electrode, analysis, copper, sulfate, chloride, elimination, silver	Tidsskr. Planteavl. 79(4), 495-500 (Dan) 1975.	ELECTROCHEMICAL	CODEN: TPLAAY.
84(4):23529e	Levins, D. M.; Glass, R. W.; Chilton, M. W.; Inman, D. J.	Monitoring and analysis of process streams in a krypton-85 off-gas decontamination system.	analysis, streams, krypton, gas, decontamination, glass, oak, ridge, helium, gases, radioactive, fuel, scrubbing, wastes	Report, ORNL-TM-4921, 40 pp. Avail. NTIS From: Nucl. Sci. Abstr. 1975, 32(7), Abstr. No. 16940 (Eng) 1975	ELECTROCHEMICAL	
84(4):21542c	Jagielak, Jan; Osiadowski, Bogdan	Research of the Central Laboratory for Radiation Protection in studying atmospheric air pollution by dusts by ionizing radiation spectrometry.	radiation, protection, atmospheric, air, pollution, ionizing, spectrometry, radioactive, wastes, analysis, pollutant	Rep.-Staatl. Zent. Strahlenschutz DDR, 157, 320-9 (Russ) 1974.	SPECTROMETRY	CODEN: [illegible]
84(2):11996q	Al-Shahristani, H.; Abbass, K.	Comparison of activation methods for mercury determination.	activation, mercury, environment, pollution, neutron, analysis	J. Radioanal. Chem., 27(1), 57-66 (Eng) 1975.	RADIOCHEMICAL	CODEN: JRACBN.
83(24):200697m	Piotrowski, Tadeusz	Effect of the characteristics of IR radiation detectors on their suitability in thermal analysis.	radiation, detectors, thermal, analysis, infrared, light, thermography, detector, electric, resistors, thermistors, cadmium, telluride, solid, mercury, germanium	Przegl. Elektrotech., 51(8), 391-403 (Pol) 1975.	SPECTROMETRY	CODEN: PZETAH
83(22):187965q	Charrier, G.; Malherbe, P.	Radiochromatographic analysis of fission rare gases.	radiochromatographic, analysis, fission, rare, gases, radioactive, wastes, nuclear, reactors, gas, reactor, waste	Bull. Inf. Sci. Tech., Commis. Energ. At. (Fr.), 209, 59-65 (Fr) 1975.	CHROMATOGRAPHY	CODEN: BUIAAA.
83(18):157487e	Winstel, Guenter; Aschmann, Johannes	Semiconductor sensor for gaseous and/or liquid substances.	semiconductor, sensor, gaseous, liquid, liquids, analyte, layer, detection, gases, gas, analysis, acetone, carbon, monoxide, nitrogen	Ger. Offen. DE 2407110 21 Aug 1975, 11 pp. (Ger).	ELECTROCHEMICAL	CODEN: GWXXBX. CLASS: 1C; G01N APPLICATION: DE 74-2407110 14 Feb 1974

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83(15):137084y	Talmi, Yair; Norvell, V. E.	Determination of arsenic and antimony in environmental samples using gas chromatography with a microwave emission spectrometric system.	arsenic, antimony, environmental, gas, chromatography, microwave, emission, spectrometric, oak, ridge, environment, plant, analysis, spectrometry	Anal. Chem., 47(9), 1510-16 (Eng) 1975	CHROMATOGRAPHY	CODEN: ANCHAM.
83(13):105350a	Sheppard, John C.; Funk, William H.	Trees as environmental sensors monitoring long-term heavy metal contamination of Spokane River, Idaho.	trees, environmental, sensors, metal, spokane, river, water, pollution, metals, environment, pine, biological	Environ. Sci. Technol., 9(7), 638-42 (Eng) 1975.	GENERAL	CODEN: ESTHAG
83(13):107810a	Anfalt, Torbjorn; Granéli, Anders; Jagner, Daniel	Potentiometric gas sensors for ammonia based on ion-selective electrodes for silver and mercury(II).	potentiometric, gas, sensors, ammonia, ion, electrodes, silver, copper, mercury, metal, sensor, analysis, electrode, sensitive	Anal. Chim. Acta, 76(2), 253-9 (Eng) 1975.	ELECTROCHEMICAL	CODEN: ACACAM
83(10):[illegible]q	Profio, A. E.; Huth, G. C.	Remote sensing of plutonium by the low-energy scattered flux.	sensing, plutonium, energy, scattered, flux, gamma, ray, emitters, radiation, geochemistry, emitter, earth, air, analysis, detection, detectors, sodium, iodide	Nucl. Technol., 24(3), 340-51 (Eng) 1975.	RADIOCHEMICAL	CODEN: NUTYBB.
83(10):[illegible]r	Brauer, F. P.; Kaye, J. H.; Fager, J. E.	Thallium-activated sodium iodide/lithium-drifted germanium coincidence gamma-ray spectrometry for radionuclide analysis of environmental samples.	thallium, activated, sodium, iodide, lithium, drifted, germanium, coincidence, gamma, ray, spectrometry, radionuclide, analysis, environmental, radioactive, waste, spectrometer, spectrometers	Report, BNWL-SA-5000, 25 pp. Avail. Dep. NTIS From: Nucl. Sci. Abstr. 1975, 31(4), Abstr. No. 19731 (Eng) 1974.	SPECTROMETRY	
83(9):67305q	Nieschmidt, E. B.; Dyer, N. C.; Killian, E. W.; Coates, R. A.	Application of a realtime stack monitor using a lithium-drifted germanium detector and a PDP-9 processor.	lithium, drifted, germanium, detector, radiation, detectors, nuclear, reactor, computer, radioactive, wastes, analysis, detection, reactors	Report, ANCR-1171, 24 pp. Avail. Dep. NTIS From: Nucl. Sci. Abstr. 1974, 31(7), Abstr. No. 19029 (Eng) 1974.	RADIOCHEMICAL	
83(8):67292d	Feldman, Josef; Hayes, Edward J.	Hydrocarbon and ozone analysis for radioactive gases.	hydrocarbon, ozone, analysis, radioactive, gases, hydrocarbons, nuclear, reactor, streams, nondispersive, spectrometry, wastes, reactors, helium, removal	Adv. Instrum., 29; Pt. 3, 730, 7 pp. (Eng) 1974.	SPECTROMETRY	CODEN: AVINAP.
83(4):37091v	Takata, Yoshinori; Fujita, Terumori	Application of a coulometric detector to rapid ion-exchange chromatography.	coulometric, detector, ion, exchange, chromatography, coulometers, flow, liquid, analysis, metals	J. Chromatogr., 108(2), 255-63 (Eng) 1975.	CHROMATOGRAPHY	CODEN: JOCRAM.
83(2):21390e	Kulkarni, P. V.; Preiss, I. L.	Use of radioisotope induced x-ray fluorescence for environmental studies.	radioisotope, ray, fluorescence, environmental, elements, sediments, radiometric, spectrometry, analysis, geological, element, environment	J. Radioanal. Chem., 24(2), 433-52 (Eng) 1975.	SPECTROMETRY	CODEN: JRACBN.
83(2):15805r	Sparks, C. J., Jr.; Ogle, J. C.	Quantitative trace element analysis with x-ray fluorescence.	element, analysis, ray, fluorescence, oak, ridge, environment, environmental	Proc. Annu. NSF Trace Contam. Conf., 1st, Meeting Date 1973, (Conf. 730802), 421-34. Edited by: Fulkerson, W.; Shults, W. D.; Van Hook, R. I. NTIS: Springfield, Va. (Eng) 1974.	SPECTROMETRY	CODEN: 30DDAF.
83(1):1676a	Van Hook, R. I., Jr.; Blaylock, B. G.; Bondietti, E. A.; Francis, C. W.; Huckabee, J. W.; Reichle, D. E.; Sweeton, F. H.; Witherspoon, J. P.	Radioisotope techniques to evaluate the environmental behavior of cadmium.	radioisotope, environmental, cadmium, oak, ridge, food, environment, adsorption, aquatic, biological	Comp. Stud. Food Environ. Contam., Proc. Symp., Meeting Date 1973, 25-42. IAEA: Vienna, Austria. (Eng) 1974.	RADIOCHEMICAL	CODEN: 29QWAT.
82(24):174927r	Schuettelkopf, H.; Pessler, H.	Fast separation of radioiodine from waste water samples and determination of the iodine concentration by neutron activation.	radioiodine, waste, water, iodine, neutron, activation, analysis, silver, iodide, catalyst	Report, KFK-2036, 40 pp. Avail. Dep. NTIS (U. S. Sales Only); KFK From: Nucl. Sci. Abstr. 1975, 31(5), Abstr. No. 10508 (Ger) 1974	RADIOCHEMICAL	
82(18):115542p	Wood, H. B.; Randolph, R. W.	Continuous monitoring of noble gases in reactor stack exhaust.	noble, gases, reactor, exhaust, wood, river, plant, apparatus, nuclear, waste, gas, radioactive, wastes, analysis, isotopes	Report, OPOEU-74-30-5, 14 pp. Avail. Dep. NTIS, 4 dollars From: Nucl. Sci. Abstr. 1974, 30(9), 23950 (Eng) 1974.	RADIOCHEMICAL	

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82(16):105538m	McDowell, W. J.; Farrar, D. T.; Billings, M. R.	Plutonium and uranium determination in environmental samples. Combined solvent extraction-liquid scintillation method.	plutonium, uranium, environmental, solvent, extraction, liquid, scintillation, oak, ridge, environment, soil, analysis, radiation, detectors	Talanta, 21(12), 1231-45 (Eng) 1974.	RADIOCHEMICAL	CODEN: TLNTA2.
82(16):102806e	Umbarger, C. J.; Walton, R. B.; Foley, J. E.; Cowder, L. R	NDA (nondestructive assay) measurement of low-level uranium plutonium waste.	nondestructive, uranium, plutonium, waste, radioactive, wastes, americium, gamma, ray, thermal, neutron, detectors, analyses, radiation, detector	Nucl. Mater. Manage., 3(3), 140-50 (Eng) 1974.	RADIOCHEMICAL	CODEN: NUMMD6
82(16):102807d	Weber, Hans J.	Fission multiplicity detector for plutonium waste.	fission, multiplicity, detector, plutonium, waste, radioactive, wastes, analysis	Nucl. Mater. Manage., 3(3), 107-17 (Eng) 1974.	RADIOCHEMICAL	CODEN: NUMMD6.
82(16):92657b	Ge Young, Lanes G.	Trace analysis of heavy elements by x-ray energy spectroscopy.	analysis, elements, ray, energy, spectroscopy, air	U. S. N. T. I. S., AD Rep., No. 783006/1GA, 36 pp. Avail. NTIS From: Govt. Rep. Announce. (U. S.) 1974, 74(19), 54 (Eng) 1974.	SPECTROMETRY	CODEN: XADRCH
82(14):84494w	Piatkowski, Adam; Tarchak, Marian; Modzelewski, Andrzej; Schacl, Waldemar	Device for monitoring air contamination by radioactive aerosols.	air, radioactive, aerosols, wastes, aerosol, alpha, beta, activity, scintillation, analysis	Postepy Fiz. Med., 9(1), 43-50 (Pol) 1974.	GENERAL	CODEN: PFMDAK
82(10):67751k	Wheeler, Garry L.; Lott, Peter F.	Rapid determination of trace amounts of selenium(IV), nitrite, and nitrate by high pressure liquid chromatography using 2,3-diaminonaphthalene.	selenium, nitrite, nitrate, liquid, chromatography, diaminonaphthalene, fluorometers, detectors, soil, analysis	Microchem. J., 19(4), 390-405 (Eng) 1974	CHROMATOGRAPHY	CODEN: MICJAN.
82(10):63726c	Schuide, Eugene P.; Taylor, John K.	Piezoelectric sensor for mercury in air.	piezoelectric, sensor, mercury, air, analysis, gold, coated, crystal	Environ. Sci. Technol., 8(13), 1097-9 (Eng) 1974.	PIEZOELECTRIC	CODEN: ESTHAG.
82(1):779e	Jarvis, Robert E.; Tiefenbach, Bollar Chattopadhyay, Amares	Determination of trace cadmium in biological materials by neutron and photon activation analyses.	cadmium, biological, neutron, photon, activation, analyses, hair, vegetable, food, analysis, soil, fertilizer	Can. J. Chem., 52(17), 3008-20 (Eng) 1974.	RADIOCHEMICAL	CODEN: CJCHAG.
81(26):190995t	Neary, Michael P.; Seitz, Rudolf; Hercules, David M	Chemiluminescence detector for transition metals separated by ion exchange.	chemiluminescence, detector, metals, ion, exchange, chromatography, liquid, chemiluminescent, detection, analysis, catalysis, luminol, oxide, metal, ions, elution	Anal. Lett., 7(8-9), 583-90 (Eng) 1974.	CHROMATOGRAPHY	CODEN: ANALBP.
81(26):190561p	Hansen, E. H.; Ruzicka, J.	Selectrode. Universal ion selective electrode. VIII. Solid state lead(II) selectrode in lead(II) buffers and potentiometric titrations.	selectrode, ion, electrode, solid, buffers, potentiometric, titrations, electrodes, analysis, sulfide, silver	Anal. Chim. Acta, 72(2), 365-73 (Eng) 1974.	ELECTROCHEMICAL	CODEN: ACACAM
81(24):158077n	Talmi, Yair; Andren, Anders W.	Determination of selenium in environmental samples using gas chromatography with a microwave emission spectrometric detection system.	selenium, environmental, gas, chromatography, microwave, emission, spectrometric, detection, oak, ridge, environment, spectrometry, analysis	Anal. Chem., 46(14), 2122-6 (Eng) 1974.	CHROMATOGRAPHY	CODEN: ANCHAM.
81(22):140519w	Colangelo, E.; Castellani, C. C.; Tarroni, G.	Results of radioactivity measurements in the sewage of some Italian towns.	radioactivity, sewage, towns, radioelements, analysis, hospitals, radiotherapy, wastewater, radioisotopes, waste	Com. Naz. Energ. Nucl., RT/PROT(73)5, 7 pp. (Ital) 1973.	RADIOCHEMICAL	CODEN: CNENAJ
81(19):135032z	Cottenie, A.; Velghe, G.	Determination of ammonia in plants and soils by the specific electrode.	ammonia, plants, soils, electrode, electrodes, ion, plant, analysis, soil	Meded. Fac. Landbouwwetensch., Rijksuniv. Gent, 38(3), 951-9 (Neth) 1973	ELECTROCHEMICAL	CODEN: MFLRA3.
81(16):98537z	Quandt, Ulrich; Herr, Wilfrid	Highly sensitive photo neutron detector for nondestructive submicrogram anal beryllium.	sensitive, photo, neutron, detector, nondestructive, submicrogram, analysis, beryllium, geological, rocks, photon, activation, radiation, sensitivity	Nucl. Instrum. Methods, 119(2), 375-85 (Ger) 1974.	RADIOCHEMICAL	CODEN: NUIMAL.

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81(4):16221f	Gowd, G ; Thomas, R E	Electronic design parameters for optimizing photometric mercury detectors	electronic, optimizing, photometric, mercury, detectors, air, analysis, optimization, detector, electric	Chem Instrum , Volume Date 1973-1974, 5(4), 231-41 (Eng) 1974	SPECTROMETRY	CODEN: CHIMBH
80(17):91703w	Friedman, Melvin H ; Miller, Eugene; Tanner, James T	Instrumental neutron activation analysis for mercury in dogs administered methylmercury chloride Use of a low energy photon detector	neutron, activation, analysis, mercury, dogs, administered, methylmercury, chloride, energy, photon, detector, foods, food, drug, brain	Anal Chem , 46(2), 236-9 (Eng) 1974	GENERAL	CODEN: ANCHAM
80(14):80657b	Takata, Yoshinori; Arikawa, Yoshihiro	Application of controlled potential coulometry to the automatic recording of liquid chromatography V Improved-flow coulometric detector and its application to liquid chromatography	coulometry, automatic, liquid, chromatography, flow, coulometric, detector, coulometers, alkaline, earth, metals, rare, analysis, detection	Bunseki Kagaku, 22(7), 912-18 (Eng) 1973	CHROMATOGRAPHY	CODEN: BNSKAK
80(15):80665s	Wogman, N A ; Rieck, H G , Jr ; Kosorok, J R ; Perkins, R W	In situ activation analysis of marine sediments with californium-252	activation, analysis, marine, sediments, californium, minerals, detection, neutron, geological, nuclear, radiochemical, sensitivity	J Radioanal Chem , 15(2), 591-600 (Eng) 1973	RADIOCHEMICAL	CODEN: JRACBN
80(14):77924p	Kawaguchi, Hiroshi; Sakamoto, Takeshi; Yoshida, [illegible]; Mizuike, Atsushi	Gas chromatography of metal chelates of trifluoroacetylacetone using an emission spectrometric detector	gas, chromatography, metal, chelates, trifluoroacetylacetone, emission, spectrometric, detector, spectrometers, detectors, metals, trifluoroacetylacetonates, analysis, trifluoroacetylacetonate	Bunseki Kagaku, 22(11), 1434-9 (Japan) 1973	CHROMATOGRAPHY	CODEN: BNSKAK
80(12):66410a	Taylor, Larry R ; Johnson, Dennis C	Determination of antimony using forced-flow liquid chromatography with a coulometric detector	antimony, flow, liquid, chromatography, coulometric, detector, hair, human, alloys, analysis	Anal Chem , 46(2), 262-6 (Eng) 1974	CHROMATOGRAPHY	CODEN: ANCHAM
80(12):65947h	Wacker, [illegible]	Chromatographic separation of uranium and plutonium from reprocessing plant liquid waste followed by automatic measurement of plutonium amounts by probe-type alpha detector and the uranium by photometry methods Final report, December 15, 1969-December 14, 1971.	chromatographic, uranium, plutonium, plant, liquid, waste, automatic, alpha, detector, photometry, energy, radioactive, wastes, analysis	Report, IAEA-R-880-F, 59 pp Avail IAEA From: Nucl Sci Abstr 1973, 28(10), 24151 (Russ) 1973	CHROMATOGRAPHY	
80(10):51893w	Jepsen, Andrew F	Measurements of mercury vapor in the atmosphere	mercury, vapor, atmosphere, air, pollution, analyses, portable, airborne	Advan Chem Ser , 123, 81-95 (Eng) 1973	SPECTROMETRY	CODEN: ADCSAJ
80(6):33033n	Lee, John K ; Alves, William R	Radioactive halogen monitoring system	radioactive, halogen, electric, charcoal, coolant, reactor, gases, wastes, reactors, iodine, isotopes, analysis	U S US 3767915 30 Oct 1973, 7 pp (Eng)	GENERAL	CODEN: USXXAM CLASS IC: G01T NCL: 250364000 APPLICATION: US 72 236922 15 Mar 1972
80(6):31962b	DeCarlo, V A	Design of a system for the nondestructive assay of uranium-233 waste drums	nondestructive, uranium, waste, ash, sludge, radioactive, wastes, analysis	Report, ORNL-TM-4240, 20 pp Avail Dep NTIS From: Nucl Sci Abstr 1973 28(8) 17812 (Eng) 1973	RADIOCHEMICAL	
80(4):20834m	Welling, James D	Mass spectrometric method for analyzing the diffusion of lithium, using p-n junctions for the simultaneous detection of lithium-6 and lithium-7 ions	spectrometric, analyzing, diffusion lithium, detection, ions, metals, spectroscopy, detector, semiconductor analysis, detectors	174 pp Avail Univ Microfilms, Ann Arbor, Mich , Order No 73-27,288 From: Diss Abstr Int B 1973, 34(5), 2148-9 (Eng) 1973	SPECTROMETRY	
79(22):132162a	Codding, Edward G ; Horlick, Gary	Application of AND and exclusive-or (XOR) logic operations to the identification of elemental emission spectra measured using a photodiode array direct reading spectrometer	elemental, emission, spectra, photodiode, reading, spectrometer, spectrochemical, analysis, detector, computer, spectrometers, spectrometry elements, diodes, photo, detectors, detection	Appl Spectrosc , 27(5) 366-70 (Eng) 1973	SPECTROMETRY	CODEN: APSPA4

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79(18):96398r	Lutz, George J.	Determination of lead in environmental samples by photon activation analysis.	environmental, photon, activation, analysis, biological, soils	Nucl. Methods Environ. Res., Proc. Amer. Nucl. Soc. Top. Meet., 146-9. Edited by: Vogt, James R. Off. Conf. Short Courses Univ. Mo.-Columbia: Columbia, Mo. (Eng) 1971.	RADIOCHEMICAL	CODEN: 26QUAQ.
79(16):98224	Kelley, J. A.	Recovery of the fission product zirconium from Purex waste sludge.	fission, zirconium, waste, sludge, river, radioactive, wastes, cation, exchange, preparation, purifn, adsorption	Radiochem. Radioanal. Lett., 14(2), 95-100 (Eng) 1973.	RADIOCHEMICAL	CODEN: RRALAI.
79(12):72719v	Heck, Robert A.	Measurement of argon-41 effluent from university-size reactors.	argon, reactors, health, radioactive, wastes, detector, air, ionization, nuclear, analysis, reactor	Health Phys. Oper. Monit., Pap. Symp., Meeting Date 1969, Volume 2, 1039-42. Edited by: Willis, Charles A. Gordon and Breach: New York, N. Y. (Eng) 1972.	RADIOCHEMICAL	CODEN: 26MRAE
79(10):60700c	Iyer, R. H.; Nagar, M. S.; Sampathkumar, R.; Chaudhuri, N. K.	Application of the fission track registration technique in the estimation of fissile materials. Uranium-235-content in natural and depleted uranium samples and total uranium in solutions.	fission, track, fissile, uranium, solutions, solid, detectors, radioactive, wastes, nuclear, reactor, fuels, fuel, elements, analysis	Nucl. Instrum. Methods, 109(3), 483-9 (Eng) 1973.	RADIOCHEMICAL	CODEN: NUIMAL.
79(10):57417b	Chiles, M. M.	Low-level detector for alpha contamination monitor in continuously flowing process waste water.	detector, alpha, continuously, flowing, waste, water, oak, ridge, radioactive, wastes	Nucl. Instrum. Methods, 109(3), 561-6 (Eng) 1973.	RADIOCHEMICAL	CODEN: NUIMAL
79(8):37775p	Reilly, T. Douglas	Assay experience with the Mobile Nondestructive Assay Laboratory at Oak Ridge.	experience, nondestructive, oak, ridge, radioactive, wastes, radiochemical, analysis	Nucl. Mater. Manage., 1(3), 246-49 (Eng) 1972	RADIOCHEMICAL	CODEN: NUMMAB.
79(4):26354v	Larkin, Kenneth R.	Monitor of the concentration of radioactive iodine in a stream of gas.	radioactive, iodine, stream, gas, atomic, energy, wastes, reactor, nuclear, reactors, isotopes, analysis	U.S. US 3731100 1 May 1973, 5 pp. (Eng).	RADIOCHEMICAL	CODEN: USXXAM. CLASS: IC: G01T. NCL: 250083600FT. APPLICATION: US 71-131976 7 Apr 1971.
79(2):13710a	Martin, H. R.; Ogel, R. A.	Reaction gamma ray interferences in the passive assay of plutonium.	gamma, ray, passive, plutonium, rocky, flats, alpha, particle, impurity, atoms, radioactive, wastes, analysis, rays, neutrons	Inst. Nucl. Mater. Manage., Proc. Annu. Meet., 12th, Meeting Date 1971, Volume 2, 755-71. Inst. Nucl. Mater. Manage.: Columbus, Ohio. (Eng) 1972.	RADIOCHEMICAL	CODEN: 26TVAU
78(22):143559k	Aue, Walter A.; Hill, Herbert H., Jr.	Selective determination of heteroorganics by a dual-channel detector based on flame conductivity and emission.	heteroorganics, detector, flame, conductivity, emission, chromatography, gas, organometallic, metal, analysis	Anal. Chem., 45(4), 729-33 (Eng) 1973.	SPECTROMETRY	CODEN: ANCHAM
78(20):133794v	Kawaguchi, Hiroshi; Sakamoto, Takeshi; Mizuike, Atsushi	Emission spectrometric detection of metal chelates separated by gas chromatography.	emission, spectrometric, detection, metal, chelates, gas, chromatography, spectrochemical, analysis, chromatographic, aluminum	Talanta, 20(3), 321-6 (Eng) 1973.	CHROMATOGRAPHY	CODEN: TLNTA2.
78(20):131075m	Webster, G. H.; Kowalczuk, R. D.	Gamma spectrometry at a nuclear power plant using a digital computer.	gamma, spectrometry, nuclear, plant, digital, computer, light, ray, spectroscopy, reactor, chemical, radioactive, reactors, fission, wastes	IEEE Trans. Nucl. Sci., 20(1), 707-13 (Eng) 1973	SPECTROMETRY	CODEN: IETNAE
78(13):79232a	Osipov, V. G.; Gorgunov, V. V.	Use of titanium dioxide films in gas chromatographic detectors	titanium, dioxide, gas, chromatographic, detectors, steel, alloys, chromatography, electric, conductivity, conduction, electron, donor, analysis, detection	Zh. Anal. Khim., 27(11), 2233-43 (Russ) 1972	CHROMATOGRAPHY	CODEN: ZAKHA8.
77(22):143560h	Forklyn, Arthur; Vree, Pieter H.	Determination of trace amounts of gases.	gases, chromatography, gas, detectors, ionization, air, analysis, xenon	Brit. GB 1296183 22 Nov 1972, 4 pp. (Eng)	CHROMATOGRAPHY	CODEN: BRXXAA. CLASS: IC: G01N. APPLICATION: GB 70-53432 10 Nov 1970
77(20):134647q	Saltmarsh, M. J.; Van der Woude, A.; Ludemann, C. A.	Measurement of surface contamination using oxygen ion-induced x-rays.	oxygen, ion, rays, oak, ridge, radioactive, wastes, salt, mines, analysis, lanthanum, crystals, sodium, chloride, crystal, diffusion	Appl. Phys. Lett., 21(2), 44-7 (Eng) 1972.	RADIOCHEMISTRY	CODEN: APPLAB.

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77(20):133885n	Hladky, Eduard; Moravek, Josef; Pietrik, Ivan	Selective detector of radioiodine in gaseous wastes of nuclear power plants.	detector, radioiodine, gaseous, wastes, nuclear, plants, radioactive, iodine, isotopes, analysis	Jad. Energ., 18(8), 264-72 (Czech) 1972.	RADIOCHEMICAL	CODEN: JADEAQ
77(18):117729y	Garland, P. J.; Lovett, M. B.; Wilson, B. G.	Simple system for the rapid determination of airborne radioactivity.	airborne, radioactivity, fish, food, radioactive, wastes, air, analysis, waste	Rapid Methods Meas. Radioactiv. Environ., Proc. Symp., 723-36. IAEA: Vienna, Austria. (Eng) 1971.	RADIOCHEMICAL	
77(16):108815u	Zimmer, W. H.	Lithium-drifted germanium IV plutonium-239 package counter operating and servicing procedures.	lithium, drifted, germanium, plutonium, hanford, spectrometers, nuclear, detector, radioactive, wastes, analysis	Report, ARH-2031, 26 pp. Avail. Dep. NTIS From: Nucl. Sci. Abstr., 1972, 26(12), 28210 (Eng) 1971.	RADIOCHEMICAL	
77(16):108564y	Sutton, J. W. R.; Mitchell, N. T.	Rapid methods for specific radionuclide analysis and their application to aquatic emergency conditions.	radionuclide, analysis, aquatic, emergency, fish, radioactive, wastes, disposal, radioelement, radioelements, waste	Rapid Methods Meas. Radioactiv. Environ., Proc. Symp., 745-59. IAEA: Vienna, Austria. (Eng) 1971.	RADIOCHEMICAL	
77(16):106632l	Basin, M. A.; Boltaev, A. P.; Karbatov, V. A.; Kolos'ev, M. M.	Measurement of the weak modulation of radiation using a photoresistor.	radiation, photoresistor, photoconductors, germanium, optical, antimony, zinc, detectors, photoconductor, detector	Tiz. Tekh. Poluprov., 6(7), 1395-8 (Russ) 1972	RADIOCHEMICAL	CODEN: FTPPA4.
77(12):85270k	Chen, E. C. M.; Wentworth, W. E.	Detector temperature in electron capture detection.	detector, electron, detection, chromatography, gas, detectors, sensitivity, analysis	J. Chromatogr., 68(1), 302 (Eng) 1972	RADIOCHEMICAL	CODEN: JOCRAM.
77(10):69644v	Boumans, P. W. J. M.; Brouwer, G.	Photodiodes and phototransistors as detection devices for multichannel emission spectrometry.	photodiodes, phototransistors, detection, multichannel, emission, spectrometry, spectrochemical, analysis, photoelectric, detectors, spectrometric, diodes, photo, flame, calcium	Spectrochim. Acta, Part B, 27(6), 247-55 (Eng) 1972.	SPECTROMETRY	CODEN: SAASBH
77(4):24564e	Aurand, K.; Arndt, J.; Bubble, H.; Wolter, R.	Control of radioactive waste water from nuclear power plants.	radioactive, waste, water, nuclear, plants, radioelements, analysis, wastes, radioelement	Report, Wabolu-3/70, 13 pp. From: Nucl. Sci. Abstr. 1972, 26(4), 6712 (Ger) 1970	RADIOCHEMICAL	
76(22):135337m	Gaglya, V. G.; Shepelev, V. E.; Rottberg, M. B.; Zhukhovitskii, A. A.	Use of a pyroelectric effect during the gas-chromatographic analysis of mixtures based on the catalytic reaction.	pyroelectric, gas, chromatographic, analysis, mixtures, heat, catalytic, chromatography, detectors, detection, crystals	Zavod. Lab., 37(2), 131-3 (Russ) 1971.	CHROMATOGRAPHY	CODEN: ZVDLAU.
76(22):128863h	Smith, Richard J.; Mecha, Francis L.; Clark, Willis B.	Engineering materials list.	oak, ridge, centrifuges, spectrometers, spectrographs, nuclear, radiation, detectors, neutron, phototubes, cameras, optical, reactor, fuel, plants, electric, amplifiers, spark, trigger, amplifier, radioactive, wastes, analysis, uranium, oxide	Report, TID-4100(Suppl.65), 41 pp. Avail. NTIS From: Nucl. Sci. Abstr. 1972, 26(2), 2632 (Eng) 1971.	SPECTROMETRY	
76(22):134713t	Liepert, J. C.	Plant instrumentation program.	plant, nuclear, reactor, fuels, fuel, elements, radioactive, wastes, passive, radiation, gamma, ray, neutron, chemical, waste, analysis	Report, WCAP-7562-4, 45 pp. Avail. Dep. NTIS From: Nucl. Sci. Abstr. 25(23), 55004 (Eng) 1971	RADIOCHEMICAL	
76(20):117289m	Bast, L. V.; Parker, J. L.; Reilly, T. D.; Walton, R. B.	Gamma-ray scanning system for barrels containing plutonium waste.	gamma, ray, scanning, barrels, plutonium, waste, radioactive, wastes, analysis	IEEE Trans. Nucl. Sci., 19(1), 211-18 (Eng) 1972.	RADIOCHEMICAL	CODEN: IETNAE
76(13):67105a	Zimmer, William H.	Ge(Li) IV plutonium-239 package counter.	plutonium, hanford, energy, gamma, ray, chemical, radioactive, wastes, computer, analysis	U. S. At. Energy Comm., ARH-1983, 26 pp. Avail. Dep. NTIS From: Nucl. Sci. Abstr. 1971, 25(21), 48952 (Eng) 1971	RADIOCHEMICAL	CODEN: XAERAF
76(8):30306p	Hey, Henke	Atomic absorption spectrometry as a mercury specific detecting system for gas chromatography.	atomic, absorption, spectrometry, mercury, gas, chromatography, detectors, food, analysis, spectrophotometric, detector	Fresenius' Z. Anal. Chem., 256(5), 361-2 (Ger) 1971.	CHROMATOGRAPHY	CODEN: ZACFAU

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76(4):20868a	Girardi, F.; Guzzi, G.	Gamma-ray spectroscopy by means of germanium lithium-drifted detectors in activation analysis.	gamma, ray, spectroscopy, germanium, lithium, drifted, detectors, activation, analysis, radiochemical, radiation	Advan. Activ. Anal., 1, 137-81 (Eng) 1969	RADIOCHEMICAL	CODEN: ADATAB
76(4):20475f	Kawasu, Hideo; Sakamoto, Masanobu	Characteristics of the lithium-drifted germanium detector installed in Kanazawa University and its applications to environmental problems	lithium, drifted, germanium, detector, environmental, radioactive, wastes, environment, nuclear, reactor, radiation, detectors, gamma, rays, soil, explosion	Sci. Rep. Kanazawa Univ., 16(1), 1-13 (Eng) 1971.	RADIOCHEMICAL	CODEN: SRKUAT
75(17):119735h	Pillay, K. K. Sivasankara; Thomas, Charles C., Jr.; Sondel, James A.; Hyche, Carolyn M.	Determination of mercury in biological and environmental samples by neutron activation analysis.	mercury, biological, environmental, neutron, activation, analysis, fish, environment, aquatic, eris	Anal. Chem., 43(11), 1419-25 (Eng) 1971.	RADIOCHEMICAL	CODEN: ANCHAM
75(19):79495j	Fisher, William L.	Use and calibration of the automatic Columbia River monitoring station iodine monitor.	automatic, river, iodine, energy, radiation, gamma, ray, scintillation, water, analysis	U. S. At. Energy Comm., BNWL-B-41, 36 pp. Avail. Dep. NTIS From: Nucl. Sci. Abstr. 1971, 25(8), 15891 (Eng) 1970	RADIOCHEMICAL	CODEN: XAERAE
75(8):58512x	Cooke, B. D.; Dagnall, R. M.; Sharp, B. L.; West, Thomas Summers	Application of photon counting as a detection system in atomic fluorescence and emission spectrometry.	photon, detection, atomic, fluorescence, emission, spectrometry, analysis, spectrochem, detectors, spectrophotometric	Spectrosc. Lett., 4(5), 91-7 (Eng) 1971.	SPECTROMETRY	CODEN: SPLEBX
75(6):44095a	Smith, Douglas G.; Cochran, J. A.; Shleien, B.	Calibration and initial field testing of krypton-85 detectors for environmental monitoring.	krypton, detectors, environmental, health, sanitation, radiation, environment, radioactive, wastes, radiochemistry, detection, analysis	U.S. Clearinghouse Fed. Sci. Tech. Inform., PB Rep., No. 195773, 47 pp. Avail. NTIS From: U. S. Gov. Res. Develop. Rep. 1971, 71(3), 139 (Eng) 1970.	RADIOCHEMICAL	CODEN: XCCRAO.
74(26):139938k	Cochran, Joseph A.; Smith, D. G.; Magno, Paul J.; Shleien, Bernard	Investigation of airborne radioactive effluent from an operating nuclear fuel reprocessing plant	airborne, radioactive, nuclear, fuel, plant, health, radioactivity, environmental, reactor, fuels, irradiated, analysis	U.S. Clearinghouse Fed. Sci. Tech. Inform., PB Rep., No. 193969, 49 pp. Avail. CFSTI From: U. S. Govt. Res. Develop. Rep. 1970, 70(20), 158 (Eng) 1970	GENERAL	CODEN: XCCRAO
73(24):126603y	Lal, Sudarshan; Christian, Gary D.	Potentiometric studies with a liquid ion-exchange lead-selective electrode.	potentiometric, liquid, ion, exchange, electrode, electrodes, analysis, titrimetric, titrant	Anal. Chim. Acta, 52(1), 41-6 (Eng) 1970	ELECTROCHEMICAL	CODEN: ACACAM.
73(18):92911t	Hashitani, Hiroshi; Emura, Sataru; Matsuyama, Kazuo; Nakajima, Katsutoshi	Separation and determination of zirconium-95-niobium-95 and ruthenium-106 in process solutions on reprocessing tests with irradiated fuels.	zirconium, niobium, ruthenium, solutions, irradiated, fuels, energy, radioactive, wastes, analysis, nuclear, reactor, fuel, fission	Nippon Genshiryoku Gakkaishi, 12(5), 259-63 (Japan) 1970.	RADIOCHEMICAL	CODEN: NGEGAL
73(14):72013c	Riva, Michele; Carisano, Alessandro	Selective detection of phosphorus, halogens, nitrogen, and arsenic by ionizing flames modified by alkali metal salts.	detection, phosphorus, halogens, nitrogen, arsenic, ionizing, flames, alkali, metal, salts, flame, ionization, chromatographic, chromatography, gas, detectors, salt, analysis	Cron. Chim., No. 26 3-7 (Ital) 1969	CHROMATOGRAPHY	CODEN: CRCCAC
73(8):41073m	Tona, V.; La Negra, R.; Milone, C.	Fission measurements by means of glass detectors	fission, glass, detectors, angular, nuclear, emulsions, gamma, rays, bremsstrahlung	Lett. Nuovo Cimento, 3(16), 542-4 (Eng) 1970	GENERAL	CODEN: NCLTAK
72(26):136173c	Bernard, Pierre; Briand, C.; Tirout, J. P.	Spectrometry of radioactive alpha-emitters using semiconducting detectors.	spectrometry, radioactive, alpha, emitters, semiconducting, detectors, wastes, ray, emitter, rays, waste, water, analysis	Ann. Phys. Biol. Med., 3(1), 31-8 (Fr) 1969	SPECTROMETRY	CODEN: APBMBO
72(1):371h	Buraca, Massimo	Preliminary comparative analysis of tritium and nickel-63 electron capture detectors.	preliminary, analysis, tritium, nickel, electron, detectors, gas, steroids, fluids, chromatography, detector	Gas Chromatogr. Horm. Steroids Appl. Biol. Fluids, Proc. Round-Table Conf., Meeting Date 1967, 153-9. Edited by: Schuller, A. Dunod: Paris, Fr. (Eng) 1968.	RADIOCHEMICAL	CODEN: 21LQA4
71(22):105057t	De Groot, A. J.; Zschuppe, K. H.; De Bruin, M.; Houtman, J. P. W.; Singgih, P. Amin	Activation analysis applied to sediments from various river deltas.	activation, analysis, sediments, river, soil, elements, geological	Nat. Bur. Stand. (U.S.), Spec. Publ., No. 312(1), 62-71 Avail. Gov. 4 dollars 50 cents (Eng) 1969.	GENERAL	CODEN: XNBSAV.

CA NO.	AUTHOR	TITLE	KEYWORDS	CITATION	SENSOR TYPE	OTHER
71(20):97530t	Strohm, W. W.; Combs, R. B.; Jarvis, J. T.	Gamma-ray assay of plutonium-239 in waste cans. I. Single-channel assay. II. Multichannel assay.	gamma, ray, plutonium, waste, multichannel, energy, radioactive, wastes, analysis	U. S. At. Energy Comm., MLM-1545, 30 pp. Avail. Dep.; CFSTI From: Nucl. Sci. Abstr. 1969, 23(15), 28720 (Eng) 1969.	RADIOCHEMICAL	CODEN: XAERAX.
71(16):73807u	Bourmann, E.; Fabre, P.; Sini, E.	Determination of uranium in solution by measuring internal conversion X-rays.	uranium, solution, rays, energy, radioactive, wastes, analysis, water	Nucl. Tech. Miner. Resour., Proc. Symp., Meeting Date 1968, 309-14, Int. At. Energy Agency: Vienna, Austria. (Fr) 1969.	RADIOCHEMICAL	CODEN: 21ELA0
70(24):111356d	Moore, James F.; Jones, Jerry Lynn	Electrogravimetric trace analysis on a piezoelectric detector.	electrogravimetric, analysis, piezoelectric, detector	Talanta, 16(1), 140-50 (Eng) 1969.	PIEZOELECTRIC	CODEN: TLNTA2.
70(20):92877q	Jones, Jerry Lynn; Moore, James F.	Piezoelectric transducer for determination of metals at the micromolar level.	piezoelectric, transducer, metals, micromolar, analysis	Anal. Chem., 41(3), 484-90 (Eng) 1969.	PIEZOELECTRIC	CODEN: ANCHAM.
70(2):4355k	Strohm, W. W.	X-Ray assay of plutonium-239 in waste drums.	ray, plutonium, waste, analysis, radioactive, wastes, steel	Nucl. Appl., 5(3), 183-9 (Eng) 1968.	RADIOCHEMICAL	CODEN: NUAPAO.
69(10):40593b	Bistline, Robert W.; Tyson, William H.	Comparison of low-energy photon detectors for plutonium and americium wound counting.	energy, photon, detectors, plutonium, americium, wound, rocky, flats, wounds, analysis	U. S. At. Energy Comm., RFP-1080 9 pp. Avail. Dep.; CFSTI. From: Nucl. Sci. Abstr. 1968, 22(5), 8340 (Eng) 1967.	RADIOCHEMICAL	CODEN: XAERAX.
68(20):92026o	Andreatch, Anthony J.; Innes, William B.	Analysis using a hydrogen flame ionization detector.	analysis, hydrogen, flame, ionization, detector, air, sealed, respiratory, exhaust, gases, hydrocarbons, detection, halogenated, chromatography, gas, detectors, blood, urine, breath, human	U.S. US 3366456 30 Jan 1968, 17 pp. (Eng).	SPECTROSCOPY	CODEN: USXXAM. NCL: 02733030B. APPLICATION: US 23 Mar 1962.
68(16):74881p	Morin, M. R.	Coupling of a mass spectrometer with a gas chromatograph.	spectrometer, gas, chromatograph, spectrometers, chromatographic, detectors, chromatography, analysis, benzene, cyclohexane	Methodes Phys. Anal. (July-Sept.), 157-62 (Fr) 1967.	CHROMATOGRAPHY	CODEN: MPYAAJ.
67(23):108528h	Devaux, Philippe; Guiochon, Georges	Electron capture detector in gas chromatography. II. Comparative study of responses for several organic compounds.	electron, detector, gas, chromatography, organic, analysis	Bull. Soc. Chim. Fr. (4), 1336-47 (Fr) 1967.	CHROMATOGRAPHY	CODEN: BSCFAS.
66(2):1755x	Cairns, R. B.; Samson, James A. R.	Metal photocathodes as secondary standards for absolute intensity measurements in the vacuum ultraviolet.	metal, photocathodes, vacuum, light, photometry, photoelectric, metals, cathodes, photo	J. Opt. Soc. Am., 56(11), 1568-73 (Eng) 1966.	SPECTROMETRY	CODEN: JOSAAH.

10. LIST OF MANUFACTURERS, VENDORS, AND RESEARCH ORGANIZATIONS

This section contains a list of (1) companies that manufacture or sell several different types of devices used for analyzing, detecting, monitoring, or sensing of chemicals; and (2) organizations known to be doing research aimed at development of various types of chemical sensors. The list includes devices other than chemical sensors because the use of the term "chemical sensor" is still not widespread, especially in manufacturing literature. The list was compiled from three sources: (1) the *1993 LabGuide Edition of Analytical Chemistry* (August 15, 1992); (2) the *Thomas Register of American Manufacturers*, Thomas Publishing Company, New York, 1992; and (3) a report to the DOE/Office of Environmental Restoration and Waste Management obtained from S.J. Mech of Westinghouse Hanford Company (WHC-SP-0718, 25 November 1991). A few entries were obtained from lists of attendees at DOE meetings in which one of the authors participated. As pointed out in preceding sections, the authors do not claim this information to be comprehensive, but it is believed to be representative.

The left column of the list gives the organization or company name and address along with the voice telephone and FAX numbers, where known (if FAX is not shown before a number, the entry is a voice number). The right column gives one or more index numbers that are keys to the types of devices made or being developed. The legend for these index numbers follows.

Device Type Legend		
1. Aerosol Analyzer	14. CO Detector	26. Hydrocarbon Analyzer
2. Air Monitor, oxygen	15. Colormetric Detector	27. Ion Analyzer
3. Air Sampling & Analysis	16. Electrochemical Detector	28. Mercury Vapor Detector
4. Aldehyde Analyzer	17. Methane Detector	29. NO_2 Monitor
5. NH_3 Analyzer	18. Photoacoustic Detector	30. NO_x Analyzer
6. Cd Analyzer	19. Pyroelectric Detector	31. Chemical Sensor
7. Ca Analyzer	20. not used	32. Specific Ion Meter
8. C,H,N Analysis	21. Ion-Selective Electrode	33. Surface Analysis Equipment
9. CO_2 Analyzer	22. Microelectrode	34. Toxic Gas Detector
10. CO Analyzer	23. Specific Ion Electrode	35. Water Analyzer
11. Cl^- Ion Analyzer	24. Fiber Optic Detector	36. Vapor Detector
12. Cu Analyzer	25. Gas Analysis Apparatus	37. Organic Solvents
13. CO_2 Detector		

ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
Adsistor Technology Inc. P.O. Box 51160 Seattle, WA 98115 206-368-9110	36

Advanced Chemical Sensors Company 350 Oaks Lane Pompano Beach, FL 33069 305-979-0958; FAX 305-338-5737	??
Aesar/Johnson Matthey P.O. Box 8247 Ward Hill, MA 01835 508-521-6300; FAX 800-322-4757	22

ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
A.I.M. USA 12919 S.W. Freeway, #170 Stafford, TX 77477 713-240-5020; FAX 800-275-4246	14, 17
Air Products & Chemicals Inc. 7201 Hamilton Blvd. Allentown, PA 18195 FAX 800-752-1597	3, 25
Aldrich Chemical Company, Inc. 1001 W. St.Paul Ave. Milwaukee, WI 53233 800-558-9160	2, 3, 5, 13, 14, 28, 34
Alfa/Johnson Matthey 30 Bond Street Ward Hill, MA 01835 508-521-6300; FAX 800-322-4757	23
Alko Diagnostic Corporation ALKO Industrial Park, 333 Fiske St. Holliston, MA 01746 508-429-4600; FAX 800-828-2556	23
Alltech Associates 2051 Waukegan Rd. Deerfield, IL 60015 708-948-8600	5, 27, 29, 30
Alphagaz Div/Liquid Air Corporation 2121 N. California Blvd., Suite350 Walnut Creek, CA 94596 510-977-6506; FAX 800-248-1427	3
Alpha-M Corporation 11518 Reeder Rd., No. 115 Dallas, TX 75229 214-406-0424	21, 23

Alpha Resources, Inc. 8
3090 Johnson Rd.
Stevensville, MI 49127
616-465-5559; FAX 800-833-3083

Altamira Instruments Inc. 33
2090 William Pitt Way
Pittsburgh, PA 15238
FAX 412-826-3081

ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
American Gas & Chemical Company., Ltd. 220 Pegasus Ave. Northvale, NJ 07647 201-767-7300; FAX 800-288-3647	14, 17, 34
American Scientific Instrumentation 107 Hawthorne Ave. Park Ridge, NJ 07656 FAX 201-391-6804	3
Ames Laboratory, Iowa State University Office of Research & Technology Application 119 O&L Bldg. Ames, IA 50011-3020 515-294-2635	11, 24, 30, 31
Ametek P.O. Box 4239, Grand Central Sta. New York, NY 10163 FAX 215-296-3412	2
Ametek/Dycor 150 Freeport Rd. Pittsburgh, PA 15238 FAX 412-826-0399	25
Ametek Inc./Mansfield & Green Division 8600 Somerset Dr. Largo, FL 34643 FAX 813-539-6882	3
Ametek, Inc., Process & Analytical Instr Division 150 Freeport Rd. Pittsburgh, PA 15238 FAX 412-826-0399	2, 9, 10, 13, 14, 17, 25, 29, 30
Anacon Corporation 117 South St. Hopkinton, MA 01748 FAX 508-435-6881	2, 13, 14, 16, 17
Analabs 140 Water St. Norwalk, CT 06854 203-288-8463	3

Analytical Measurements, Inc.
31 Willow St.
Chatham, NJ 07928
FAX 908-273-7502

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ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
Analytical Products, Inc. 3339 Arden Rd. Hayward, CA 94545 510-732-5400; FAX 800-227-9738	13
Andersen Instruments Inc. 4801 Fulton Industrial Blvd. Atlanta, GA 30336 404-691-1910; FAX 800-241-6898	1, 3, 8, 25
Applied Automation/Hartmann & Braun 7780 Quincy St. Willowbrook, IL 60521 708-986-1090; FAX 800-888-3847	9, 10
Applied Science Corporation 111 Bullard Pkwy., Suite 208 Tampa, FL 33687 813-988-8181; FAX 813-988-2814	14, 17
Arizona Instrument Corporation P.O. Box 1930 Tempe, AZ 85280 602-731-3400; FAX 800-528-7411	3, 25, 28, 34
Arnel Inc. 3145 Bordentown Ave. Parlin, NJ 08859 FAX 908-721-4300	3, 25, 26
Astro International Corporation 100 Park Ave. League City, TX 77573 FAX 713-554-6795	9, 17, 26
Babcock & Wilcox Company Applied Measurement Technologies Group 1562 Beeson St. Alliance, OH 44601 216-829-7271	24, 31
Bacharach Inc. 625 Alpha Dr. Pittsburgh, PA 15238 412-963-2107; FAX 412-963-2091	2, 3, 7, 13, 14, 26, 30, 34

Bailey Controls Company
29801 Euclid Ave.
Wickliffe, OH 44092
216-585-8500

14, 24, 31

ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
Balzers 8 Sagamore Park Rd. Hudson, NH 03051 FAX 603-889-8573	3, 8, 25, 33
Baxters Scientific Products Division 1430 Waukegan Rd. McGaw Park, IL 60085 708-689-8410	2, 11, 21, 23, 27
Beckman Instruments Inc. 2500 Harbor Blvd. Fullerton, CA 92634 714-871-4848; FAX 800-742-2345	22, 27
Belov Tech. Company, Inc. 345 Sandford St. New Brunswick, NJ 08901 FAX 908-247-5396	19, 24
BGI Inc. 58 Guinan St. Waltham, MA 02154 FAX 617-891-8151	3
Bioanalytical Systems Inc. 2701 Kent Ave., Purdue Research Park W. Lafayette, IN 47906 FAX 317-497-1102	16, 22
Bio-Rad Labs, Digilab Division 237 Putnam Ave. Cambridge, MA 02139 617-868-4330; FAX 800-225-1248	3, 25
Bio-Rad Laboratories, Life Science Group 3300 Regatta Blvd. Richmond, CA 94804 510-741-1000; FAX 800-950-4246	16
Bioscience Inc. 1530 Valley Center Pkwy., Suite 120 Bethlehem, PA 18017 215-974-9693; FAX 800-627-3069	35
Bomem/Hartmann & Braun 450 Ave. St. Jean-Baptiste Quebec City, Quebec G2E 5S5 Canada 418-877-2944	13, 14, 24, 31

ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
Bomem Inc. 1360 Wood Dale, Suite B Wood Dale, IL 60191 708-350-0550; FAX 800-888-3847	19
Bran & Luebbe, Inc. 1025 Busch Pkwy. Buffalo Grove, IL 60089 FAX 708-520-0855	3, 5, 7, 11, 27
Brinkmann Instruments, Inc. One Cantiague Rd. Westbury, NY 11590-0207 516-334-7500; FAX 800-645-3050	5, 6, 11, 12, 21, 22, 23, 27, 32, 35
Brooklyn Thermometer Company, Inc. 90 Verdi St. Farmingdale, NY 11735 FAX 516-694-6329	31
Buchler Instruments 8811 Prospect Kansas City, MO 64132 816-333-8811; FAX 800-732-0031	11
Buck Scientific Inc. 58 Fort Point St. East Norwalk, CT 06855-1097 203-853-9444; FAX 800-562-5566	28, 35
Burrell Corporation 2223 Fifth Ave. Pittsburgh, PA 15219 FAX 412-391-4231	3, 25
Cahn Instruments Inc. 16207 Carmenita Rd. Cerritos, CA 90701 310-926-3378; FAX 800-423-6641	33
Calibrated Instruments Inc. 200 Saw Mill River Rd. Hawthorne, NY 10532 FAX 914-741-5711	3, 5, 9, 10, 13, 14, 16, 25, 26
California Measurements Inc. 150 E. Montecito Ave. Sierra Madre, CA 91024 FAX 818-355-5320	1, 3

ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
Capital Controls Company Inc. P.O. Box 211 Colmar, PA 18915 215-822-2901; FAX 800-523-2553	3, 5, 34
CCI Controls 5052 Cecelia St. South Gate, CA 90280-3511 213-560-6060; FAX 213-560-1136	3, 36
CDS Analytical 7000 Limestone Rd. Oxford, PA 19363-0277 215-932-3636; FAX 800-541-6593	3
CEA Instruments Inc. 16 Chestnut St. Emerson, NJ 07630 FAX 201-967-8450	2, 3, 4, 5, 9, 10, 13, 14, 17, 25, 26, 29, 30, 34
Charles Evans & Associates 301 Chesapeake Dr. Redwood City, CA 94063 415-369-4567	33
CHEMetrics Inc. Route 28 Calverton, VA 22016 703-788-9026; FAX 800-356-3072	5, 7, 9, 11, 12, 13
Chestec Corporation 21 Yennicock Ave. Port Washington, NY 11050 516-883-1700; FAX 800-548-0904	14, 17
Chrompack Inc. 1130 Hwy. 202 South Raritan, NJ 08869 908-722-8930; FAX 800-526-3687	3, 26, 35
Cincinnati Electronics Corporation 7500 Innovation Way Mason, OH 45040 FAX 513-573-6290	19
Clean Air Engineering 500 West Wood St. Palatine, IL 60067 708-991-3300; FAX 800-627-0033	1, 2, 3, 5, 9, 10, 25, 26, 29, 30

ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
Climatronics Corporation 140 Wilbur Place Bohemia, NY 11716 516-567-7300	31
Climet Instruments Company 1320 W. Colton Ave. Redlands, CA 92373 FAX 714-793-1738	3, 35
Columbus Instruments 950 N. Hague Ave. Columbus, OH 43204 614-276-0861; FAX 800-669-5011	9
Computer Chemistry Corporation 3 Haverstock Rd. Franklin, MA 02038 FAX 508-520-3766	11, 32
Conax Buffalo Corporation 2300 Walden Ave. Buffalo, NY 14225 716-684-4500; FAX 800-223-2389	24
Control Instruments Corporation 25 Law Dr. Fairfield, NJ 07004 201-575-9114; FAX 201-575-0013	31
Corning Inc. Science Products Division, HP-AB-03-08 Corning, NY 14831 FAX 607-974-7919	23
Cuda Products Corporation 6000 Powers Ave. Jacksonville, FL 32217 904-737-7611; FAX 904-733-4832	24
Custom Sensors & Technology 7534 Watson Rd. St. Louis, MO 63119 314-962-4555	5, 24, 31, 36
Cypress Systems Inc. P.O. Box 3931 Lawrence, KS 66046 FAX 913-842-0327	22

ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
Davis Instrument Manufacturing Company Inc. 4701 Mt. Hope Drive Baltimore, MD 21215 410-358-3900; FAX 800-368-2516	2, 3, 13, 14, 16, 17, 25, 29
Del Mar Scientific 4145 Billy Mitchell Addison, TX 75244 FAX 214-490-9243	3, 15
Delphian Corporation 220 Pegasus Ave. Northvale, NJ 07647 201-767-7300; FAX 800-288-3647	14, 17, 34
Diamond General Corporation 3810 Varsity Dr. Ann Arbor, MI 48108 313-973-7160; FAX 800-678-9856	22, 23
Dionex Corporation 1228 Titan Way Sunnyvale, CA 94086 408-737-0700; FAX 800-346-6390	11, 12, 16, 27
DuPont Company 1007 Market St. Wilmington, DE 19898 302-774-2421; FAX 800-441-7515	3
Du Pont Clinical & Instrument Systems Division Wilmington, DE 19898 302-772-5488	5, 25, 30
Dwyer Instruments Inc. 102 Highway 212 Michigan City, IN 46360 FAX 219-872-9057	25
Dynamation Inc. 3784 Plaza Dr. Ann Arbor, MI 48108 313-769-0573; FAX 313-769-1888	3, 14, 25, 34
Eberbach Corporation 505 S. Maple Rd. Ann Arbor, MI 48106 313-665-8877; FAX 800-422-2558	12, 28

ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
Eberline Instrument Corporation P.O. Box 2108, Airport Rd. Santa Fe, NM 87501 505-471-3232; FAX 800-678-7088	3
Edjewise Sensor Products Inc. 3450 Green Rd., Suite 201 Cleveland, OH 44122 216-397-4621	24, 36
Edmund Scientific Company 101 E. Gloucester Pike Barrington, NJ 08007 FAX 609-573-6295	24
Edo Corporation/Barnes Engineering Division 88 Long Hill Crossroads Shelton, CT 06484 FAX 203-926-1030	19
Edwards High Vacuum Inc. 3279 Grand Island Blvd. Grand Island, NY 14072 716-773-7552; FAX 800-828-3864	25
EEV Inc. 4 Westchester Plaza Elmsford, NY 10523 914-592-6050; FAX 800-342-5338	19
EG&G Gamma Scientific 3777 Ruffin Rd. San Diego, CA 92123 619-279-8034	31, 33
EG&G Ortec/EG&G Berthold 100 Midland Rd. Oak Ridge, TN 37831 615-482-4411; FAX 800-251-9750	3
EG&G Princeton Applied Research CN 5206 Princeton, NJ 08540 FAX 609-883-7259	4, 6, 11, 12, 16
Electric Power Research Institute 3412 Hillview Ave. Palo Alto, CA 94304 415-855-2331	5, 13, 14, 24, 31, 35

ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
Electrosynthesis Company, The P.O. Box 430 E. Amherst, NY 14051 FAX 716-684-0511	22
Enmet Corporation 680 Fairfield Ct. Ann Arbor, MI 48106 FAX 313-761-3220	2, 3, 5, 13, 14, 16, 17, 26, 29, 31, 34
Entech 950 Enchanted Way, Suite 101 Simi Valley, CA 93065 FAX 805-527-5687	3
Envirochem Inc. Rt. 896, Box 180 Kemblesville, PA 19347 FAX 215-255-0673	35
Environmental Technologies Group Inc. 1400 Taylor Ave. Baltimore, MD 21284-9840 301-339-3146; FAX 800-635-4598	4, 5, 25
Epitaxx Inc. Infrared Aerospace & Defense Group 2121 Avenue of the Stars, 6th Floor Los Angeles, CA 90067 213-551-6507	17, 24, 37
Eppendorf North America Inc. 545 Science Dr. Madison, WI 53711 608-231-1188; FAX 800-421-9988	5, 7, 9, 11, 12, 16, 23, 27
Erdco Engineering Corporation P.O. Box 6318 Evanston, IL 60202 800-553-0550; FAX 708-328-3535	25, 26
ES Industries 701 South Rte. 73 Berlin, NJ 08009 609-753-8400; FAX 800-356-6140	3, 35

ESA Inc.
45 Wiggins Ave.
Bedford, MA 01730
FAX 617-275-5529

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ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
Extech Instruments 335 Bear Hill Rd. Waltham, MA 02154 FAX 617-890-7864	31
FEI Microwave 825 Stewart Dr. Sunnyvale, CA 94086 408-732-0880; FAX 800-822-5864	33
Femtometrics 1001 W. 17th St., #7 Costa Mesa, CA 92627-4512 714-722-6239	??
Fenwal Electric Inc. 450 Fortune Blvd. Milford, MA 01757 FAX 508-473-6035	31
Fiberchem Inc. 3135 Regal Oak Drive Henderson, NV 89014 702-435-1524	5, 13, 14, 24, 31, 37
Figaro USA Inc. 1000 Skokie Blvd. Wilmette, IL 60091 708-256-3546; FAX 708-256-3884	5, 14, 26, 34
Fisher Scientific Company 711 Forbes Ave. Pittsburgh, PA 15219 412-562-8300; FAX 800-76607000	11, 21, 23, 25, 32
Fisons Instruments 24911 Stanford Ave. Valencia, CA 91355 800-551-8741; FAX 800-631-6841	8
Florida State University Dept. of Chemistry Tallahasse, FL 32306-3006 904-644-3001	24, 31, 37
Foxboro Bristol Park B521B Foxboro, MA 02035 508-543-8750; FAX 800-521-0451	3, 4, 5, 8, 9, 10, 13, 14, 17, 23, 25, 26, 29, 30, 33, 34, 35

ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
Galileo Electro-Optics Corporation P.O. Box 550 Sturbridge, MA 01566 508-347-9191; FAX 800-648-1800	24, 31
Gastech Inc. 8445 Central Ave. Newark, CA 94560 510-794-6200; FAX 510-794-6210	13, 14, 25
GE Company Business Information Center One Winners Circle - L Albany, NY 12205 800-626-2004	9, 10, 31
Gelman Sciences 600 S. Wagner Rd. Ann Arbor, MI 48106-1448 313-665-0651; FAX 800-521-1520	3
General Fiber Optics 98 Commerce Rd. Cedar Grove, NJ 07009 FAX 201-239-4258	24
Geo-Centers Inc., Sensor Systems Group 7 Wells Ave. Newton Centre, MA 02159 617-964-7070	5, 13, 14, 24, 29, 31, 37
Gilson Medical Electronics Inc. 3000 W. Beltline Hwy. Middleton, WI 53562 608-836-1551; FAX 800-445-7661	16
Gow-Mac Instrument Company P.O. Box 32 Bound Brook, NJ 08805 FAX 908-271-2782	9, 25, 26
Great Lakes Instruments Inc. 8855 N. 55th St., Dept. LGIE Milwaukee, WI 53223 FAX 414-355-8346	23

Hach Company P.O. Box 389 Loveland, CO 80539 303-669-3050; FAX 800-227-4224	5, 7, 12, 21, 23, 32

ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
Hamamatsu Corporation 360 Foothill Rd. Bridgewater, NJ 08807 908-231-0960; FAX 800-524-0504	19
Harvard Apparatus 22 Pleasant St. S. Natick, MA 01760 508-655-7000; FAX 800-272-2775	15
Hewlett-Packard Company 3495 Deer Creek Rd. Palo Alto, CA 94304	3
Hiac/Royco 2431 Linden Lane Silver Spring, MD 20910 301-495-7000; FAX 800-638-2790	3
Hill, E. Vernon Inc. 940 Adams St., Suite G Benecia, CA 94510-2950 FAX 707-747-1534	3
HIQ Environmental Products Company 7386 Trade St. San Diego, CA 92121 FAX 619-549-9657	3
HNU Systems Inc. 160 Charlemont St. Newton Highlands, MA 02161 617-964-6690; FAX 800-962-6032	3, 5, 7, 21, 23, 26, 32, 34
Honeywell, Inc. Honeywell Plaza Minneapolis, MN 55408 612-870-5200; FAX 800-328-5111	31, 34
Horiba Instruments Inc. 1021 Duryea Ave. Irvine, CA 92714 714-250-4811	3, 7, 9, 10, 13, 14, 21, 23, 25, 26, 30
Houston Atlas 9441 Baythorne Dr. Houston, TX 77041 FAX 713-462-1831	3, 14

Idaho National Engineering Laboratory
P.O. Box 1625, MS 1LS-W3
Idaho Falls, ID 83415

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ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
Illinois Instruments Inc. 5302 W. Elm St. McHenry, IL 60050 FAX 815-344-6332	9
Infometrix Inc. 2200 Sixth St., No. 833 Seattle, WA 98121 FAX 206-441-0841	16
Infrared Analysis Inc. 1424 N. Central Park Ave. Anaheim, CA 92802 FAX 714-535-5046	3, 25
Infrared Fiber Systems Inc. 2301-A Broad Birch Dr. Silver Spring, MD 20904 301-622-9546	13, 14, 24, 31
Ingold Electrodes Inc. 261 Ballardvale St. Wilmington, MA 01887 508-658-7615; FAX 800-352-8763	9, 21, 22, 23, 24, 27, 30
Innovative Sensors Inc. 4745 E. Bryson St. Anaheim, CA 92807 FAX 714-779-9315	21, 23
Institute of Organic Chemistry Analytical Division Karl Franzens University A-8010 Graz, Austria	5, 24
Instruments SA Inc. 6 Olsen Ave. Edison, NJ 08820 908-494-8660; FAX 800-438-7739	33
International Crystal Laboratories 11 Erie St. Garfield, NJ 07026 FAX 201-478-4201	25, 35
International Sensor Technology 17771 Fitch St. Irvine, CA 92714 714-863-9999	25, 31

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Interscan Corporation P.O. Box 2496 Chatsworth, CA 818-882-2331; FAX 800-458-6153	3, 10, 14, 16, 25, 29, 30
Ionics Inc., Instrument Division 65 Grove St. Watertown, MA 02172 617-926-2500; FAX 800-446-6427	6, 12, 16
I-STAT Corporation 436 Hazeldean Rd. Kanata, ONTARIO K2L 1T9, Canada 613-831-2725; FAX 613-836-4883	??
JASCO 8649 Commerce Dr. Easton, MD 21601 410-822-1220; FAX 800-333-5272	7, 8, 16
Johnson Matthey, Catalytic Systems Division 456 Devon Park Dr. Wayne, PA 19087 FAX 215-293-1284	25
Kahl Scientific Instrument Company P.O. Box 1166 El Cajon, CA 92022 FAX 619-444-0207	31
Kontes Spruce St. Vineland, NJ 08360 609-692-8500; FAX 800-223-7150	3, 28
Koslow Scientific Company 75 Gorge Rd. Edgewater, NJ 07020 201-941-4484; FAX 800-556-7569	16, 22
KUB/Analect 17819 Gillette Ave. Irvine, CA 92714 714-660-8801; FAX 800-326-2328	3
Kyoto Electronics Mfg. USA, Inc. 2 Edison Place Springfield, NJ 07081 201-379-9651; FAX 800-458-3168	22

ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
Lachat Instruments 6645 W. Mill Rd. Milwaukee, WI 53218 414-358-4200; FAX 800-247-7613	5, 6, 11, 12, 27
La Motte Company Route 213 North Chestertown, MD 21620 410-778-3100; FAX 800-344-3100	3
Lawrence Livermore National Laboratory P.O. Box 808 Livermore, CA 94550 510-422-3521	5, 13, 14, 24, 29, 30, 31, 34, 36, 37
Lazar Research Labs Inc. 920 N. Formosa Ave. Los Angeles, CA 90046 213-384-6195; FAX 800-824-2066	13, 21, 22, 23
Leeds & Northrup 351 Sumneytown Pike North Wales, PA 19454 215-699-2000; FAX 800-533-3726	8, 9, 10, 11, 12, 13, 21, 23, 25, 26, 31, 32
Leeman Labs Inc. 55 Technology Dr. Lowell, MA 01851 FAX 508-452-7429	6, 8, 12, 28
Kurt J. Lesker Company 1515 Worthington Ave. Clairton, PA 15025 412-233-4200; FAX 800-245-1656	27
Leybold Inficon Inc. Two Technology Place East Syracuse, NY 13057 FAX 315-437-3803	25
Li-Cor Inc. 4421 Superior St. Lincoln, NE 68504 402-467-3576; FAX 800-447-3576	9
Lightsense Corporation 1513 18th St. Santa Monica, CA 90404 213-828-1045	5, 13, 24, 31

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Lockwood and McLorie Inc. P.O. Box 113 Horsham, PA 19044 FAX 215-659-0902	3
Los Alamos National Laboratory Group P-14 P.O. Box 1663 Los Alamos, NM 87545 505-667-2470	24, 31
L.T. Industries Inc. 6110 Executive Blvd. Rockville, MD 20852 FAX 301-468-2230	4
Lumidor Safety Products 5364 N.W. 167th St. Miami, FL 33014 305-625-6511; FAX 800-825-1811	14, 17
Malvern Instruments Inc. 10 Southville Rd. Southborough, MA 01772 FAX 508-460-9692	1
Martin Marietta Energy System Inc. 831 Tri-County Blvd. Silver Springs, TN 615-435-3426	??
Matheson Gas Prod 30 Seaview Dr. Secaucus, NJ 07096 FAX 201-867-4572	2, 3, 13, 14, 17, 29, 31, 34
McCrone Accessories & Components 850 Pasquinelli Dr. Westmont, IL 60559 708-887-7100	3
McNeill International Inc. 37914 Euclid Ave. Willoughby, OH 44094 800-626-3455; FAX 216-953-1933	14, 29, 31

McPherson
530 Main St.
Acton, MA 01720
508-263-7733; FAX 800-255-1055

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ORGANIZATION/COMPANY NAME	DEVICE TYPE(S)
MDA Scientific Inc. 405 Barclay Blvd. Lincolnshire, IL 60069 708-634-2800; FAX 800-344-4632	3, 5, 10, 14, 16, 25, 34
M G Industries 2460 Blvd. of The Generals Valley Forge, PA 19482 215-630-5400; FAX 800-638-6360	34
Measurement & Analysis Systems Inc. 1155 Zion Rd. Bellefonte, PA 16823 FAX 814-353-0605	3, 8, 25
Meeco Inc. 250 Titus Ave. Warrington, PA 18976 215-343-6600; FAX 800-641-6478	25
Melles Griot Inc. 1770.Kettering St. Irvine, CA 92714 714-261-5600; FAX 800-835-2626	24
Met One Inc. 481 California Ave. Grants Pass, OR 97526 FAX 503-479-3057	3
Microelectrodes Inc. 298 Rockingham Rd. Londonderry, NH 03053 FAX 603-668-7926	21, 22, 23
Microsensor Systems Inc. 120 S. Union Ave. Havre De Grace, MD 21078 410-939-1089; FAX 410-939-1168	??
Midac Corporation 1599 Superior Ave., Suite B3 Costa Mesa, CA 92627 FAX 714-548-8459	3, 25
MIE Inc. 1 Federal St., Suite 2 Billerica, MA 01821-3500 FAX 508-663-4890	1, 3, 25

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Millipore Corporation 80 Ashby Rd. Bedford, MA 01730 617-275-9200; FAX 800-225-1380	3
Minarad Scientific Inc. 1525 Kings Hwy. East Fairfield, CT 06430 FAX 203-368-0846	19
Mine Safety Appliances Company P.O. Box 426 Pittsburgh, PA 15230 800-672-2222	3, 4, 10, 14, 25, 30, 34
Minitool Inc. 1334-F Dell Ave. Campbell, CA 95008 408-374-1587; FAX 408-374-2917	22
Minntech Corporation 14905 28th Ave. North Minneapolis, MN 55447 612-553-3300; FAX 800-328-3340	2, 3
3M Company, Analytic Systems 3M Center, Bldg. 53-3 St. Paul, MN 55101 612-778-4012	33
Moisture Systems Corporation 117 South St. Hopkinton, MA 01748 FAX 508-435-6677	33
Mosaic Industries Inc. 5437 Central Ave., Suite 1 Newark, CA 94560 FAX 510-790-0925	14, 17, 25
MTEC Photoacoustics Inc. 111 Lynn Ave. Ames, IA 50010 FAX 515-292-7125	18
MTI Analytical Instruments/Microsensor Technology 41762 Christy St. Fremont, CA 94538 FAX 510-651-2498	2, 13, 14, 17

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Munhall Company, The 5655 N. High St. Worthington, OH 43085 614-888-7700; FAX 800-247-6629	16
National Draeger Inc. 101 Technology Dr. Pittsburgh, PA 15230-0120 412-787-8389; FAX 412-787-2207	2, 3, 9, 13, 14, 29, 30, 31
National Electrostatics Corporation Box 310, Graber Rd. Middleton, WI 53562 FAX 608-256-4103	33
New Brunswick Scientific Company Inc. 44 Talmadge Rd. Edison, NJ 08818-4005 908-287-1200; FAX 800-631-5417	3
NGS Division, MKS Instruments 24 Walpole Park South Walpole, MA 02081 508-660-1770; FAX 800-282-1770	25, 33
Nicolet Instrument Corporation 5225 Verona Rd. Madison, WI 53711 608-271-3333; FAX 800-356-8088	3, 25, 26, 34
Nova Analytical/Biomedical 200 Prospect St. Waltham, MA 02164 617-894-0800; FAX 617-899-0417	5, 11, 16, 21, 23, 30, 31
Nuclear Associates 100 Voice Rd. Carle Place, NY 11514 FAX 516-741-5414	3, 35
Nutech Corporation 4022 Stirrup Creek Dr., Suite 325 Durham, NC 27703 919-544-8535; FAX 800-637-6312	3, 34
Oak Ridge National Laboratory Bldg. 4005S, MS 6101 Oak Ridge, TN 37831-6101 615-574-6249	11, 17, 24, 31, 37

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O.I. Analytical Graham Rd. at Wellborn Rd. College Station, TX 77841 FAX 409-690-0440	3
Omega Engineering P.O. Box 4047 Stamford, CT 06907 203-359-1660; FAX 800-826-6342	3, 11, 12, 19, 21, 23, 31, 32, 33
Optics for Research Inc. P.O. Box 82 Caldwell, NJ 07006 FAX 201-228-0915	24
Optronic Laboratories Inc. 4470 35th St. Orlando, FL 32811 FAX 407-648-5412	19
Orbeco Analytical Systems Inc. 185 Marine St. Farmingdale, NY 11735 516-293-4110; FAX 800-922-5242	5, 6, 9, 11, 12, 32
Pacific Northwest Laboratory P.O. Box 999 Richland, WA 99352 509-375-2081	5, 13, 14, 17, 24, 25, 29, 30, 31, 34, 35, 36, 37
Panametrics Inc. 221 Crescent St. Waltham, MA 02254 617-899-2719; FAX 800-833-9348	2
Particle Measuring Systems Inc. 1855 S. 57th Court Boulder, CO 80301 FAX 303-449-6870	1, 3, 33
PCP Inc. 2155 Indian Rd. W. Palm Beach, FL 33409-3287 407-683-0507; FAX 800-637-5307	3, 4, 5, 11, 25, 29, 30, 31, 34
Pen Kem Inc. 341 Adams St. Bedford Hills, NY 10507 FAX 914-241-4842	33

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Perkin Elmer Physical Electronics Division 6509 Flying Cloud Dr. Eden Prairie, MN 55344 612-828-6100; FAX 800-237-3603	33
Perkin-Elmer Corporation, The 761 Main Ave. Norwalk, CT 06859 203-762-1000; FAX 800-762-4000	3, 8, 9, 10, 13, 14, 16, 17, 18, 25, 26, 28, 33, 34
PGC Scientifics Corporation 9161 Industrial Court Gaithersburg, MD 20877 301-840-1111; FAX 800-424-3300	21, 25
Phoenix Electrode Company 6103 Glenmont Houston, TX 77081 713-772-6666; FAX 800-522-7920	21, 23
Photovac International Inc. 25-B Jefryn Blvd West Deer Park, NY 11729 FAX 516-254-4284	3, 34
Photovolt Corporation 1200 Madison Ave. Indianapolis, IN 46225 317-266-2024; FAX 800-222-5711	15, 25
Phrasor Scientific Inc. 1536 Highland Ave. Duarte, CA 91010 FAX 818-357-3203	27
Physical Optics Corporation 20600 Gramercy Place Torrance, CA 90501 213-320-3088	13, 14, 17, 24, 25, 29, 30, 31, 37
Poretics Corporation 111 Lindbergh Ave. Livermore, CA 94550 510-373-0500; FAX 800-922-6090	1
Princo Instruments Inc. 1020 Industrial Hwy. Southampton, PA 18966-4095 FAX 215-355-7766	31

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Quantachrome Corporation 5 Aerial Way Syosset, NY 11791 FAX 516-222-0569	33
Racal Health & Safety Inc. 7305 Executive Way Frederick, MD 21701 301-695-8200; FAX 800-682-9500	10
Radian Corporation P.O. Box 201088 Austin, TX 78720-1088 512-454-4797; FAX 512-454-8807	??
Rainin Instrument Company Inc. Mack Rd. Woburn, MA 01801 617-935-3050; FAX 800-472-4646	16, 23
Rame-Hart Inc. 43 Bloomfield Ave. Mountain Lakes, NJ 07046 201-335-0582	33
RDF Corporation 23 Elm Ave. Hudson, NH 03051-0490 603-882-5195; FAX 800-445-8367	31
Research International 18706 142nd Ave. N.E. Woodinville, WA 98072 206-486-7831	5, 13, 14, 24, 29, 31, 37
Richard Scientific Inc. 250 Bel Marin Keys Blvd., D3 Novato, CA 94948 FAX 415-382-1922	27
RMC-Cryosystems 4400 S. Santa Rita Ave. Tucson, AZ 85714 FAX 602-741-2200	31
Rosemount Analytical/Dohrmann 3240 Scott Blvd. Santa Clara, CA 95054 408-727-6000; FAX 800-538-7708	8, 9, 11, 15, 26, 35

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Rosemount Analytical/Uniloc Division 2400 Barranca Pkwy. Irvine, CA 92714 FAX 714-474-7250	23
Rupprecht & Pataschnick Company Inc. 8 Corporate Circle Albany, NY 12203 FAX 518-452-0067	1, 3
Rutgers University Fiber Optics Materials Research Program Piscataway, NJ 08855 908-932-4729	5, 13, 14, 17, 24, 31, 37
Saes Pure Gas Inc. 4175 Santa Fe Rd. San Luis Obispo, CA 93401 FAX 805-541-9399	8, 9, 14, 25, 26
Sanda Corporation 4005 Gypsy Lane Philadelphia, PA 19144 215-849-8100; FAX 800-999-2993	4, 5, 6, 8, 11, 12, 27, 32, 33
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Scientific Instruments 200 Saw Mill River Rd. Hawthorne, NY 10532 914-769-5700; FAX 800-431-1956	5, 11, 27, 35
Scott Aviation 225 Erie St. Lancaster, NY 14085 FAX 716-681-1089	14, 16, 17
Scott Specialty Gases Inc. 6141 Easton Rd. Plumsteadville, PA 18949-0310 FAX 215-766-0320	25

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Sensa Dyne Instrumentation Division 7929 N. Port Washington Rd. Milwaukee, WI 53217 FAX 414-352-8872	33
Sensidyne Inc. 16333 Bay Vista Dr. Clearwater, FL 34620 813-530-3602; FAX 800-451-9444	2, 3, 5, 8, 9, 10, 13, 14, 16, 17, 25, 26, 29, 31, 34
Sensor Solid State Services Penn Center Plaza Quakertown, PA 18951 215-536-1990	5, 24, 31, 35
Sentex Systems Inc. 553 Broad Ave. Ridgefield, NJ 07657 FAX 201-94196064	3, 13, 14, 17, 35
Servomex Company 90 Kerry Place Norwood, MA 02062 617-769-7710; FAX 800-862-0200	2, 9, 10, 13, 14, 17, 25, 26, 29, 30
Shimadzu Scientific Instruments Inc. 7102 Riverwood Dr. Columbia, MD 21046 410-381-1227; FAX 800-477-1227	9, 16, 26, 35
Siemens Industrial Automation Department 13, 100 Technology Dr. Alpharetta, GA 30202 404-740-3944	3
Sierra Monitor Corporation 1991 Tarob Court Milpitas, CA 95035 408-262-6611; FAX 408-262-9042	31
Sievers Instruments Inc. 1930 Central Ave., Suite C Boulder, CO 80302 FAX 303-444-9543	29, 30
Sigma Chemical Company 3050 Spruce St. St. Louis, MO 63103 314-771-5765; FAX 800-325-5052	21, 23

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Skalar USA Inc. 500 Oakbrook Pkwy, Suite 130 Norcross, GA 30093 404-416-6717; FAX 800-782-4994	5, 6, 11, 27, 29, 30
Solder Absorbing Technology Inc. 144 Oakland St. Springfield, MA 01108 413-788-6191; FAX 800-628-8862	31
Solomat Neotronics 652 Glenbrook Rd. Stamford, CT 06906 203-348-9700; FAX 800-932-4500	9, 11, 13, 21, 23, 32
Soltec Corporation 12977 Arroyo St. San Fernando, CA 91340 818-365-0800; FAX 800-423-2344	24
Sonoxco Inc. 430 Ferguson Dr., Bldg. 3 Mountain View, CA 94043 415-960-3007; FAX 415-960-0127	9, 10, 13, 14, 31, 34, 36
Spectra Gases Inc. 277 Coit St. Irvington, NJ 07111 201-372-2060; FAX 800-932-0624	12, 14
SPI Supplies Division/Structure Probe Inc. 569 E. Gay St. West Chester, PA 19381-0656 215-436-5400; FAX 800-242-4774	33
Standard Instrumentation 147 11th Ave. South Charleston, WV 25303 FAX 304-744-4319	8
Staplex Company, The 777 Fifth Ave. Brooklyn, NY 11232-1695 718-768-3333; FAX 800-221-0822	3
Supelco Inc. Supelco Park Bellefonte, PA 16823 800-359-3041; FAX 800-247-6628	3, 25

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Surface/Interface Inc. 110 Pioneer Way, Suite H Mountain View, CA 94041 FAX 415-965-8207	33
Sutter Instrument Company 40 Leveroni Court Novato, CA 94949 FAX 415-883-0572	22
Technicon Industrial Systems 511 Benedict Ave. Tarrytown, NY 10591 914-631-8000	4, 5, 11, 12, 16, 23
Tekmar Company 7143 E. Kemper Rd. Cincinnati, OH 45249 513-247-7000; FAX 800-543-4461	3
Teknekron Sensor Development Corporation 1080 Marsh Rd. Menlo Park, CA 94025 415-322-6200; FAX 415-322-6337	??
Tektronix Inc. P.O. Box 500; 76/260 Beaverton, OR 97077 503-627-7111; FAX 800-835-9433	24, 31
Teledyne Analytical Instruments 16830 Chestnut St. City of Industry, CA 91749 FAX 818-961-2538	2, 3, 4, 5, 8, 9, 10, 13, 14, 16, 17, 25, 26, 29, 30
Temp-Pro Inc. 200 Industrial Dr. Northampton, MA 01060 FAX 413-586-3625	31
Thermedetec Inc. 470 Wildwood St. Woburn, MA 01888 FAX 617-938-0651	3
Thermo Environmental Instruments Inc. 8 West Forge Pkwy. Franklin, MA 02038 508-520-0430; FAX 508-520-1460	3, 34

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Thermometrics Inc. 808 U.S. Hwy. 1 Edison, NJ 08817 FAX 908-287-8847	31
Thorton Associates 1432 Main St. Waltham, MA 02154 617-890-3399; FAX 800-642-4418	31
Tintometer Company, The 309-A McLaw's Circle Williamsburg, VA 23185 FAX 804-229-0472	27
T M Analytic Inc. 574 Supreme Dr. Bensenville, IL 60106 708-860-9122; FAX 800-323-5405	16, 21
TN Technologies Inc. P.O. Box 800 Round Rock, TX 78680 512-388-9100; FAX 800-736-0801	12
Trace Analytical Inc. 3517 A Edison Way Menlo Park, CA 94025 FAX 415-364 6897	10, 14, 17, 25, 26
Transducer Research Inc. Naperville, IL 708-357-1055	??
TSI Inc. 500 Cardigan Rd. St. Paul, MN 55164 612-483-0900	1, 3
UIC Inc. 1225 Channahon Rd. Joliet, IL 60436 815-727-5431; FAX 800-342-5842	8, 9, 15
Ultra Scientific Inc. 250 Smith St. North Kingstown, RI 02852 401-294-9400; FAX 800-338-1754	3

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UniFET 11021 via Frontera, Suite 200 San Diego, CA 92127 619-673-1851; FAX 800-441-3515	16, 21, 22, 23
United Electric Controls Company 180 Dexter Ave. Watertown, MA 02172 FAX 617-926-2658	31
Universal Sensors Inc. 5258 Veterans Blvd., Suite D Metairie, LA 70006 FAX 504-885-8443	3, 16, 25, 34
University of Washington, Chemistry Department Seattle, WA 98105 206-543-0579	5, 13, 24, 31, 37
UTI Instruments Company 497 S. Hillview Dr. Milpitas, CA 95035 408-945-1955; FAX 800-346-0100	3, 25
Varian Associates 3075 Hansen Way, K-306 Palo Alto, CA 94304-1025 415-424-5235	??
Veeco/Sloan Technology Division 602 E. Montecito St. Santa Barbara, CA 93103 FAX 805-965-0522	33
VG/Fisons Instruments 32 Commerce Center, Cherry Hill Dr. Danvers, MA 01923 FAX 508-777-0678	9, 10, 25, 26, 33
VICI Metronics 2991 Corvin Dr. Santa Clara, CA 95051 FAX 408-737-0346	3
Wallace Fisher Instrument Company 334 Pleasant St. Pawtucket, RI 02860 FAX 401-727-4901	3

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Wheaton 1501 N. 10th St. Millville, NJ 08332 609-825-1100; FAX 609-825-1368	3, 8, 25
XonTech Inc. 6862 Hayvenhurst Ave. Van Nuys, CA 91406 FAX 818-786-4275	3
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50. Dr. David Costello, Lovelace Scientific Resources, 6901 Corporate Dr., Suite 115, Houston, TX 77036.

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