Nuclear Decay Data for Selected Radionuclides

Edited by M. J. Martin

1968

OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION-CARBIDE CORPORATION FOR THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

BLANK PAGE

Printed in the United States of America. Available from
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road, Springfield, Virginia 22161
Price: Printed Copy \$5.50; Microfiche \$2.25

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the Energy Research and Development Administration, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

Contract No. W-7405-eng-26

NUCLEAR DECAY DATA FOR SELECTED RADIONUCLIDES*

Edited by M. J. Martin

*Prepared from the Evaluated Nuclear Structure Data File of the Nuclear Data Project.
To be published in part in NBS Handbook 80, A Manual of Radioactivity Procedures.

NUCLEAR DATA PROJECT

W. B. Ewbank, Director

F. E. Bertrand, Deputy Director

D. J. Horen, Director (1969-1975)

R. L. Auble

B. Harnatz

D. C. Kocher

Y. A. Ellis

H. J. Kim

M. J. Martin

R. L. Haese

M. R. Schmorak

Technical Assistants

S. J. Ball

F. W. Hurley

M. R. McGinnis

S. H. Dockery

J. T. Miller

March 1976

OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37830
operated by
UNION CARBIDE CORPORATION
for the
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

file

NUCLEAR DECAY DATA FOR SELECTED RADIONUCLIDES*

Edited by M. J. Martin

Contained in this report are tabulations of the atomic and nuclear radiations emitted by 194 radioactive nuclides. The nuclei included comprise most of those currently of interest in medical practice or research, health physics, industry, nuclear power, environmental impact studies, and as reference standards. Listed in tabular form are recommended values for half-lives, energies, intensities (probabilities per decay), and equilibrium absorbed-dose constants for each of the atomic and nuclear radiations emitted by these radioactive atoms. The data contained here supersede those in earlier publications by the editor (70MaBl, 73MaVR).

Space limitations do not permit the inclusion of references for the nuclear data appearing in this table. If documentation is required, it can be obtained by writing to the Nuclear Data Project.

CONTENTS

- I. REVIEW OF RADIATION PROCESSES
- II. COMPUTER PROGRAM, MEDLIST
- III. EXPLANATION OF TABLE OF RADIATION DATA, POLICIES FOLLOWED
- IV. PARENT-DAUGHTER ACTIVITY RATIOS
- V. SYMBOLS AND DEFINITIONS
- VI. INDEX TO TABLE
- VII. TABLE OF RADIATION DATA
- VIII. REFERENCES

*Prepared from the Evaluated Nuclear Structure Data File of the Nuclear Data Project.
To be published in part in NBS Handbook 60, A Manual of Radioactivity Procedures.

BLANK PAGE

As in β^- -decay (see above), the β^+ -particles emitted in a transition to a particular level in the daughter nucleus have a continuous distribution of energies with a definite $E_{\max}$ and $E_{\min}$. For positron decay, $E_{\max} = Q^+ - 2mc^2 - E(\text{level})$, where Q^+ is the atomic mass difference between ground states of parent and daughter. Note that β^+ -decay to a particular level cannot occur unless $Q^+ - E(\text{level}) > 2mc^2$ ($2mc^2 = 1022 \text{ keV}$).

D. ϵ -Decay

In electron-capture decay, an atomic electron is captured by a nucleus and a neutrino is emitted as a result of the process $p + e^- \rightarrow n + \nu$. This decay decreases the nuclear charge by one unit and leaves the daughter nucleus with a vacancy in one of its atomic shells. K-shell electron capture, for example, refers to a capture process where the final-state vacancy is in the K-shell. For a K-shell electron-capture branch to a particular level, the energy released is given by $Q^+ - E(\text{level}) - E_K$, where E_K is the K-shell binding energy in the daughter atom.

The electron-capture process always competes with β^+ -decay, but also can occur when the transition energy is too small to allow β^+ -emission, that is when $Q^+ - E(\text{level}) < 1022 \text{ keV}$.

E. γ -Decay

Electromagnetic radiation is emitted by a nucleus in a transition from a higher to a lower energy state. A numeric index on γ , as in $\gamma 1$, denotes a γ -ray emitted in the transition between a particular pair of nuclear levels. The energy of this gamma, $E(\gamma 1)$, is equal to the energy difference between the two levels (except for a negligible amount of nuclear recoil energy, $E_{\text{recoil}} (\text{keV}) = 5.4 \times 10^{-7} E^2(\gamma)/A$, where A is the mass number and $E(\gamma)$ is in keV).

F. Internal-Conversion-Electron Emission (ce)

An atomic electron can be emitted as an alternative to γ -ray emission in the transition of a nucleus from a higher to a lower energy state. In the internal-conversion process, the energy difference between these states is transferred directly to a bound atomic electron which is then ejected from the atom. An alphabetic index on ce refers to the shell from which the atomic electron is ejected. Thus, ce-K denotes K-shell conversion and ce-MNO denotes conversion in the M-, N-, and O-shells combined. A numeric index, as in ce-K-1, has a meaning analogous to that used above for γ -rays. For a transition with energy $E(\gamma 1)$, the K-shell internal-conversion electron is emitted

I. REVIEW OF RADIATION PROCESSES

A. α -Decay

In α -decay, a nucleus with atomic number Z and mass number A emits an α -particle (${}^4\text{He}$ nucleus, $Z = 2$, $A = 4$) and decays to a nucleus with atomic number $Z - 2$ and mass number $A - 4$.

For decay to a particular level in the daughter nucleus, the maximum energy available for the α -particle is

$$E_{\alpha} = Q_{\alpha} - E_R = E(\text{level}) - \frac{M}{M + M_{\alpha}} [Q_{\alpha} - E(\text{level})] = \frac{M}{M + M_{\alpha}} Q'_{\alpha},$$

where Q_{α} is the atomic mass difference between ground states of parent and daughter, M_{α} and M are the masses of the α -particle and daughter atom, respectively, and $E_R = M_{\alpha} Q'_{\alpha} / (M_{\alpha} + M)$ is the energy carried off by the recoil of the daughter atom.

B. β^{-} -Decay

In β^{-} decay, an antineutrino ($\bar{\nu}$) and a negative electron (β^{-}) are emitted from the nucleus as a result of the process $n \rightarrow p + \beta^{-} + \bar{\nu}$. The decay increases the nuclear charge by one unit.

The energy released in a single β -transition is divided between the β -particle and the antineutrino in a statistical manner so that, when a large number of transitions are considered, both the antineutrinos and β -particles are found to have energy distributions extending from zero up to some maximum value. For decay to a particular level in the daughter nucleus, the maximum energy available is $E_{\text{max}} = Q^{-} - E(\text{level})$, where Q^{-} is the atomic mass difference between ground states of parent and daughter. The average energy of a β -particle in this transition is given by

$$E_{\text{av}} = \int_0^{E_{\text{max}}} E \times N(E) dE / \int_0^{E_{\text{max}}} N(E) dE,$$

where $N(E)$ is the number of β -particles with energy between E and $E + dE$. Thus, the β^{-} -particles from a particular transition i , denoted in the main table by $\beta^{-}i$, constitute a "group" having a continuous distribution of energies with a definite E_{max} and E_{av} .

C. β^{+} -Decay

In β^{+} -decay, a neutrino (ν) and a positive electron (β^{+}) (positron) are emitted from the nucleus as a result of the process $p \rightarrow n + \beta^{+} + \nu$. This decay decreases the nuclear charge by one unit.

with energy $E(\text{ce-K-l}) = E(\gamma\text{l}) - E_K$, where E_K is the K-shell binding energy. The energy of an electron converted in one of the other shells is given by the same expression with the replacement of E_K by the binding energy appropriate to that shell.

For a particular transition, the ratio of the probability for emission of a K-conversion electron to that for emission of a γ -ray, $I(\text{ce-K})/I(\gamma)$, is called the K-shell conversion coefficient for that transition. Conversion coefficients for the other shells are defined in an analogous manner.

G. X-Ray and Auger-Electron Emission (X, e_A)

Whenever a vacancy is produced in an inner electron shell of an atom, the filling of this vacancy is accompanied by either X-ray or Auger-electron emission. Vacancies created by the filling of the initial vacancy will in turn produce further X-rays or Auger electrons. This cascade of radiations continues until all vacancies have been transferred to the outermost electron shell. Inner-shell vacancies are always produced in two types of nuclear decay, electron capture and internal conversion. Other processes which produce electron vacancies following a nuclear decay, such as electron shakeoff (the ejection of one or more atomic electrons due to a sudden change in nuclear charge) or the ejection of atomic electrons by escaping α - or β -particles, are not discussed here because of the low probability of their occurrence.

1. Fluorescence yield (ω)

The fluorescence yield for a particular atomic shell (ω_K, ω_L , etc.) is defined as the probability that a vacancy in that shell will result in the emission of an X-ray. If n_K is the number of K-shell vacancies per disintegration, the number of K X-rays will be $n_K \omega_K$, and the number of K-Auger electrons will be $n_K(1 - \omega_K)$.

The most recent and thorough review of fluorescence yields is that of Bambynek et al. (72BaCr). The K-shell fluorescence yields, ω_K , adopted in the present work are the "fitted values" from Table III-V of the above reference. The average L-shell fluorescence yields, ω_L , with uncertainties, have been estimated by the editor from Fig. 4-34 of this same work.

2. X-Rays

X_K . An X-ray emitted as a result of the filling of a K-shell vacancy by an electron from a higher shell, for example the Y-shell, has an energy $E_K - E_Y$, where E_K and E_Y are the electron binding energies in the K- and Y-shells, respectively. This transition

can be denoted by $K - Y$. In order of decreasing intensity, the most important transitions are

$$\begin{array}{ll} K_{\alpha 1} & K - L_3 \\ K_{\alpha 2} & K - L_2 \\ K_{\beta 1} & K - M_3 \\ K_{\beta 2} & K - N_3 \\ K_{\beta 3} & K - M_2 \\ K_{\beta 4} & K - N_2 \\ K_{\beta 5} & K - M_4 \end{array}$$

Energies and intensities for the $K_{\alpha 1}$ and $K_{\alpha 2}$ lines and the $K_{\beta} = \sum K_{\beta i}$ group are given explicitly. The X-ray energies are taken from Bearden and Burr (67BeBu), and the intensity ratios K_{β}/K_{α} and $K_{\alpha 2}/K_{\alpha 1}$ are taken from Rao et al. (72Ra47).

As already mentioned, the number of K X-rays per disintegration is $n_{K \leftarrow K}$. Thus the number of $K_{\alpha 1}$ X-rays is

$$\frac{n_{K \leftarrow K}}{(1 - K_{\beta}/K_{\alpha})(1 - K_{\alpha 2}/K_{\alpha 1})}$$

with similar expressions for $K_{\alpha 2}$ and K_{β} . The number of K-vacancies per disintegration is the sum of the vacancies produced by K capture and those produced by internal conversion in the K-shell. Thus

$$n_K = \epsilon_K + I(\text{ce-K}),$$

where ϵ_K is the total number of K-captures per disintegration, and $I(\text{ce-K})$ is the total number of K-shell internal-conversion electrons per disintegration.

X_L . As in the case of the K-shell, many transitions contribute to the L X-ray spectrum. However, since the relative intensities of these transitions are not known for all Z-values and since the energy differences between the strong transitions are small (≤ 3 keV), the total L X-ray radiation is treated here as a single group having the energy of the strongest transition, $L_{\alpha 1} = L_3 - M_5$. For $Z < 37$, the M_5 -transitions have not been resolved experimentally from the M_4 -transitions. In these cases, the energy given is that for the transition $L_{\alpha 1, \alpha 2} = L_3 - M_4, M_5$. See Figs. 4-8 and 4-11 of 72BaCr for examples of L X-ray spectra.

The calculation of the number of L X-rays per disintegration, $n_{L \leftarrow L}$, is similar to that for K X-rays except that, in addition to vacancies produced by direct L-shell capture and by L-shell conversion, those created by the transfer of L-shell electrons to K-shell vacancies must also be included. Thus,

$$n_L = \epsilon_L + I(\text{ce-L}) + n_{KL} \times n_K,$$

where n_{KL} is the number of L-shell vacancies created per K-shell vacancy, and the other symbols have meanings analogous to those used above for the K-shell. Values of n_{KL} are taken from 72BaCr.

3. Auger Electrons (α_{α})

The Auger process competes with the emission of X-rays as a means of carrying off the energy released in the filling of an inner-shell vacancy by an electron from an outer shell. In the Auger process, the filling of an inner-shell vacancy is accompanied by the simultaneous ejection to the continuum of an outer-shell electron. The resulting atom is left with two vacancies. The Auger-electron yield per disintegration of a particular atomic shell is $n_K(1 - \omega_K)$, $n_L(1 - \omega_L)$, etc. If the original vacancy is in the K-shell and if this vacancy is filled by an electron from shell X with the ejection of an electron from shell Y, the transition is denoted by KXY. The energy of the ejected electron is $E_K - E_X - E'_Y$, where E_K and E_X are neutral-atom K- and X-shell binding energies, respectively, and E'_Y is the binding energy of a Y-shell electron in an atom containing a vacancy in the X-shell. The most intense K-Auger transitions are of the type KLL. Since the relative intensities of the electrons in the KLL-group are not accurately known for all Z-values and since the energy difference between the transitions is small (≤ 5 keV), the K-Auger electrons are treated here as a single group having the energy of the strongest transition, KL_2L_3 . The energy of this transition as a function of atomic number is taken from Table 1 of Bergstrom and Nordling (65Be37). See Fig. 3-5 of 72BaCr for an example of a K-Auger electron spectrum.

In the case of the L-Auger process, very little is known about the energies or relative intensities of the individual L-Auger electrons. For this compilation, the L-Auger electrons are treated as a single group having the energy appropriate to an $L_3M_4M_5$ transition. See Fig. 4-13 of 72BaCr for an example of an L-Auger electron spectrum.

H. Bremsstrahlung

In addition to any monoenergetic X-rays or γ -rays that may be present in radioactive decay, every β -decay produces continuous electromagnetic radiation called bremsstrahlung. Two processes contribute to this continuous spectrum.

1. "External" bremsstrahlung is produced by collisions between β 's (and β^+ 's) and the atoms of the material surrounding the radiating atoms. Since the intensity of the external bremsstrahlung depends on the atomic number, Z, of the surrounding material, this radiation is not included in the present tables. In many cases this radiation cannot

be neglected in dose calculations. An approximate value for the average energy of the external bremsstrahlung associated with a β -group of maximum energy E_β (keV) (thick target approximation) is given by (55Ev23, p. 619)

$$E_{av} \approx 1.4 \times 10^{-7} Z E_\beta^2 \text{ keV per } \beta.$$

In the decay of ^{32}P , where $E_\beta = 1711$ keV, the average energy per disintegration of the external bremsstrahlung is $\approx 0.4 Z$ keV.

2. "Internal" bremsstrahlung, originating within a decaying atom, is produced by the sudden change of nuclear charge which occurs in β^+ -, β^- -, or ϵ -decay. This radiation is not included here because of its low intensity and low average energy. The average energy of the internal bremsstrahlung associated with a β -group of maximum energy E_β (keV) is given for $E_\beta \gg mc^2$ (511 keV) by (66Sc35, pp. 76-84)

$$E_{av} \approx 1.5 \times 10^{-3} E_\beta \log(0.004 E_\beta - 2.2) \text{ keV per } \beta.$$

In electron capture, the corresponding expression for a transition with energy E_ϵ (keV) is (66Sc35, pp. 76-84)

$$E_{av} \approx 1.5 \times 10^{-7} E_\epsilon^2 \text{ keV per capture.}$$

In the decay of ^{32}P , where $E_\epsilon = 1711$ keV, the average internal bremsstrahlung energy per disintegration is ≈ 1.7 keV.

II. COMPUTER PROGRAM, MEDLIST*

Based on the radioactive decay data sets in the Evaluated Nuclear Structure Data File and computerized tabulations of the relevant Z -dependent constants (a_K , a_{KL} , etc.) discussed in the preceding section, the computer program, MEDLIST, calculates the energies and intensities of the atomic radiations (X-ray and Auger-electron transitions). The program then combines these radiations with the nuclear radiations, sorts them according to radiation type (i.e., α , β , γ , ϵ ...), and, within each type, arranges and numerically labels them in order of increasing energy.

*Written by W. B. Ewbank, Nuclear Data Project, and M. J. Kowalski, Great Lakes College Association — Oak Ridge Science Semester participant from Ohio Wesleyan University.

Uncertainties on all experimental quantities, including the atomic constants, are consistently carried through the calculations. A 3% uncertainty is assigned to all theoretical conversion coefficients and is propagated, within MEDLIST, along with the experimental uncertainties.

A variable low-intensity cutoff limit is built into MEDLIST. For the present tables this intensity limit is 0.1%. Immediately following the listing of each of the radiation types, α , β , and γ , MEDLIST prints a comment giving the number and the summed intensity of the radiations omitted because of the chosen cutoff limit, provided that this summed intensity is greater than 0.01%.

It should be noted that the numerical labels on the γ -radiations are based on all the radiations contained in the original data set on which MEDLIST operates. These labels are maintained throughout the MEDLIST calculations and are carried into the output. In particular, when low-intensity radiations are omitted, the remaining radiations are not relabelled. Thus, in the γ -listing there may appear the sequence γ_1 , γ_2 , γ_4 , ..., which tells the reader that γ_3 , with energy between that of γ_2 and γ_4 , has been omitted because its intensity is below the cutoff limit. Note that there could still appear a conversion line associated with γ_3 , say ce-K-3, if its conversion coefficient is large enough such that the intensity of ce-K-3 exceeds the cutoff limit.

For those nuclei which decay by positron emission, MEDLIST prints a comment at the end of the γ -ray list, giving the maximum possible intensity of the annihilation radiation ($\gamma^\pm$), calculated from $I(\gamma^\pm) = 2 \sum_i I(\beta_i^+)$.

III. EXPLANATION OF TABLE OF RADIATION DATA, POLICIES FOLLOWED

The table contains data on atomic and nuclear radiations of the type Auger (K-, L-shells); X-ray (L, $K_{\alpha 1}$, $K_{\alpha 2}$, K_β); β^- ; β^+ ; α ; γ ; and ce (K-, L-, ... shells) emitted with intensity > 0.1 per 100 disintegrations of the parent nucleus (i.e., > 0.1%). Following the listing of α -, β -, and γ -radiations for each data set is a comment stating the number and total intensity of the observed radiations omitted because of this intensity cutoff.

Auger electrons and X-rays resulting from the filling of vacancies in the M-, N-, ... shells, although sometimes occurring with large intensities, are not included. These transitions have energies ranging from ≈ 2 keV in ^{197}Hg decay to ≈ 0.6 keV in ^{113}Sn decay. Their intensities, however, are not in general calculable since the contribution to the total number of, say, M-shell vacancies due to initial K- or L-shell vacancies has not been measured. However, theoretical estimates of some of these quantities are

available for limited Z-regions. For ^{83m}Kr , based on theoretical values of the required atomic constants (from $^{72}\text{BaCr}$), the editor estimates a yield of $\approx 300\%$ M-shell Auger transitions (with energy ≈ 0.2 keV). As an additional example, for ^{125}I decay, where M-shell vacancies are produced both in electron-capture decay and the subsequent internal conversion process, the editor estimates a yield of $\approx 590\%$ M-shell Auger transitions. The total energy emitted per decay by these low-energy Auger transitions (≈ 0.5 keV) is ≈ 3 keV.

The radiations are listed in the first column by type. For an explanation of the notation employed see Symbols and Definitions (Section V). Particle radiations (Auger, α , β) are given first, followed by the electromagnetic radiations (X-ray, γ). In the case of β -decay, whenever more than one group is present, a separate entry (designated "total β ") is made for the composite spectrum. The intensity given for the "total β " entry is the sum of the intensities of the individual groups. For β^- -emitters with no alternate mode of decay, this intensity must be exactly 100%. However, it should be noted that, since the intensities of the individual β^- -groups are usually determined from the γ -intensities which in turn are usually determined by the requirement that the total ($\beta^- + \gamma$)-feeding of the daughter ground state be 100%, the intensity of the total β^- -spectrum as calculated from the sum of the individual β^- -intensities does not always come to exactly 100%. This summed value could be replaced by 100%, but has not been done so here.

Columns 2 and 3 contain, respectively, the energy (in keV) and intensity (particles or photons per 100 disintegrations of the parent nucleus). For the β -groups, both the maximum and the average energies are given.

In column 4, Δ , the value of energy emitted per disintegration, is presented in units of g-rad/ $\mu\text{Ci-h}$. For an infinite, homogeneous medium in which a source is uniformly dispersed with a concentration of 1 $\mu\text{Ci-h/g}$, Δ gives the absorbed dose in rads. See also Symbols and Definitions (Section V).

The nuclei are listed in order of increasing mass number, $A = N + Z$. For nuclei with the same A, the order is by increasing Z.

Each decay mode of a given radionuclide is listed separately. In those cases where a nucleus decays by more than one mode, a cross reference is given to the alternate mode or modes. For example, ^{64}Cu decays by both β^- - and β^+ -branches. A separate listing is given for each of these decay modes. Following the heading " ^{64}Cu B- DECAY"

is the comment "SEE ALSO 64CU B+ DECAY", and following the heading "64CU B+ DECAY" is the comment "SEE ALSO 64CU B- DECAY". As another example, ^{154}d ^{121}Te decays by both electron-capture (EC) and isomeric transition (IT) branches. Following the heading "121TE EC DECAY" is the comment "SEE ALSO 121TE IT DECAY", and conversely. In such cases, the radiations in each data list should simply be combined to obtain all the radiations from the parent under consideration. In those cases where a parent decays to one or more radioactive descendants, the parent and each descendant are treated separately. If one of the daughters is an isomer, then for that isomer data listing, a comment is made giving the percentage feeding from the immediate parent. For example, ^{99}Mo decays to $^{99\text{m}}\text{Tc}$. Following the heading "99MO B- DECAY" is the comment "SEE ALSO 99TC IT DECAY (0.02 H)", and following the heading "99TC IT DECAY" is the comment "FEEDING OF 99MTC IN 99MO DECAY = 86.8%". To correctly include all the contributions of such radioactive chains, the user must combine the radiations from each member of the chain using the standard equations for parent-descendant activity relations and the feeding of each member of the chain (given in the table only for isomers; otherwise feeding is 100%). (See Parent-Daughter Activity Ratios, Section IV.)

No separate entry is made in the γ -listing for the 511-keV annihilation radiation ($\gamma^\pm$) accompanying positron decay. Instead, the intensity of this radiation, calculated from $I(\gamma^\pm) = 0.5 \times \sum I(\beta_+^+)$, is given in a comment at the end of each data set. This intensity is presented separately, and as a "maximum" value, since the annihilation process takes place external to the decaying atom in the medium surrounding the atom. The fraction of the maximum which will be of importance in a given application therefore depends upon the extent of the region surrounding the decaying atom that is being considered in that application.

The following policy on the use of "B+" and "EC" in decay type headings should be noted. "EC" as in "... EC DECAY" is used to denote either EC or EC + B+ (if positrons are energetically allowed). "B+" as in "... B+ DECAY" is also sometimes used, especially if the positron decay dominates electron capture, or if "B+ DECAY" is a more common descriptor of a certain nucleus. Thus the use of "EC" as a heading does not preclude the possibility of positron decay.

IV. PARENT-DAUGHTER ACTIVITY RATIOS

A thorough discussion of the general case of activity relations among members of a radioactive decay chain is contained in 55Ev23. For the special case of a radioactive parent with one radioactive daughter, fed in a fraction, f , of the parent decays, the ratio of daughter activity to that of the parent is given as a function of time, t , by

$$\frac{f T_{1/2}(p)}{T_{1/2}(p) - T_{1/2}(d)} [1 - e^{-(\lambda_d - \lambda_p) t}], \quad (1)$$

where $T_{1/2}(p)$, $T_{1/2}(d)$ are the half-lives, and λ_p , λ_d the decay constants ($\lambda = \ln 2 / T_{1/2} \equiv 0.693 / T_{1/2}$) of the parent and daughter nuclides, respectively. The activity of the daughter is taken to be zero at time $t = 0$ (i.e., the parent source is initially pure).

A common case occurring in these tables is that in which the daughter half-life is shorter than the parent half life. In such cases, the ratio of parent-to-daughter activities first increases with time and then approaches a constant value. For time, t , large compared with $1/(\lambda_d - \lambda_p)$, Eq. (1) reduces to

$$\frac{f T_{1/2}(p)}{[T_{1/2}(p) - T_{1/2}(d)]}. \quad (2)$$

An example of this case is the decay of ^{99}Mo to ^{99m}Tc where $T_{1/2}(p) = 66.0 \text{ h}$, $T_{1/2}(d) = 6.02 \text{ h}$, and $f = 0.8689$. For large t ($t > 10 T_{1/2}(d)$ is sufficient here), the ratio of ^{99m}Tc activity to that of ^{99}Mo is, from Eq. (2), $(0.8689) \times (1.1001) = 0.95510$. Thus, to correctly account for all the radiations from a ^{99}Mo source, the radiations from ^{99m}Tc should be multiplied by 0.95510, and combined with those from ^{99}Mo .

V. SYMBOLS AND DEFINITIONS*

Auger-K, Auger-L	K-shell Auger electron, L-shell Auger electron
avg	Average
ce-L-1, ce-L-2, etc.	K-shell conversion electron for transition 1, L-shell conversion electron for transition 2, etc.
Ci	Curie
D	Day

*Many of these symbols are nonstandard (thus D rather than d for day, etc.). Their form is dictated by the symbols available on the computer print train used to prepare the table.

H	Hour
$K\alpha_1, K\alpha_2, K\beta; L$	K X-rays; L X-ray
M	Minute
max	Maximum
rad	Unit of absorbed dose, equal to 6.25×10^7 MeV/g
S	Second
Y	Year
$\alpha_1, \alpha_2, \dots$	Alpha particle corresponding to transition 1, 2, etc.
$\beta_1, \beta_2, \dots$	Beta particle corresponding to transition 1, 2, etc.
$\gamma_1, \gamma_2, \dots$	Gamma ray corresponding to transition 1, 2, etc.
$\gamma^\pm$	Annihilation radiation
Δ	Equilibrium absorbed-dose constant. See below
$\mu\text{Ci-h}$	Microcurie-hour
3.624 12	3.624 ± 0.012
3.6 H 12	3.6 ± 1.2 H
2.1E5 Y 2	$(2.1 \pm 0.2) \times 10^5$ Y
108MAG	108mAg

Equilibrium Dose Constant (Δ). For a radioactive source distributed uniformly throughout an infinite, homogeneous, absorbing material, the energy absorbed per gram is in equilibrium with the energy emitted per gram. Under these conditions the equilibrium absorbed dose, D_{eq} , is given by (68Lo14)

$$D_{eq} = C \times \sum_i \Delta_i \text{ rad,}$$

where the cumulated concentration C ($\mu\text{Ci-h/g}$) is constant, and $\Delta_i = 0.00213 \times I_i \times E_i$, g-rad/ $\mu\text{Ci-h}$ is the equilibrium (absorbed) dose constant for i -type radiation of average energy E_i (keV) and intensity per decay I_i . Thus Δ_i , the energy emitted per disintegration, depends only on the decay scheme of the radioactive nuclide from which the source is made. It may be interpreted as the equilibrium dose per unit cumulated concentration or as the equilibrium dose rate per unit concentration. The constant 0.00213 is the factor required to convert Δ_i from units of keV/dis to g-rad/ $\mu\text{Ci-h}$. (1 keV/disintegration = $3.7 \times 10^4 \times 3.6/6.25 \times 10^7 = 0.00213$ g-rad/ $\mu\text{Ci-h}$.)

VI. INDEX TO TABLE

11C E- DECAY (12.35 Y 1)	77MR EC DECAY (56 H 2)	123I EC DECAY (13.2 H 1)
11C B+ DECAY (20.4 H 1)	79KR B+ DECAY (35.04 H 10)	124SB B- DECAY (60.20 D 3)
13H B+ DECAY (9.97 H 2)	81KR EC DECAY (2.125 Y 2)	124I B+ DECAY (8.18 D 2)
14C B- DECAY (5730 Y 40)	82MR B- DECAY (35.30 H 3)	125I EC DECAY (60.14 D 11)
150 B+ DECAY (123 S 1)	84RB B+ DECAY (34 B 1)	126I EC DECAY (13.02 D 7)
16H B- DECAY (7.12 S 2)	84RB B- DECAY (34 D 1)	126I B- DECAY (13.02 D 7)
18P B+ DECAY (109.74 H 4)	85KR B- DECAY (10.72 Y 1)	127XE EC DECAY (36.41 D 2)
22HA B+ DECAY (2.602 Y 2)	85KR IT DECAY (4.48 H 1)	129YE B- DECAY (69.6 H 2)
24HA B- DECAY (15.00 H 4)	85KR B- DECAY (4.48 H 1)	129YE IT DECAY (33.6 D 1)
26AL B+ DECAY (7.1625 Y 32)	85SR EC DECAY (64.85 D 3)	129YE B- DECAY (33.6 D 1)
27MG B- DECAY (9.462 Y 11)	86RE B- DECAY (18.66 D 2)	129I B- DECAY (1.5727 Y 4)
28HC B- DECAY (20.91 H 3)	86Y B+ DECAY (14.74 H 2)	129XE IT DECAY (8.0 D 2)
28AL B- DECAY (2.240 H 1)	86ZP EC DECAY (16.5 H 1)	129CS EC DECAY (32.06 H 6)
32SI B- DECAY (450 Y AP)	87KE B- DECAY (76.3 H 5)	130I B- DECAY (12.36 H 1)
32P B- DECAY (14.29 D 3)	87SE EC DECAY (2.805 H 3)	131I B- DECAY (8.04 D 1)
33P B- DECAY (25.4 D 2)	87SE IT DECAY (2.805 H 3)	131XE IT DECAY (11.9 D 1)
35S B- DECAY (87.44 D 7)	87Y EC DECAY (80.3 H 3)	131CS EC DECAY (9.69 D 1)
38CL B- DECAY (37.21 S 4)	88KP B- DECAY (2.84 H 2)	131BA EC DECAY (11.8 D 2)
41AB B- DECAY (1.827 H 7)	88RB B- DECAY (17.8 H 1)	132TE B- DECAY (78.2 H 8)
42K B- DECAY (12.36 H 1)	88Y EC DECAY (157 D 1)	132I B- DECAY (2.30 H 3)
43K B- DECAY (22.6 H 2)	89HB B- DECAY (3.17 H 2)	132CS B+ DECAY (6.475 D 10)
44SC B+ DECAY (3.927 H 8)	89RB B-DECAY (15.2 H 1)	133I B- DECAY (20.8 H 1)
44TI EC DECAY (47.3 Y 12)	89SE B-DECAY (50.5 D 1)	133XE B- DECAY (5.245 D 6)
45CA B- DECAY (164 D 1)	90S2 B- DECAY (28.5 Y 8)	133XE IT DECAY (2.188 D 8)
46SC IT DECAY (18.67 S 9)	90Y B- DECAY (64.0 F 1)	133BA EC DECAY (10.5 Y 1)
46SC B- DECAY (83.80 D 3)	94HB B- DECAY (2.0320 Y 16)	133BA IT DECAY (38.9 H 1)
47CA B- DECAY (4.536 D 2)	94HB IT DECAY (6.26 S 1)	134TE B- DECAY (41.8 H 8)
47SC B- DECAY (3.422 D 4)	94HB B- DECAY (6.26 H 1)	134I B- DECAY (52.6 H 5)
48V EC DECAY (15.974 D 3)	97ZP B- DECAY (16.90 H 5)	134CS B- DECAY (2.062 Y 5)
51CS EC DECAY (27.704 H 2)	97HB B- DECAY (72.1 F 7)	135I B- DECAY (6.61 H 1)
52HB EC DECAY (5.67 D 9)	97HB IT DECAY (40 S 1)	135XE B- DECAY (9.09 F 1)
52HB B- DECAY (21.1 H 2)	97BU EC DECAY (2.9 C 1)	135XE IT DECAY (15.29 H 3)
52HB IT DECAY (21.1 H 2)	99MO B-DECAY (66.0 H 2)	135BA IT DECAY (24.7 H 2)
52PE B+ DECAY (8.275 H 8)	99TC IT DECAY (6.02 H 3)	136CS B- DECAY (13.1 D 1)
54HB EC DECAY (312.5 D 5)	103BU B- DECAY (39.35 D 5)	137CS B- DECAY (30.0 Y 2)
55PE EC DECAY (2.7 Y 1)	103BH IT DECAY (56.12 H 1)	137BA IT DECAY (2.552 H 2)
56HB B- DECAY (2.5785 H 6)	103PD EC DECAY (17.5 D 4)	138TE B- DECAY (18.17 H 7)
57CD EC DECAY (270.9 D 6)	108AG EC DECAY (127 Y 21)	138CS B- DECAY (32.2 H 1)
58CD EC DECAY (70.8 D 1)	108AG EC DECAY (2.37 H 1)	139BA B- DECAY (82.7 H 2)
59PE B- DECAY (44.6 D 4)	108AG IT DECAY (127 Y 1)	139CE EC DECAY (137.65 D 5)
60CO B- DECAY (5.271 Y 1)	108AG B- DECAY (2.37 H 1)	144CE B- DECAY (32.50 D 7)
63HI B- DECAY (96 Y 4)	109CD EC DECAY (453 D 2)	142PB B- DECAY (19.13 H 4)
64CU B+ DECAY (12.701 H 2)	109PD B- DECAY (13.46 H 2)	143PB B- DECAY (13.56 D 2)
64CU B- DECAY (12.701 H 2)	110AG EC DECAY (24.6 S 2)	144PB B- DECAY (17.28 H 3)
65XB EC DECAY (244.1 D 2)	110AG B- DECAY (24.6 S 2)	145PB EC DECAY (17.7 Y 4)
66GA B+ DECAY (9.40 H 7)	110AG IT DECAY (250.9 D 3)	147HD B- DECAY (11.06 D 3)
67CU B- DECAY (61.86 H 12)	110AG B- DECAY (250.8 D 3)	149HD B- DECAY (1.73 H 1)
67GA EC DECAY (78.0 H 3)	111AG B- DECAY (7.45 D 1)	175TB B- DECAY (4.19 D 1)
68GA B+ DECAY (68.0 H 1)	111IB EC DECAY (2.83 F 1)	177LB B- DECAY (6.71 D 1)
68GE EC DECAY (284 D 1)	113IB IT DECAY (1.658 H 1)	181HP B- DECAY (42.4 D 1)
69ZB IT DECAY (13.76 H 3)	113SE EC DECAY (114.9 D 1)	181U EC DECAY (121.2 D 3)
69ZB B- DECAY (57 H 1)	115IB IT DECAY (4.3 H 1)	185H B- DECAY (75.1 D 3)
72LS EC DECAY (26.0 H 1)	115IB B- DECAY (4.3 H 1)	191OS B- DECAY (15.4 D 2)
72GA B- DECAY (14.1 H 2)	116IB B- DECAY (54.15 H 6)	1944B B- DECAY (19.15 H 3)
73AS EC DECAY (80.30 D 6)	117SB IT DECAY (14.0 D 3)	199I B- DECAY (20.00 H 12)
73SE EC DECAY (7.1 H 1)	117SB EC DECAY (2.82 H 5)	198AU B- DECAY (2.696 D 2)
74AS B- DECAY (17.78 D 3)	119SB IT DECAY (245 D 20)	199AB B- DECAY (3.139 H 7)
75SE EC DECAY (120 D 1)	121TE EC DECAY (17 D 1)	201TL EC DECAY (73.5 H 8)
76AS B- DECAY (26.32 H 7)	121TE EC DECAY (154 D 7)	203MG B- DECAY (46.59 D 5)
77KE B- DECAY (11.30 H 1)	121TE IT DECAY (154 D 7)	203PD EC DECAY (54.62 H 5)
77AS B- DECAY (38.8 H 3)	122SB EC DECAY (2.70 D 1)	207BI EC DECAY (38 Y 3)
	122SB B- DECAY (2.70 D 1)	239HF B- DECAY (2.355 D 4)

38 B- DECAY (12.35 Y 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β ⁻ 1 max avg	90.600 20 5.710 10 100		0.0122

11C B- DECAY (20.0 H 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-K	0.17	0.230 10	-0
β ⁺ 1 max avg	960.0 14 305.5 6	99.760 10	0.019
Maximum γ ₂ -intensity = 199.52%			

138 B- DECAY (9.97 H 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-K	0.26	0.170 10	-0
β ⁺ 1 max avg	1198.5 9 491.8 4	99.820 10	1.05
Maximum γ ₂ -intensity = 199.60%			

14C B- DECAY (5730 Y 40) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β ⁻ 1 max avg	156.08 24 49.30 10	100	0.105

150 B- DECAY (123 S 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-K	0.38	0.107 6	-0
β ⁺ 1 max avg	1751.8 7 735.2 3	99.887 6	1.56
Maximum γ ₂ -intensity = 199.77%			

168 B- DECAY (7.12 S 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β ⁻ 1 max avg	1546.9 24 630.5 11	1.00 20	0.0134
β ⁻ 2 max avg	3299.9 24 1460.6 12	8.9 4	0.152
β ⁻ 3 max avg	4287.9 23 1941.0 12	60.0 20	2.81
β ⁻ 4 max avg	10418.6 23 4979.2 12	26.0 20	2.76
total β ⁻ avg	2695.0 15	100 3	5.74

1 weak β's omitted (I_β = 0.01%)

γ 3	1753.0 6	0.13 3	0.0049
γ 5	2741.0 6	0.76 15	0.0444
γ 8	6129.34 18	69.0 20	9.01
γ 10	7117.0 4	5.0 4	0.750

7 weak γ's omitted (I_γ = 0.16%)

18P B- DECAY (109.74 H 4) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-K	0.52	2.88 20	-0
β ⁻ 1 max avg	634.0 10 249.6 5	96.90 17	0.515
Maximum γ ₂ -intensity = 193.80%			

BLANK PAGE

228A B- DECAY (2.602 Y 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-K	0.02	0.04 7	0.0002
β ⁻ 1 max	545.8 6		
avg	215.7 3	90.23 4	0.015
1 weak β's omitted (I _β = 0.06%)			
K X-ray	0.04	0.12 4	~0
γ 1	1270.540 20	99.940 20	2.71
Maximum γ ₁ -intensity = 100.50%			

208A B- DECAY (15.00 H 4) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β ⁻ 1 max	1390.8 8		
avg	551.1 3	99.915 4	1.17
3 weak β's omitted (I _β = 0.07%)			
γ 2	1368.53 5	100	2.91
γ 3	2754.69 5	99.063 5	5.86
4 weak γ's omitted (I _γ = 0.06%)			

26AL B- DECAY (7.1685 Y 32) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-K	1.10	16.19 23	0.0000
β ⁻ 1 max	1174.8 5		
avg	543.8 23	81.00 20	0.907
K X-ray	1.25	0.04 6	~0
γ 1	1129.67 10	2.50 20	0.0402
γ 2	1000.65 7	99.76 4	3.04
γ 3	2938.26 13	0.240 20	0.0150
Maximum γ ₂ -intensity = 163.60%			

278G B- DECAY (9.462 H 11) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β ⁻ 1 max	1595.8 12		
avg	646.2 5	29.0 4	0.399
β ⁻ 2 max	1766.5 12		
avg	724.7 6	71.0 4	1.10
total β ⁻ avg	701.9 6	100.0 6	1.50
γ 1	170.606 15	0.00 10	0.0029
γ 2	803.76 3	71.8 4	1.29
γ 3	1010.44 4	28.0 4	0.605

288G B- DECAY (20.91 H 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-K	1.39	26 6	0.0000
ce-K- 1	29.000 20	27 7	0.0160
ce-L- 1	30.522 20	2.6 7	0.0017
β ⁻ 1 max	212.0 20		
avg	65.2 7	4.60 20	0.0064
β ⁻ 2 max	459.0 20		
avg	155.9 8	90.0 23	0.312
β ⁻ 3 max	860.0 20		
avg	314.3 9	1.40 20	0.0095
total β ⁻ avg	154.0 9	100.0 21	0.328
K X-ray	1.48	0.97 24	~0
γ 1	30.640 20	66 4	0.0431
γ 2	400.690 20	36.6 10	0.312
γ 5	941.45 3	30.3 10	0.768
γ 8	1302.25 3	52.6 16	1.59
γ 9	1372.89 6	4.70 20	0.137
γ 10	1589.16 3	4.20 20	0.142
γ 11	1620.00 15	0.30 10	0.0104

4 weak γ's omitted (I_γ = 0.13%)

20AL B- DECAY (2.240 H 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β ⁻ 1 max	2062.9 9		
avg	1246.6 4	99.990 10	2.65
γ 1	1770.85 3	100	3.78

125I B- DECAY (- 450 Y) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β- 1 max	213.7		
avg	66.7 22	100	0.135

132P B- DECAY (16.29 D 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β- 1 max	1711.0 12		
avg	695.2 5	100	1.40

133P B- DECAY (25.0 D 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β- 1 max	209.0 20		
avg	76.6 6	100	0.163

135S B- DECAY (07.00 D 7) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β- 1 max	167.36 20		
avg	40.00 18	100	0.100

130Cl B- DECAY (37.21 H 4) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)	
β- 1 max	1107.2 9			
avg	420.40 10	32.5 6	0.291	
β- 2 max	2709.4 9			
avg	1181.5 8	11.4 8	0.207	
β- 3 max	4917.2 9			
avg	2700.1 8	1.0 5	2.60	
total β-	avg	1529.5 8	99.9 12	3.25
γ 1	1602.02 6	32.5 6	1.10	
γ 2	2167.51 5	80.0 5	2.03	

1 weak γ's omitted (ΣIγ = 0.03%)

142Ba B- DECAY (1.027 H 7) I(min)=0.10%

<u>Radiation</u> <u>Type</u>	<u>Energy</u> <u>(keV)</u>	<u>Intensity</u> <u>(%)</u>	<u>A(g-rad/</u> <u>μCi-h)</u>
β- 1 max	1190.1 6		
avg	459.3 3	99.170 20	0.970
β- 2 max	2491.8 8		
avg	1076.5 8	6.700 20	0.9179
total β-			
avg	460.0 3	100.00 3	0.980

1 weak β's omitted (ΣIβ = 0.05%)

γ 1 1293.60 4 99.160 20 2.73

1 weak γ's omitted (ΣIγ = 0.05%)

142K B- DECAY (12.36 H 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β- 1 max	1603.0 20		
avg	701.0 10	0.320 20	0.0040
β- 2 max	1996.0 20		
avg	822.0 10	17.5 5	0.306
β- 3 max	3520.0 20		
avg	1563.0 10	02.1 5	2.73
total β-			
avg	1029.0 11	100.0 7	3.00

2 weak β's omitted (ΣIβ = 0.12%)

γ 1 312.75 3 0.319 17 0.0021
γ 6 1520.665 20 17.9 5 0.501

6 weak γ's omitted (ΣIγ = 0.10%)

43K B- DECAY (22.6 H 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
β- 1 max	623.10		
avg	137.8	2.26 9	0.0065
β- 2 max	927.10		
avg	250.8	92.1 13	0.505
β- 3 max	1228		
avg	469.5	3.7 8	0.0370
β- 4 max	1000.10		
avg	568.5	0.8 13	0.0097
β- 5 max	1817.10		
avg	762.5	1.3 3	0.0211
total β- avg	309.5	100.1 19	0.659
γ 1	104.30 20	0.27 6	0.0011
γ 2	220.600 10	0.11 22	0.0193
γ 3	372.763 15	0.73 5	0.693
γ 4	396.870 20	11.43 12	0.0966
γ 5	404.10 20	0.109 8	0.0009
γ 6	593.40 8	11.0 3	0.139
γ 7	617.494 25	00.5 14	1.06
γ 8	800.8 10	0.147 10	0.0025
γ 9	990.25 20	0.33 7	0.0069
γ 10	1315.1 10	0.16 7	0.0034
γ 11	1821.79 10	1.88 4	0.0409
γ 12	1334.2 7	0.102 12	0.0030

44SC B+ DECAY (3.927 H 8) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	0.3	8.49 23	0
Auger-K	3.3	8.18 12	0.0003
β- 1 max	1401.8		
avg	635.0 20	94.42 4	1.28
X-ray Kα ₂	3.60009	0.202 25	0
X-ray Kα ₁	3.6917	0.40 5	0
γ 2	156.95 10	99.87 8	2.46
γ 3	1499.8 3	0.91 4	0.0291
γ 5	2656.30 20	0.13 4	0.0074

Maximum γ₂-intensity = 100.04%

44TI EC DECAY (47.3 Y 12) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	0.37	172 6	0.0014
Auger-K	3.64	83 3	0.0064
Cu-K- 1	63.36 3	10.8 21	0.0146
Cu-L- 1	67.35 3	1.1 3	0.0015
Cu-KM- 1	67.00 3	0.35 7	0.0005
Cu-K- 2	73.91 6	2.9 5	0.0046
Cu-L- 2	77.90 6	0.20 5	0.0005

*** continued ***

44TI EC DECAY (47.3 Y 12) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
X-ray L	0.4	0.34 12	0
X-ray Kα ₂	4.00610 2	5.8 4	0.0005
X-ray Kα ₁	4.09060 2	11.5 11	0.0010
X-ray Kβ	4.06	2.26 21	0.0002
γ 1	67.05 3	87.7 15	0.127
γ 2	70.40 6	94.7 15	0.150
γ 3	147.0 15	0.10 3	0.0003

45CA B- DECAY (164 D 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
β- 1 max	250.7 16		
avg	77.8 5	100	0.166

46SC IT DECAY (10.67 S 9) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	0.37	61 11	0.0005
Auger-K	3.64	32 6	0.0025
Cu-K- 1	130.035 3	39 7	0.115
Cu-KM- 1	142.474 3	1.1 6	0.0034
X-ray L	0.4	0.12 5	0
X-ray Kα ₂	4.00610 2	2.2 5	0.0002
X-ray Kα ₁	4.09060 2	8.8 9	0.0004
X-ray Kβ	4.06	0.86 19	0
γ 1	142.520 3	56 6	0.170

46SC B- DECAY (83.90 D 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
β- 1 max	357.3 11		
avg	112.0 4	100	0.239
γ 1	989.25 3	100	1.09
γ 2	1120.51 5	100.00 10	2.39

67CA B- DECAY (0.536 D 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(q-rad/ μCi-h)
β ⁻ 1 max	691.2 25		
avg	201.2 10	42.0 20	0.421
β ⁻ 2 max	1980.3 25		
avg	677.2 12	10.0 20	0.313
total β ⁻			
avg	300.9 13	100 3	0.735
2 weak β's omitted (X _β = 9.11%)			
γ 2	489.23 10	6.7 3	0.0702
γ 3	530.4 3	0.105 16	0.0012
γ 4	767.0 3	0.195 16	0.0032
γ 5	887.06 10	6.9 3	0.119
γ 6	1297.09 10	70.9 19	2.07

2 weak γ's omitted (X_γ = 0.03%)

67SC B- DECAY (3.622 D 4) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(q-rad/ μCi-h)
Auger-L	0.02	0.307 15	-0
Auger-K	0	0.175 0	-0
ce-K-1	150.02 5	0.220 0	0.0007
β ⁻ 1 max	641.0 20		
avg	102.5 0	61.0 20	0.206
β ⁻ 2 max	600.0 20		
avg	203.0 0	32.0 20	0.139
total β ⁻			
avg	162.1 9	100 3	0.305
γ 1	159.39 5	60.0 20	0.231

68V EC DECAY (15.970 D 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(q-rad/ μCi-h)
Auger-L	0.02	16.7 0	0.0001
Auger-K	0	7.9 0	0.0007
β ⁻ 1 max	699 0		
avg	292.0 20	50.1 5	0.312
total β ⁻			
avg	292.0 20	50.1 5	0.312

1 weak β's omitted (X_β = 0.09%)

*** continued ***

68V EC DECAY (15.970 D 3) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A(q-rad/ μCi-h)
X-ray Kα ₁	0.50006	0.65 6	-0
X-ray Kα ₂	0.51004	1.30 12	0.0001
X-ray Kβ	5	0.260 25	-0
γ 1	802.0 13	0.100 20	0.0020
γ 2	920.20 0	0.90 10	0.0170
γ 3	930.12 3	7.9 0	0.150
γ 4	983.50 3	100	2.09
γ 5	1312.00 3	97.00 20	2.72
γ 6	1436.00 10	0.12 3	0.0037
γ 7	2200.35 6	2.00 20	0.115

2 weak γ's omitted (X_γ = 0.02%)
Maximum γ-intensity = 100.20%

51CR EC DECAY (27.704 D 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(q-rad/ μCi-h)
Auger-L	0.07	100.7 12	0.0010
Auger-K	0.30	66.9 7	0.0062
X-ray L	0.5	0.33 12	-0
X-ray Kα ₁	0.90060	6.59 21	0.0007
X-ray Kα ₂	0.95220	13.1 0	0.0010
X-ray Kβ	5.03	2.62 9	0.0003
γ 1	320.070 0	9.00 10	0.0660

52Ru EC DECAY (5.67 D 9) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(q-rad/ μCi-h)
Auger-L	0.50	90 3	0.0011
Auger-K	0.70	40.0 15	0.0005
β ⁻ 1 max	573 5		
avg	200.6 21	20.3 11	0.105
X-ray L	0.57	0.25 9	-0
X-ray Kα ₁	5.00551	5.11 22	0.0006
X-ray Kα ₂	5.01072	10.1 5	0.0012
X-ray Kβ	6	2.03 9	0.0003
γ 1	306.06 5	1.10 10	0.0001
γ 2	399.2 0	0.30 5	0.0020
γ 3	502.17 10	0.22 0	0.0020
γ 4	600.22 5	0.33 3	0.0006
γ 5	607.53 5	0.01 3	0.0057
γ 6	700.10 3	07 3	1.30
γ 7	800.12 3	1.00 20	0.0610
γ 8	935.50 3	90 3	1.07
γ 9	1206.25 0	0.70 20	0.125
γ 10	1333.62 0	3.20 20	0.100
γ 11	1630.05 3	100	3.05

2 weak γ's omitted (X_γ = 0.09%)
Maximum γ-intensity = 56.60%

5288 D- DECAY (21.1 H 2) I(min)=0.10%

E(TC+g+)=97.0 e

SEE ALSO 5288 IT DECAY (21.1 H)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	0.54	2.30 5	-0
Auger-K	0.78	1.057 23	0.0001
β ⁻ 1 max	903 5		
avg	301.0 23	0.21 7	0.0017
β ⁻ 2 max	2631 5		
avg	1172.8 20	96.0 e	2.00
total β ⁻			
avg	1170.6 20	96.3 e	2.00

1 week β's omitted (Iβ = 0.06%)

X-ray K _α	5.40551	0.123 5	-0
X-ray K _β	5.41672	0.204 8	-0
γ 1	1030.05 3	97.0 e	2.99
γ 3	1727.7 e	0.23 e	0.0004

2 week γ's omitted (Iγ = 0.11%)

Maximum γ-intensity = 192.54%

5288 IT DECAY (21.1 H 2) I(min)=0.10%

EIT=2.2 e

SEE ALSO 5288 D- DECAY (21.1 H)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
γ 1	377.61 5	2.2 e	0.0177

5288 D- DECAY (0.275 H 0) I(min)=0.10%

SEE ALSO 5288 IT DECAY (21.1 H)

SEE ALSO 5288 D- DECAY (21.1 H)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	0.6	61.6 23	0.0000
Auger-K	5.19	26.9 12	0.0030
β ⁻ 1 max	803 12		
avg	300 5	56.0 10	0.406
X-ray L	0.64	0.19 7	-0
X-ray K _α	5.88765	3.6 3	0.0005
X-ray K _β	5.89875	7.2 6	0.0009
X-ray K _γ	6.09	1.05 12	0.0002
γ 1	160.770 20 100		0.359

Maximum γ-intensity = 112.00%

5488 BC DECAY (312.5 H 5) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	0.54	102.0 12	0.0016
Auger-K	0.78	63.0 7	0.0045
X-ray L	0.57	0.37 13	-0
X-ray K _α	5.40551	7.03 21	0.0009
X-ray K _β	5.41672	10.7 e	0.0017
X-ray K _γ	6	2.00 10	0.0004
γ 1	830.827 21	99.9760 2	1.70

5588 BC DECAY (2.7 Y 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	0.6	139 e	0.0010
Auger-K	5.19	60.7 22	0.0067
X-ray L	0.64	0.02 10	-0
X-ray K _α	5.88765	0.2 7	0.0010
X-ray K _β	5.89875	16.3 12	0.0020
X-ray K _γ	6.09	3.3 3	0.0005

5688 D- DECAY (2.5705 H 6) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β ⁻ 1 max	327.1 21		
avg	99.6 8	1.16 3	0.0025
β ⁻ 2 max	736.9 21		
avg	255.7 9	10.6 e	0.0795
β ⁻ 3 max	1039.3 21		
avg	382.5 9	27.9 8	0.227
β ⁻ 4 max	2050.0 21		
avg	1217.6 10	56.3 9	1.46
total β ⁻			
avg	830.6 15	100.1 13	1.77

3 week β's omitted (Iβ = 0.12%)

γ 1	806.750 20	98.9 3	1.70
γ 4	1010.72 e	27.2 8	1.05
γ 5	2113.05 e	10.3 e	0.645
γ 6	2522.08 e	0.99 3	0.0531
γ 8	2657.45 5	0.653 20	0.0369
γ 9	2959.77 6	0.306 10	0.0193
γ 10	3369.60 7	0.160 10	0.0121

3 week γ's omitted (Iγ = 0.16%)

57CO EC DECAY (270.9 D 6) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	0.47	247 3	0.0035
Auger-K	5.62	104.5 13	0.0125
ce-K- 1	7.393 3	67.9 3	0.0106
ce-L- 1	13.569 3	7.61 21	0.0022
ce-HBO- 1	16.322 3	1.12 7	0.0002
ce-K- 2	140.951 4	1.07 10	0.0006
ce-L- 2	121.217 3	0.103 10	0.0005
ce-K- 3	129.364 4	1.00 13	0.0039
ce-L- 3	135.630 3	0.140 13	0.0004
I-ray L	0.7	0.77 25	=0
I-ray K _α	6.39004	16.5 5	0.0022
I-ray K _β	6.40304	32.5 8	0.0044
I-ray K _γ	7	5.56 20	0.0010
γ 1	10.4167 25	9.54 13	0.0029
γ 2	122.063 3	85.59 19	0.223
γ 3	136.076 3	10.61 10	0.0309
γ 5	692.00 3	0.160 5	0.0020

6 weak γ's omitted (I_γ = 0.03%)

58CO EC DECAY (70.9 D 7) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	0.47	116.2 13	0.0017
Auger-K	5.62	49.2 6	0.0059
β ⁻ 1 max	875 3		
avg	201.0 20	15.00 5	0.0402
I-ray L	0.7	0.36 12	=0
I-ray K _α	6.39004	7.76 21	0.0011
I-ray K _β	6.40304	15.3 4	0.0021
I-ray K _γ	7	3.09 10	0.0005
γ 1	810.750 20	49.450 10	1.72
γ 2	863.940 20	0.600 10	0.0125
γ 3	1674.73 4	0.520 10	0.0105

Maximum γ₂-intensity = 30.00%

59FE β- DECAY (44.6 D 8) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β ⁻ 1 max	131.0 20		
avg	35.0 6	1.27 3	0.0010
β ⁻ 2 max	273.0 20		
avg	80.8 6	45.6 8	0.0705
β ⁻ 3 max	466.0 20		
avg	149.3 7	52.8 12	0.160
β ⁻ 4 max	1565.0 20		
avg	635.8 8	0.10 4	0.0020
total β ⁻			
avg	117.0 8	99.9 15	0.250

1 weak β's omitted (I_β = 0.00%)

*** continued ***

59FE β- DECAY (44.6 D 8) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
γ 1	142.644 4	1.03 3	0.0030
γ 2	192.341 6	3.03 7	0.0123
γ 3	330.00 20	0.270 10	0.0019
γ 5	1399.220 25	56.1 12	1.31
γ 6	1291.56 3	43.6 4	1.23

2 weak γ's omitted (I_γ = 0.00%)

60CO β- DECAY (5.271 Y 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β ⁻ 2 max	317.00 10		
avg	95.00 10	99.920 20	0.200
total β ⁻			
avg	96.22 10	100.000 20	0.205

2 weak β's omitted (I_β = 0.09%)

γ 3	1173.200 25	99.900 20	2.50
γ 4	1332.46 3	100	2.94

4 weak γ's omitted (I_γ = 0.01%)

63NI β- DECAY (96 Y 4) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β ⁻ 1 max	65.87 15		
avg	17.13 4	100	0.0365

60CU β- DECAY (12.701 H 2) I(min)=0.10%

S(EC+β⁻)=62.8 4
SEE ALSO 60CU β- DECAY

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	0.94	58.9 21	0.0011
Auger-K	6.54	23.3 12	0.0032
β ⁻ 1 max	655.1 25		
avg	279.1 11	10.00 20	0.107
I-ray L	0.85	0.22 8	=0
I-ray K _α	7.06009	4.9 4	0.0008
I-ray K _β	7.47015	9.6 7	0.0015
I-ray K _γ	8.26	1.96 10	0.0003
γ 1	1345.9 3	0.49 4	0.0140

Maximum γ₂-intensity = 36.00%

64CU B- DECAY (12.701 H 2) I(min)=0.10%

49--37.2 4

SEE ALSO 64CU 5+ DECAY

Radiation Type	Energy (keV)	Intensity (%)	$\Delta(q\text{-rad}/\mu\text{Ci-h})$
β^- 1 max	570.0 23		
avg	120.2 9	37.2 4	0.151

65Zn EC DECAY (244.1 D 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	$\Delta(q\text{-rad}/\mu\text{Ci-h})$
Auger-L	0.92	126.7 18	0.0025
Auger-K	7	48.3 8	0.0072

β^+ 1 max	328.8 11		
avg	142.5 5	1.460 20	0.0044

X-ray L	0.93	0.57 20	=0
X-ray $K\alpha_2$	8.027830	11.5 3	0.0020
X-ray $K\alpha_1$	8.047780	22.6 5	0.0039
X-ray $K\beta$	9	4.61 13	0.0009
γ 3	1115.52 3	50.75 10	1.21

Maximum γ -intensity = 2.92%

66GA B+ DECAY (9.40 H 7) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	$\Delta(q\text{-rad}/\mu\text{Ci-h})$
Auger-L	0.99	56 3	0.0012
Auger-K	7.53	20.6 13	0.0033
β^+ 1 max	362 3		
avg	157.0 13	1.00 10	0.0033
β^+ 2 max	720 3		
avg	308.7 13	0.160 10	0.0011
β^+ 3 max	772 3		
avg	330.9 13	0.70 10	0.0049
β^+ 4 max	821 3		
avg	352.2 13	0.220 20	0.0017
β^+ 5 max	924 3		
avg	397.1 13	4.10 20	0.0347
β^+ 6 max	1780 3		
avg	781.5 13	0.37 3	0.0062
β^+ 7 max	4153 3		
avg	1904.1 14	49.9 10	2.02
total β^+ avg	1726.3 20	56.4 11	2.08

X-ray L	1	0.28 12	=0
X-ray $K\alpha_2$	8.61578	5.6 4	0.0010
X-ray $K\alpha_1$	8.63886	11.0 8	0.0020
X-ray $K\beta$	9.57	2.25 16	0.0005
γ 4	448.90 10	0.111 5	0.0011
γ 7	686.28 10	0.261 10	0.0038
γ 8	833.56 10	6.12 15	0.109
γ 10	856.70 10	0.123 5	0.0022
γ 11	907.0 3	0.115 8	0.0022
γ 15	1039.29 10	38.4 8	0.850
γ 18	1190.36 10	0.134 12	0.0034
γ 20	1232.9	0.538 15	0.0141
γ 21	1333.20 20	1.25 3	0.0355
γ 22	1356.2	0.38 4	0.0109
γ 23	1356.6	0.127 20	0.0037
γ 24	1357	0.19 8	0.0055
γ 25	1418.88 10	0.645 16	0.0195
γ 27	1508.33 10	0.564 17	0.0188
γ 29	1899.18 10	0.434 15	0.0176
γ 30	1918.64 10	2.17 5	0.0887
γ 32	2173.90 20	0.12 3	0.0055
γ 33	2190.00 20	5.76 15	0.269
γ 34	2213.60 20	0.142 9	0.0067
γ 36	2393.30 20	0.253 10	0.0129
γ 37	2422.70 10	1.97 5	0.102
γ 40	2752.10 20	23.5 6	1.38
γ 41	2780.50 20	0.129 5	0.0076
γ 42	2934.30 20	0.219 6	0.0137
γ 46	3229.26 10	1.51 4	0.104
γ 48	3381.32 10	1.43 4	0.103
γ 49	3422.64 15	0.833 24	0.0607
γ 50	3433.00 15	0.284 7	0.0208
γ 53	3767.40 20	0.142 9	0.0114
γ 54	3791.47 10	1.025 25	0.0828
γ 58	4086.36 10	1.15 4	0.0999
γ 59	4295.70 20	3.53 9	0.323
γ 60	4462.01 15	0.718 17	0.0682
γ 61	4806.59 15	1.49 5	0.153

27 weak γ 's omitted (I γ = 1.24%)
Maximum γ -intensity = 112.90%

67CU B- DECAY (61.86 H 12) I(min)=0.10%

THE UNCERTAINTIES IN THE INTENSITIES FOR THE RADIATIONS FROM 67CU INCLUDE ONLY THE UNCERTAINTIES IN RELATIVE PHOTON AND INTERNAL CONVERSION DATA. THE ADDITIONAL UNCERTAINTY ARISING FROM THE CONVERSION OF RELATIVE INTENSITIES TO INTENSITIES PER 100 67CU DECAYS IS NOT KNOWN SINCE THE UNCERTAINTY IN THE GROUND STATE B- BRANCH, NEEDED FOR THIS CONVERSION, IS NOT KNOWN. NOTE THAT A 20% UNCERTAINTY IN THIS B- BRANCH WOULD RESULT IN A 5% UNCERTAINTY TO BE ADDED (IN QUADRATURE) TO THE INTENSITY UNCERTAINTIES GIVEN BELOW

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	0.99	20.0 14	0.0004
Auger-K	7.53	7.3 6	0.0012
ce-K- 1	81.614 17	0.56 4	0.0010
ce-K- 2	83.657 17	12.5 8	0.0223
ce-L- 2	92.122 17	1.54 10	0.0030
ce-M- 2	93.180 17	0.225 15	0.0004
ce-K- 3	174.902 20	0.91 10	0.0034
β^- 1 max	180 8		
avg	50 3	1.20 20	0.0013
β^- 2 max	399 8		
avg	120 3	57.0 20	0.146
β^- 3 max	581 8		
avg	153 3	22.7 20	0.0717
β^- 4 max	574 8		
avg	189 3	20	0.0805
total β^-			
avg	180 4	100 3	0.299
X-ray L	1	0.10 4	=0
X-ray $K\alpha_2$	8.61578	1.99 17	0.0004
X-ray $K\alpha_1$	8.63886	3.9 4	0.0007
X-ray $K\beta$	9.57	0.80 7	0.0002
γ 1	91.273 17	7.6 5	0.0148
γ 2	93.316 17	16.7 10	0.0332
γ 3	184.567 20	47.7 10	0.188
γ 4	208.966 20	6.114 10	0.0005
γ 5	300.232 25	0.76 5	0.0049
γ 6	393.502 20	0.215 20	0.0018

67GA EC DECAY (78.0 H 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	0.99	167 9	0.0035
Auger-K	7.53	61 4	0.0098
ce-K- 1	81.614 17	0.232 15	0.0004
ce-K- 2	83.657 17	28.3 16	0.0505
ce-L- 2	92.122 17	3.47 20	0.0068
ce-M- 2	93.180 17	0.51 3	0.0010
X-ray L	1	0.8 4	=0
X-ray $K\alpha_2$	8.61578	16.7 12	0.0031
X-ray $K\alpha_1$	8.63886	32.7 24	0.0060
X-ray $K\beta$	9.57	6.7 5	0.0014
γ 1	91.273 17	3.18 17	0.0062
γ 2	93.316 17	37.8 20	0.0751
γ 3	184.567 20	23.7 12	0.0931
γ 4	208.966 20	2.34 12	0.0104
γ 5	300.232 25	16.00 20	0.102
γ 6	393.502 20	4.48 23	0.0375
γ 10	887.68 4	0.139 10	0.0026

3 weak γ 's omitted (I γ = 0.12%)

68GA B+ DECAY (69.0 H) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	0.99	10.3 7	0.0003
Auger-K	7.53	5.2 4	0.0008
β^+ 1 max	820		
avg	352.0 10	1.10 10	0.0082
β^+ 2 max	1897.0 10		
avg	835.0 10	88 3	1.57
total β^+			
avg	826.2 10	84 3	1.57
X-ray $K\alpha_2$	8.61578	1.43 10	0.0003
X-ray $K\alpha_1$	8.63886	2.81 20	0.0005
X-ray $K\beta$	9.57	0.57 4	0.0001
γ 3	1077.40 10	3.30 10	0.0757
γ 6	1883.20 10	0.143 6	0.0057

6 weak γ 's omitted (I γ = 0.24%)
Maximum γ -intensity = 178.82%

68GE EC DECAY (288 D 6) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	1	121.4 18	0.0028
Auger-K	8	42.4 7	0.0073
X-ray L	1	0.67 19	=0
X-ray $K\alpha_2$	9.22482	13.1 3	0.0026
X-ray $K\alpha_1$	9.25174	25.6 5	0.0050
X-ray $K\beta$	10.3	5.45 14	0.0012

69Zn IT DECAY (12.76 H 3) I(min)=0.10%

12.76-H 69Zn ALSO DECAYS VIA A 0.033% 3 B- BRANCH

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	0.99	6.3 4	0.0001
Auger-K	7.53	2.28 16	0.0004
ce-K- 1	428.975 18	4.38 16	0.0401
ce-L- 1	437.440 18	0.512 21	0.0048
ce-MNO- 1	438.498 18	0.171 10	0.0016
X-ray $K\alpha_2$	8.61578	0.62 5	0.0001
X-ray $K\alpha_1$	8.63886	1.23 9	0.0002
X-ray $K\beta$	9.57	0.250 19	=0
γ 1	438.634 18	94.90 16	0.887

692H B- DECAY (57 H 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β ⁻ 1 max	907 4		
avg	322.2 15	100	0.686

72AS BC DECAY (26.0 H 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	1.19	15.9 7	0.0004
Auger-K	8.56	5.5 4	0.0010
ce-K- 7	680.10 20	0.87 9	0.0125
β ⁺ 3 max	814 7		
avg	351 3	0.450 20	0.0034
β ⁺ 4 max	927 7		
avg	400 3	0.167 9	0.0014
β ⁺ 5 max	1865 7		
avg	922 4	6.0 3	0.105
β ⁺ 6 max	2495 7		
avg	1115 4	64.1 12	1.52
β ⁺ 7 max	2638 7		
avg	1203 4	0.12 9	0.0031
β ⁺ 8 max	3329 7		
avg	1526 4	16.5 14	0.536
total β ⁺			
avg	1165 5	87.6 19	2.17

6 weak β's omitted (IIB = 0.23%)

X-ray K _{α2}	9.85532	1.91 10	0.0004
X-ray K _{α1}	9.88642	3.73 19	0.0008
X-ray Kβ	11	0.83 5	0.0002
γ 5	600.90 10	0.319 17	0.0041
γ 6	629.93 5	8.1 3	0.109
γ 9	786.43 5	0.430 18	0.0072
γ 10	834.00 3	79.7 14	1.42
γ 12	894.27 5	0.79 3	0.0150
γ 21	1050.76 5	0.98 4	0.0219
γ 25	1215.14 5	0.231 17	0.0060
γ 28	1390.44 5	0.239 9	0.0071
γ 29	1464.00 7	1.14 5	0.0355
γ 30	1475.91 7	0.502 14	0.0158
γ 32	1568.20 10	0.143 9	0.0048
γ 36	1680.70 10	0.120 9	0.0043
γ 37	1710.90 7	0.271 17	0.0099
γ 41	1991.14 8	0.343 18	0.0162
γ 43	2105.9 3	0.74 8	0.0332
γ 44	2109.9 3	0.223 25	0.0100
γ 46	2201.74 9	0.518 19	0.0243
γ 48	2248.50 10	0.335 17	0.0160
γ 53	2507.90 10	0.335 17	0.0179
γ 58	2621.50 10	0.391 18	0.0218
γ 64	2940.10 10	0.335 17	0.0210
γ 66	2982.10 20	0.191 25	0.0121
γ 67	3094.30 20	0.143 9	0.0095

56 weak γ's omitted (IIG = 1.75%)
Maximum γ₂₅-intensity = 175.13%

72GA B- DECAY (14.1 H 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	1.19	0.56 4	0
Auger-K	8.56	0.204 15	0
ce-K- 20	690.10 20	0.443 19	0.0064
β ⁻ 1 max	235 3		
avg	67.1 10	0.112 19	0.0002
β ⁻ 2 max	315 3		
avg	93.7 10	0.78 3	0.0016
β ⁻ 3 max	427 3		
avg	133.0 11	0.247 10	0.0007
β ⁻ 4 max	538 3		
avg	173.9 11	0.350 20	0.0013
β ⁻ 5 max	554 3		
avg	179.9 11	0.340 20	0.0013
β ⁻ 6 max	651 3		
avg	217.6 11	14.9 4	0.0691
β ⁻ 7 max	668 3		
avg	224.2 11	22.0 4	0.105
β ⁻ 8 max	958 3		
avg	342.4 12	27.4 8	0.200
β ⁻ 9 max	1050 3		
avg	381.5 12	1.96 4	0.0159
β ⁻ 10 max	1478 3		
avg	569.7 13	9.10 24	0.110
β ⁻ 11 max	1529 3		
avg	592.6 13	0.14 4	0.0018
β ⁻ 12 max	1591 3		
avg	620.5 13	0.33 6	0.0044
β ⁻ 13 max	1928 3		
avg	774.7 13	2.90 20	0.0479
β ⁻ 14 max	2265 3		
avg	931.3 14	0.7 5	0.0139
β ⁻ 15 max	2529 3		
avg	1055.7 14	9.0 9	0.202
β ⁻ 16 max	3159 3		
avg	1355.0 14	9.5 12	0.274
total β ⁻			
avg	493.4 18	100.0 19	1.05

8 weak β's omitted (IIB = 0.23%)

X-ray K _{α1}	9.88642	0.138 9	0
γ 2	112.52 3	0.11 5	0.0003
γ 6	244.3 3	0.172 10	0.0011
γ 9	336.3 3	0.105 10	0.0008
γ 10	381.20 20	0.268 10	0.0022
γ 12	428.3 3	0.220 10	0.0020
γ 13	449.6 3	0.153 20	0.0015
γ 14	479.1 3	0.105 10	0.0011
γ 17	587.9 4	0.105 10	0.0013
γ 18	600.85 3	5.45 20	0.0697
γ 19	629.86 4	25.2 8	0.339
γ 21	735.90 20	0.373 10	0.0058
γ 24	786.40 10	3.26 9	0.0546
γ 25	810.24 9	2.01 9	0.0346
γ 26	834.02 3	95.59 11	1.70
γ 27	861.11 5	0.92 3	0.0160
γ 29	894.22 5	9.9 3	0.189
γ 30	924.10 20	0.143 10	0.0024
γ 32	939.40 20	0.259 7	0.0052
γ 34	970.54 6	1.09 3	0.0225
γ 36	999.86 6	0.803 20	0.0171
γ 38	1050.69 6	6.88 20	0.154
γ 42	1215.16 8	0.784 20	0.0203
γ 43	1230.86 7	1.46 4	0.0383
γ 44	1260.10 8	1.10 3	0.0295
γ 45	1276.75 8	1.558 20	0.0424
γ 47	1464.00 10	3.54 10	0.110
γ 49	1567.9 4	0.20 4	0.0067
γ 50	1571.50 20	0.80 3	0.0269
γ 51	1596.65 9	4.3 4	0.146

*** continued ***

72GA B- DECAY (10.1 H 2) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
γ 54	1690.77 8	0.99 4	0.0356
γ 55	1710.90 20	0.411 20	0.0150
γ 57	1837.80 20	0.229 10	0.0090
γ 58	1861.09 8	5.26 10	0.208
γ 59	1878.0 3	0.229 20	0.0092
γ 60	1920.2 3	3.143 20	0.0059
γ 61	1991.3 3	0.112 3	0.0047
γ 63	2109.50 10	1.07 3	0.0401
γ 64	2201.67 8	25.6 8	1.20
γ 65	2214.5 8	0.153 20	0.0072
γ 68	2450.98 8	7.93 20	0.421
γ 69	2507.83 8	12.7 4	0.679
γ 70	2515.6 5	0.239 20	0.0128
γ 73	2621.0 4	0.143 20	0.0080
γ 76	2944.10 20	0.478 20	0.0290

40 weak γ's omitted (IIγ = 1.30%)

73AS EC DECAY (80.30 D 6) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	1.19	321 10	0.0081
Ce-K- 1	2.160 17	27.8 5	0.0013
Auger-K	8.56	88 5	0.0161
Ce-L- 1	11.849 15	60.3 7	0.0152
Ce-H- 1	13.083 15	8.9 3	0.0025
Ce-HOP- 1	13.263 15	3.00 10	0.0008
Ce-K- 2	42.334 12	76.1 6	0.0686
Ce-L- 2	52.023 9	11.1 4	0.0123
Ce-H- 2	53.257 9	1.73 5	0.0020
Ce-HOP- 2	53.437 9	0.580 10	0.0007
X-ray L	1.19	1.9 7	=0
X-ray Kα ₂	9.85532	30.5 16	0.0064
X-ray Kα ₁	9.88642	60 3	0.0125
X-ray Kβ	11	13.3 7	0.0031
γ 2	53.437 9	10.5 3	0.0125

1 weak γ's omitted (IIγ = 0.09%)

73SE EC DECAY (7.1 H 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	1.24	67 4	0.0018
Auger-K	9.1	21.8 17	0.0042
Ce-K- 1	55.13 10	19.1 6	0.0224
Ce-L- 1	65.47 10	2.10 8	0.0029
Ce-HMO- 1	66.80 10	0.387 17	0.0006
Ce-K- 2	349.23 10	1.1 6	0.0079
Ce-L- 2	359.57 10	0.12 8	0.0009

*** continued ***

73SE EC DECAY (7.1 H 1) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
β ⁺ 4 max	1204 10		
avg	525 3	0.52	0.0052
β ⁺ 5 max	1290 10		
avg	562 5	64.6 9	0.773
β ⁺ 6 max	1651 10		
avg	725 5	0.52	0.0080
total β ⁺			
avg	563 5	65.7 9	0.787

3 weak β's omitted (IIβ = 0.05%)

X-ray L	1.28	0.47 14	=0
X-ray Kα ₂	10.507998	8.4 5	0.0019
X-ray Kα ₁	10.54370 1	16.3 10	0.0037
X-ray Kβ	11.7	3.78 23	0.0089
γ 1	67.90 10	77.4 13	0.110
γ 2	361.10 10	96.7 10	0.744
γ 4	510	1.1 4	0.0116
γ 12	865.40 20	0.47 3	0.0087
γ 14	901.2 4	0.12 3	0.0022
γ 17	1111.0 4	0.17 5	0.0041
γ 19	1422.90 20	0.11 3	0.0032

14 weak γ's omitted (IIγ = 0.49%)

Maximum γ-intensity = 131.37%

74AS B- DECAY (17.78 D 3) I(min)=0.10%

SB=33.7 37

SEE ALSO 74AS B+ DECAY

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
β ⁻ 1 max	720 3		
avg	243.4 11	15.2 7	0.0788
β ⁻ 2 max	1354 3		
avg	531.5 12	18.5 17	0.209
total β ⁻			
avg	401.1 14	33.7 19	0.288

1 weak β's omitted (IIβ = 0.04%)

γ 1	634.78 8	15.2 18	0.205
-----	----------	---------	-------

2 weak γ's omitted (IIγ = 0.04%)

70AS B- DECAY (17.78 D 3) I(min)=0.10%

%(PC+B)=66.3 37
SEE ALSO 70AS B- DECAY

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	1.19	42.5 19	0.0011
Auger-K	0.56	14.3 9	0.0026
β ⁺ 2 max	944.3 10		
avg	407.9 8	26.7 11	0.232
β ⁺ 3 max	1540.1 10		
avg	700.9 9	1.70 14	0.0254
total β ⁺			
avg	425.3 9	28.4 11	0.257

1 weak β's omitted (IIP = 0.02%)

X-ray L	1.19	0.26 9	0
X-ray K _α	9.85532	5.0 3	0.0010
X-ray K _β	9.88642	9.7 6	0.0020
X-ray K _γ	11	2.17 13	0.0005
γ 1	595.80 8	60 4	0.764
γ 2	608.39 8	0.58 5	0.0075
γ 9	1204.38 8	0.271 22	0.0070

8 weak γ's omitted (I_γ = 0.10%)
Maximum γ_γ-intensity = 56.83%

75SE EC DECAY (120 D 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	1.24	131 7	0.0035
Auger-K	9.1	42 3	0.0002
ce-K- 1	12.53 20	4.4 3	0.0012
ce-L- 1	22.87 20	0.86 6	0.0004
ce-Y- 1	24.20 20	0.138 10	0
ce-X- 2	54.183 10	0.356 24	0.0004
ce-Y- 4	84.8663 22	2.50 6	0.0045
ce-L- 4	95.2065 22	0.333 9	0.0007
ce-K- 5	109.288 3	0.624 13	0.0015
ce-K- 6	124.133 5	1.49 3	0.0040
ce-L- 6	134.473 5	0.155 4	0.0004
ce-K- 10	252.784 9	0.381 7	0.0021
ce-K- 11	267.661 9	0.178 13	0.0010

X-ray L	1.28	0.9 3	0
X-ray K _α	10.507990	16.3 10	0.0036
X-ray K _β	10.54370 1	31.7 18	0.0071
X-ray K _γ	11.7	7.3 5	0.0018
γ 2	64.050 10	1.01 24	0.0014
γ 4	96.7330 20	3.20 6	0.0066
γ 5	121.115 3	16.72 19	0.0431
γ 6	136.000 5	56.8 7	0.165
γ 7	198.596 7	1.43 3	0.0060
γ 10	264.651 8	59.50 20	0.335
γ 11	279.528 8	25.1 3	0.149
γ 13	303.910 11	1.363 25	0.0088
γ 16	400.646 9	11.78 17	0.101

15 weak γ's omitted (I_γ = 0.09%)

70AS B- DECAY (26.32 H 7) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β ⁻ 1 max	294.3 19		
avg	88.8 7	8.61 4	0.0011
β ⁻ 2 max	313.7 19		
avg	92.8 7	1.14 7	0.0023
β ⁻ 3 max	540.2 19		
avg	173.8 3	1.41 12	0.0067
β ⁻ 4 max	1191.3 19		
avg	436.4 9	1.94 12	0.0190
β ⁻ 5 max	1752.4 19		
avg	691.7 9	7.3 5	0.108
β ⁻ 6 max	1446.7 19		
avg	749.3 9	8.75 6	0.0120
β ⁻ max	2409.4 19		
avg	936.5 9	33.2 15	0.705
β ⁻ 8 max	2469.0 19		
avg	1267.1 9	53.8 20	1.43
total β ⁻			
avg	1072.3 12	100 1	2.29

9 weak β's omitted (IIP = 0.29%)

γ 6	554.10 5	42.4 19	0.511
γ 7	563.23 8	1.12 6	0.0135
γ 10	657.03 5	5.8 4	0.0017
γ 14	740.12 8	0.112 7	0.0010
γ 16	771.76 8	0.112 10	0.0010
γ 20	867.63 8	0.120 7	0.0022
γ 26	1129.87 7	0.137 11	0.0033
γ 28	1212.72 10	1.54 11	0.0403
γ 29	1216.72 7	3.69 24	0.0956
γ 31	1439.13 9	0.513 19	0.0096
γ 32	1453.60 9	0.124 11	0.0039
γ 41	2096.33 14	0.63 5	0.0204
γ 42	2110.79 15	0.374 24	0.0170

33 weak γ's omitted (I_γ = 0.59%)

77GE B- DECAY (11.30 H 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β ⁻ 1 max	162 10		
avg	45 7	0.101 6	0
β ⁻ 2 max	193 10		
avg	54 4	0.221 8	0.0003
β ⁻ 3 max	282 10		
avg	82 4	0.156 6	0.0003
β ⁻ 4 max	352 10		
avg	106 4	1.04 4	0.0023
β ⁻ 5 max	364 10		
avg	110 4	2.28 9	0.0053
β ⁻ 6 max	545 10		
avg	197 4	2.25 9	0.0093
β ⁻ 7 max	706 10		
avg	239 4	8.1 5	0.0411
β ⁻ 8 max	735 10		
avg	250 4	2.52 8	0.0134
β ⁻ 9 max	1132 10		
avg	416 5	1.87 6	0.0166
β ⁻ 10 max	1145 10		
avg	422 5	7.18 23	0.0645
β ⁻ 11 max	1167 10		
avg	431 5	0.19 15	0.0017

*** continued ***

7702 P- DECAF 111.30 n 11 (continued)

Station Type	Frequency (MHz)	Modulation (%)	Altitude/ Miles
P-12 MAI	1170 10	0.30 1	0.3005
P-13 MAI	1200 10		
P-14 MAI	1107 10	0.0 0	0.0100
P-15 MAI	1001 5	1.77 7	0.0100
P-16 MAI	1116 5	0.151 5	0.0017
P-17 MAI	1106 10	0.03 4	0.0000
P-18 MAI	1510 10		
P-19 MAI	1501 10	19.3 7	0.201
P-20 MAI	1507 5	3.100 4	0.0010
P-21 MAI	1507 10	0.176 9	0.0020
P-22 MAI	1017 10	0.107 10	0.0007
P-23 MAI	1011 10	0.270 10	0.0002
P-24 MAI	1021 10		
P-25 MAI	1021 10	0.09 7	0.0113
P-26 MAI	2072 10		0.0115
P-27 MAI	2070 10	0.00 0	0.0115
P-28 MAI	2070 10	20.0 4	0.173
P-29 MAI	2092 10		0.0150
P-30 MAI	2231 10	0.01 7	0.0150
P-31 MAI	2231 10	15.0 9	0.300
P-32 MAI	2002 10		0.0530
P-33 MAI	2001 10	2.5 0	0.117
P-34 MAI	2001 10	5.3 0	0.117
P-35 MAI	2001 10	0.07 4	0.0105
P-36 MAI	2001 10		
P-37 MAI	2001 10		
P-38 MAI	2001 10		
P-39 MAI	2001 10		
P-40 MAI	2001 10		
P-41 MAI	2001 10		
P-42 MAI	2001 10		
P-43 MAI	2001 10		
P-44 MAI	2001 10		
P-45 MAI	2001 10		
P-46 MAI	2001 10		
P-47 MAI	2001 10		
P-48 MAI	2001 10		
P-49 MAI	2001 10		
P-50 MAI	2001 10		
P-51 MAI	2001 10		
P-52 MAI	2001 10		
P-53 MAI	2001 10		

5 weak P's omitted (ITP = 0.708)

P-1	156.36 3	0.01 5	0.0027
P-2	159.11 15	0.232 11	0.0000
P-3	177.20 1	0.101 0	0.0007
P-4	190.762 20	1.79 0	0.0076
P-5	200.90 5	0.95 0	0.0002
P-6	211.031 19	31.1 13	0.100
P-7	215.505 22	20.0 12	0.133
P-8	219.1 3	0.15 15	0.0007
P-9	250.70 16	0.213 0	0.0012
P-10	250.000 17	50.0 17	0.306
P-11	260.10 22	0.1 3	0.0017
P-12	317.63 6	0.230 10	0.0017
P-13	317.66 0	0.67 3	0.0009
P-14	367.397 16	10.1 5	0.111
P-15	410.320 10	22.0 8	0.195
P-16	419.75 3	1.20 0	0.0111
P-17	439.030 20	0.200 7	0.0019
P-18	451.370 15	1.20 5	0.0126
P-19	475.033 17	1.00 0	0.0101
P-20	520	0.30 0	0.0033
P-21	550.010 13	16.2 6	0.193
P-22	502.537 10	0.707 25	0.0000
P-23	610.39	0.51 6	0.0007
P-24	620.76 9	0.100 6	0.0026
P-25	631.023 13	7.03 23	0.0906
P-26	630.309 15	2.10 7	0.0200
P-27	673	0.50 6	0.0077
P-28	673	0.130 15	0.0019
P-29	690.530 25	0.231 0	0.0036
P-30	705.20 0	0.100 0	0.0016

see continued see

7702 P- DECAF 111.30 n 11 (continued)

Station Type	Frequency (MHz)	Modulation (%)	Altitude/ Miles
P-54	712.35 0	0.00 3	0.0127
P-55	710.105 12	7.21 21	0.110
P-56	703.600 25	0.170 4	0.0020
P-57	705.700 12	0.97 1	0.0155
P-58	700.001 12	0.00 3	0.0102
P-59	704.700 11	0.70 1	0.0120
P-60	701.201 11	1.02 0	0.0170
P-61	700.770 12	1.31 5	0.0222
P-62	700.120 10	0.270 0	0.0007
P-63	010.352 12	2.29 0	0.0335
P-64	013.16 0	0.113 5	0.0023
P-65	02.11 0	0.606 20	0.0106
P-66	00.171 17	0.210 7	0.0030
P-67	005.101 17	0.700 25	0.0107
P-68	000.37 11	0.122 0	0.0023
P-69	000.000 13	0.00 1	0.0105
P-70	013.005 20	0.360 12	0.0072
P-71	023.103 20	0.696 22	0.0137
P-72	020.073 12	0.72 0	0.0103
P-73	020.053 12	1.05 0	0.0300
P-74	010.150 15	0.207 10	0.0057
P-75	006.55 1	0.106 4	0.0043
P-76	1001.600 23	0.152 5	0.0030
P-77	1000.002 0	0.203 0	0.0056
P-78	1000.100 13	0.10 20	0.101
P-79	1110.00 0	0.100 0	0.0025
P-80	1120.00 1	0.119 0	0.0020
P-81	1151.017 25	0.107 0	0.0000
P-82	1101.263 17	2.59 0	0.0659
P-83	1215.050 25	0.120 0	0.0033
P-84	1202.101 15	0.001 13	0.0106
P-85	1201.002 15	0.00 1	0.0230
P-86	1270.057 20	0.175 6	0.0000
P-87	1300.371 16	0.001 16	0.0137
P-88	1312.002 16	0.361 12	0.0101
P-89	1310.662 17	0.300 10	0.0005
P-90	1300	3.0 0	0.0003
P-91	1052.50 0	0.122 0	0.0030
P-92	1070.500 22	0.200 0	0.0077
P-93	1070	0.120 10	0.0000
P-94	1005.507 17	0.503 16	0.0100
P-95	1530.763 20	0.100 5	0.0007
P-96	1573.000 20	0.000 21	0.0222
P-97	1700.012 25	0.310 10	0.0113
P-98	1710.656 22	0.002 13	0.0107
P-99	1727.10 3	0.100 5	0.0055
P-100	1000.01 3	0.172 0	0.0000
P-101	2000.10 3	0.505 10	0.0201
P-102	2007.20 1	0.235 0	0.0100
P-103	2000.00 3	0.201 0	0.0107
P-104	2120.15 0	0.200 7	0.0033
P-105	2301.63 0	0.076 15	0.0237

90 weak P's omitted (ITP = 3.000)

77AS B- DECAY (39.9 H 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	1.32	0.11 3	=0
β^- 1 max	163 9		
avg	85 3	0.70 20	0.0007
β^- 2 max	430 9		
avg	135 4	0.70 20	0.0020
β^- 3 max	445 9		
avg	139 4	1.6 4	0.0047
β^- 4 max	680 3		
avg	229 4	97.1 8	0.474
total β^-			
avg	226 4	100.1 10	0.481

2 weak β^- 's omitted (IIB = 0.03%)

γ 3	87.876 20	0.21 6	0.0004
γ 5	161.933 20	0.13 4	0.0004
γ 7	238.999 20	1.6 4	0.0081
γ 1	240.790 20	0.43 11	0.0023
γ 12	520.652 20	0.62 16	0.0069

7 weak γ 's omitted (II γ = 0.10%)

77BR EC DECAY (56 H 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	1.32	115 7	0.0032
Auger-K	9.67	36 1	0.0074
ce-K- 3	75.14 10	0.146 5	0.0002
ce-K- 9	109.17 8	0.79 3	0.0025
ce-L- 4	160.18 9	0.134 5	0.0005
ce-K- 14	226.32 7	0.213 6	0.0010
β^- 1 max	343 3		
avg	151.6 3	0.73 3	0.0024
X-ray L	1.38	1.05 24	=0
X-ray $K\alpha_2$	11.1814 2	15.4 10	0.0037
X-ray $K\alpha_1$	11.2224 2	30.0 18	0.0072
X-ray $K\beta$	12.5	7.2 5	0.0019
γ 3	87.80 10	1.40 4	0.0026
γ 5	138.45 4	0.129 6	0.0004
γ 8	161.83 9	1.10 3	0.0038
γ 9	180.68 7	0.204 10	0.0011
γ 12	200.40 7	1.21 6	0.0052
γ 14	238.94	23.1 5	0.118
γ 16	249.77 7	2.94 10	0.0159
γ 17	270.93 7	0.321 14	0.0019
γ 19	281.65 7	2.29 7	0.0137
γ 20	297.23 8	4.16 21	0.0263
γ 21	303.76 9	1.19 4	0.0076
γ 27	384.99 9	0.84 3	0.0069
γ 32	439.87 6	1.56 5	0.0146
γ 34	484.57 7	1.00 4	0.0103
γ 36	517.9 4	0.16 5	0.0018
γ 37	520.40 6	22.4 6	0.249
γ 39	565.91 19	0.427 17	0.0052
γ 40	567.00 8	0.86 3	0.0104
γ 41	574.64 9	1.19 4	0.0145
γ 42	578.91 7	2.46 10	0.0365
γ 43	585.88 7	1.57 5	0.0196
γ 48	755.35 7	1.67 5	0.0268
γ 51	817.79 6	2.08 7	0.0362
γ 59	1095.05 6	0.42 3	0.0198

37 weak γ 's omitted (II γ = 0.77%)
Maximum γ -intensity = 1.46%

79ER B- DECAY (35.04 H 10) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	1.4	105 8	0.0032
Auger-K	10.2	31 4	0.0067
ce-K- 1	10.7 4	0.214 21	0.0001
β^- 3 max	343 6		
avg	152.3 22	0.171 3	0.0006
β^- 4 max	604 6		
avg	263.3 22	6.7 6	0.0376
total β^-			
avg	260.0 23	6.9 6	0.0382

2 weak β^- 's omitted (IIB = 0.02%)

X-ray L	1.48	1.1 4	=0
X-ray $K\alpha_2$	11.97760 2	14.9 12	0.0038
X-ray $K\alpha_1$	11.92420 2	29.5 23	0.0073
X-ray $K\beta$	13.3	7.1 6	0.0020
γ 1	44.2 4	0.210 20	0.0002
γ 2	135.99 10	1.00 10	0.0029
γ 3	180.21 15	0.10 5	0.0004
γ 4	204.45 10	0.78 4	0.0035
γ 5	217.02 10	2.40 10	0.0111
γ 6	261.26 10	12.7 4	0.0707
γ 8	299.51 10	1.57 7	0.0100
γ 9	306.31 15	2.60 10	0.0170
γ 10	344.70 10	0.240 10	0.0018
γ 11	389.00 10	1.52 7	0.0126
γ 12	397.56 10	9.5 3	0.0804
γ 16	522.94 20	0.250 10	0.0028
γ 17	525.32 15	0.430 20	0.0048
γ 19	606.07 10	9.10 20	0.105
γ 25	932.04 10	1.26 6	0.0223
γ 30	934.41 15	0.126 7	0.0025
γ 31	1025.70 10	0.156 9	0.0034
γ 35	1115.1 3	0.370 20	0.0088
γ 39	1332.13 10	0.44 3	0.0125

22 weak γ 's omitted (II γ = 0.52%)
Maximum γ -intensity = 11.73%

81KP EC DECAY (2.125 Y 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	1.4	111 6	0.0033
Auger-K	10.2	31 3	0.0068
X-ray L	1.48	1.1 4	=0
X-ray $K\alpha_2$	11.97760 2	15.1 4	0.0038
X-ray $K\alpha_1$	11.92420 2	29.3 17	0.0075
X-ray $K\beta$	13.3	7.2 5	0.0021
γ 1	275.990 11	2.0 20	0.0118

0289 B- DECAY (35.73 E 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β ⁻ 1 max	259.5		
avg	74.0 20	1.00 19	0.0022
β ⁻ 2 max	439.5		
avg	136.0 20	99.60 10	0.206
total β ⁻			
avg	135.1 21	100.00 15	0.208
γ 1	92.194 8	0.75 5	0.0015
γ 4	137.40 20	0.14 3	0.0004
γ 6	221.45 3	2.25 9	0.0106
γ 7	273.45 3	0.79 5	0.0046
γ 12	558.320 20	70.6 9	0.034
γ 14	606.30 10	1.17 9	0.0151
γ 15	619.070 20	43.1 7	0.569
γ 17	690.330 20	27.9 6	0.416
γ 19	776.49 3	03.4 9	1.30
γ 20	827.01 3	20.2 4	0.426
γ 23	952.10 20	0.37 3	0.0074
γ 24	1007.57 9	1.31 4	0.0201
γ 25	1043.97 3	27.4 5	0.600
γ 27	1091.40 20	0.63 4	0.0104
γ 30	1317.47 5	26.9 5	0.756
γ 32	1426	0.11 5	0.0033
γ 33	1474.42 9	16.60 25	0.521
γ 34	1650.30 10	0.79 5	0.0279
γ 35	1779.60 20	0.117 17	0.0044

10 weak γ's omitted (E_γ = 0.75%)

0488 B- DECAY (34.0 1) I(min)=0.10%

S(ZC+9)=46.4 6
SEE ALSO 0490 B- DECAY

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	1.5	70 4	0.0022
Auger-K	10.8	19.0 17	0.0046
β ⁺ 1 max	776 3		
avg	330.4 13	12.4 4	0.0930
β ⁺ 2 max	1650 3		
avg	730.6 14	12.0 4	0.107
total β ⁺			
avg	527.4 16	24.9 6	0.200
I-ray L	1.59	0.9 4	=0
I-ray K _{α2}	12.5900 20	19.5 6	0.0020
I-ray K _{α1}	12.6490 20	20.4 10	0.0055
I-ray Kβ	14	5.2 3	0.0016
γ 1	881.50 10	71.0 20	1.33
γ 2	1015.90 10	0.43 7	0.0093
γ 3	1097.00 20	0.78 8	0.0315

Maximum γs-intensity = 49.80%

0490 B- DECAY (34.0 1) I(min)=0.10%

E_β=1.6 6
SEE ALSO 0488 B- DECAY

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β ⁺ 1 max	490 4		
avg	309.9 14	3.6 6	0.0238
Auger-L	1.5	7.7 5	0.0002
Auger-K	10.9	2.14 20	0.0005
ce-K- 1	290.544 20	6.05 21	0.0374
ce-L- 1	302.949 20	0.99 3	0.0058
ce-BMO- 1	304.502 20	0.102 6	0.0012
I-ray L	1.59	0.19 4	=0
I-ray K _{α2}	12.5900 20	1.14 7	0.0003
I-ray K _{α1}	12.6490 20	2.21 13	0.0006
I-ray Kβ	14	0.56 4	0.0002
γ 1	304.870 20	14.0 4	0.0909

0582 IT DECAY (0.40 E 1) I(min)=0.10%

E_{IT}=21.1 6
SEE ALSO 0580 B- DECAY (0.40 E)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	1.5	7.7 5	0.0002
Auger-K	10.9	2.14 20	0.0005
ce-K- 1	290.544 20	6.05 21	0.0374
ce-L- 1	302.949 20	0.99 3	0.0058
ce-BMO- 1	304.502 20	0.102 6	0.0012
I-ray L	1.59	0.19 4	=0
I-ray K _{α2}	12.5900 20	1.14 7	0.0003
I-ray K _{α1}	12.6490 20	2.21 13	0.0006
I-ray Kβ	14	0.56 4	0.0002
γ 1	304.870 20	14.0 4	0.0909

85RB B- DECAY (4.48 H 2) I(min)=0.10%

Eg=78.96

SEE ALSO 85RB IT DECAY (4.48 H)

Radiation Type	Energy (keV)	Intensity (%)	A (q-rad/ μ Ci-h)
Auger-L	1.68	3.70 12	0.0001
Auger-K	11.8	1.00 4	0.0001
ce-K- 2	135.380 14	3.02 9	0.0007
ce-L- 2	149.115 10	3.380 17	0.0011
β^- 1 max	711.0 20		
avg	238.3 7	3.290 10	0.0015
β^- 2 max	941.0 20		
avg	290.8 7	70.6 6	0.006
total β^-			
avg	290.2 7	70.9 6	0.000

1 weak β^- 's omitted (I β^- = 0.02%)

X-ray $K_{\alpha 2}$	13.33580 2	0.587 20	0.0002
X-ray $K_{\alpha 1}$	13.39530 2	1.14 4	0.0003
X-ray K_{β}	15	0.298 11	=0
γ 1	129.850 20	0.300 10	0.0000
γ 2	151.180 10	75.5 6	0.243

2 weak γ 's omitted (I γ = 0.02%)

85RB EC DECAY (64.45 D 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (q-rad/ μ Ci-h)
Auger-L	1.68	108.3 23	0.0039
Auger-K	11.8	29.1 9	0.0071
ce-K- 1	498.790 10	0.617 13	0.0066
X-ray L	1.69	1.6 6	=0
X-ray $K_{\alpha 2}$	13.33580 2	17.1 4	0.0048
X-ray $K_{\alpha 1}$	13.39530 2	33.0 7	0.0094
X-ray K_{β}	15	8.67 24	0.0028
γ 1	513.490 10	98.0 10	1.07

1 weak γ 's omitted (I γ = 0.01%)

86RB B- DECAY (19.66 D 2) I(min)=0.10%

86RB ALSO DECAYS VIA A 0.0052% 5 EC BRANCH

Radiation Type	Energy (keV)	Intensity (%)	A (q-rad/ μ Ci-h)
β^- 1 max	695 3		
avg	231.5 11	9.76 8	0.0032
β^- 2 max	1772 3		
avg	708.2 13	91.24 8	1.38
total β^-			
avg	666.8 14	100.00 12	1.42
γ 1	1076.63 10	9.76 8	0.201

86RB B- DECAY (19.76 H 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (q-rad/ μ Ci-h)
Auger-L	1.70	69 4	0.0026
Auger-K	12	18.0 16	0.0006
β^- 1 max	420 10		
avg	187 4	0.30 4	0.0012
β^- 3 max	405 10		
avg	215 4	2.130 20	0.0015
β^- 5 max	406 10		
avg	267 5	4.37 3	0.0021
β^- 6 max	499 10		
avg	389 4	0.200 20	0.0017
β^- 7 max	933 10		
avg	400 5	1.3 3	0.0113
β^- 9 max	1064 10		
avg	467 5	2.0 5	0.0199
β^- 10 max	1195 10		
avg	520 4	1.40 20	0.0156
β^- 11 max	1250 10		
avg	550 4	12.4 5	0.105
β^- 12 max	1373 10		
avg	603 4	0.69 17	0.0009
β^- 13 max	1570 10		
avg	691 9	5.6 5	0.0020
β^- 14 max	1749 10		
avg	783 6	1.7 10	0.0280
β^- 15 max	2021 10		
avg	908 5	3.6 10	0.0609
β^- 16 max	2397 10		
avg	1093 5	0.9 3	0.0210
β^- 17 max	3170 10		
avg	1452 5	1.8 11	0.0557
total β^-			
avg	664 6	32.4 23	0.466

6 weak β^- 's omitted (I β^- = 0.24%)

X-ray L	1.7	1.1 4	=0
X-ray $K_{\alpha 2}$	14.09790 2	11.7 6	0.0035
X-ray $K_{\alpha 1}$	14.16500 2	22.5 11	0.0068
X-ray K_{β}	15.4	6.1 1	0.0020
γ 1	132.10 10	0.165 4	0.0005
γ 3	182.30 20	0.11 4	0.0004
γ 4	187.97 13	1.26 5	0.0051
γ 5	190.40 13	1.01 4	0.0041
γ 6	209.00 23	0.396 17	0.0018
γ 7	235.37 23	0.396 17	0.0020
γ 8	237.0 3	0.132 25	0.0007
γ 9	252.05 17	0.371 17	0.0020
γ 11	266.53 13	0.536 25	0.0030
γ 12	307.00 19	3.46 9	0.0227
γ 13	331.08 23	0.91 3	0.0059
γ 15	370.28 17	0.02 5	0.0065
γ 16	380.4 3	0.05 4	0.0037
γ 17	382.86 23	3.63 12	0.0296
γ 18	425.97 21	0.305 17	0.0028
γ 19	439.5 1	0.20 7	0.0019
γ 20	443.13 10	16.9 5	0.160
γ 21	444.19 23	0.64 17	0.0061
γ 23	469.20 25	0.297 25	0.0036
γ 26	515.18 20	4.89 15	0.0537
γ 27	580.57 10	4.78 15	0.0592
γ 28	608.20 10	2.01 15	0.0261
γ 29	618.2 4	0.21 4	0.0028
γ 30	627.72 10	32.6 10	0.436
γ 32	644.92	2.2 4	0.0300
γ 33	645.87	9.2 11	0.126
γ 35	689.29 25	0.17 4	0.0025
γ 36	702.2 6	0.25 4	0.0037
γ 37	703.33 10	15.4 5	0.231
γ 38	709.90 10	2.62 9	0.0397
γ 39	719.17 23	0.22 4	0.0034

*** continued ***

6612 B- DECAY (16.74 ± 2) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A (q-rad/ μCi-h)
γ 40	706.91 13	1.36 5	0.0215
γ 41	767.63 11	2.4 4	0.0391
γ 42	768.25	0.32 11	0.0053
γ 43	777.37 10	22.4 6	0.372
γ 44	783.6 3	0.26 8	0.0044
γ 45	826.02 13	1.30 9	0.0501
γ 46	833.72	1.5 4	0.0260
γ 47	835.67	4.4 6	0.0770
γ 48	882.46 17	0.25 9	0.0047
γ 49	887.40 17	0.04 5	0.0003
γ 50	955.35 20	1.04 5	0.0212
γ 51	971.03 10	0.27 4	0.0056
γ 52	1017.93 23	0.10 12	0.0039
γ 53	1020.00 10	1.79 17	0.0020
γ 54	1076.63 10	02.5 4	1.09
γ 56	1097.60 13	0.69 5	0.0161
γ 57	1102.02 23	0.190 25	0.0046
γ 58	1133.3 10	0.297 25	0.0072
γ 61	1153.05 10	30.5 10	0.750
γ 63	1163.03 10	1.10 5	0.0292
γ 64	1253.11 10	1.53 5	0.0410
γ 65	1270.16 13	0.65 10	0.0176
γ 66	1283.96 13	0.29 11	0.0079
γ 67	1290.9 3	0.29 9	0.0000
γ 68	1296.03 23	0.54 4	0.0150
γ 70	1349.15 10	2.95 10	0.0046
γ 71	1400.0 4	0.18 5	0.0054
γ 72	1415.20 23	0.33 9	0.0099
γ 73	1507.06 10	0.35 5	0.0114
γ 74	1533.19 13	0.22 4	0.0073
γ 75	1535.67 13	0.12 4	0.0030
γ 76	1564.4 5	0.10 5	0.0060
γ 77	1696.25 13	0.635 17	0.0230
γ 78	1711.6 7	0.17 4	0.0063
γ 79	1724.15 10	0.55 5	0.0203
γ 80	1790.90 10	1.00 5	0.0301
γ 81	1801.70 10	1.65 5	0.0633
γ 82	1850.30 13	17.2 5	0.670
γ 83	1920.72 13	20.8 7	0.051
γ 85	2017.1 6	0.132 17	0.0057
γ 86	2000.09 25	0.207 25	0.0110
γ 89	2291.8 5	0.124 9	0.0060
γ 90	2402.00 17	0.115 9	0.0061
γ 92	2567.97 18	2.25 11	0.123
γ 93	2610.11 20	1.24 8	0.0600
γ 94	2641.9 4	0.16 5	0.0093
γ 96	2794.9 4	0.206 17	0.0123
γ 99	2865.9 3	0.30 7	0.0232
γ 101	3069.7 4	0.115 17	0.0076
γ 102	3330.0 5	0.124 17	0.0008

23 weak γ's omitted (I_γ = 1.03%)
Maximum γ₂-intensity = 65.77%

6612 B- DECAY (16.5 ± 1) T (min) = 0.105

Radiation Type	Energy (keV)	Intensity (%)	A (q-rad/ μCi-h)
Auger-L	2	100 10	6.0076
ce-K- 1	11.0 5	69.9 4	0.0163
Auger-L	12.7	46 5	0.0120
ce-L- 1	25.6 5	4.7 3	0.0047
ce-KED- 1	27.6 5	2.00 10	0.0012
ce-K- 2	226.0 10	3.95 11	0.0171
ce-L- 2	240.6 10	0.440 10	0.0023
ce-KED- 2	242.6 10	0.10	0.0009
X-ray L	2	0.2 10	0.0002
X-ray K _α	10.00200 2	32.5 16	0.0103
X-ray K _β	10.95000 2	63 3	0.0200
X-ray K _γ	16.7	17.2 9	0.0061
γ 1	20.0 5	19.4 6	0.0116
γ 2	203.0 10	95.00 10	0.496
γ 3	612.0 20	5.2 0	0.0670

6712 B- DECAY (76.3 ± 9) T (min) = 0.105

Radiation Type	Energy (keV)	Intensity (%)	A (q-rad/ μCi-h)
Auger-L	1.60	0.210 10	0
ce-K- 2	307.370 20	0.170 9	0.0015
β- 1 max	579 7		
avg	100 3	0.50 3	0.0020
β- 2 max	833 7		
avg	207 3	0.110 10	0.0007
β- 3 max	927 7		
avg	326 3	4.4 3	0.0306
β- 4 max	1077 7		
avg	309 3	0.50 3	0.0040
β- 5 max	1333 7		
avg	500 3	9.5 3	0.101
β- 6 max	1474 7		
avg	562 3	5.60 20	0.0670
β- 7 max	1510 7		
avg	579 3	0.42 6	0.0052
β- 8 max	2100 7		
avg	870 3	0.67 10	0.0120
β- 9 max	2310 7		
avg	946 3	0.16 6	0.0032
β- 10 max	2490 7		
avg	1029 7	0.120 10	0.0026
β- 11 max	3043 7		
avg	1294 0	6.9 4	0.190
β- 12 max	3405 7		
avg	1501 3	40.0 14	1.30
β- 13 max	3800 7		
avg	1694 3	30.5 22	1.10
total β-			
avg	1323 4	100 3	2.02

*** continued ***

07KB D- DECAY (76.3 H 3) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Cl-h)
γ 2	482.570 20	49.5 16	0.020
γ 6	673.87 8	1.91 10	0.0276
γ 7	810.25 7	0.168 12	0.0029
γ 8	836.37 6	0.75 8	0.0134
γ 9	865.63 4	7.3 8	0.131
γ 12	946.64 15	0.139 11	0.0020
γ 15	1175.00 8	1.12 6	0.0201
γ 16	1337.96 8	0.65 8	0.0105
γ 17	1382.53 7	0.207 10	0.0005
γ 18	1389.91 16	0.120 11	0.0037
γ 20	1531.2 4	0.36 6	0.0116
γ 21	1577.99 14	0.129 11	0.0003
γ 22	1611.16 16	0.104 20	0.0036
γ 23	1740.52 8	2.05 10	0.0760
γ 24	1842.61 24	0.139 11	0.0054
γ 25	2011.00 12	2.90 14	0.124
γ 27	2408.50 20	0.213 17	0.0109
γ 28	2550.00 20	9.3 6	0.506
γ 29	2556.10 20	3.5 3	0.213
γ 31	2811.40 20	0.317 23	0.0190
γ 34	3308.50 20	0.450 25	0.0317

13 weak γ 's omitted ($\Sigma I_\gamma = 0.65\%$)

07SB BC DECAY (2.005 H 3) I(min)=0.10%

SIC=0.30 8
 PENDING OF 07SB IN 07Y DECAY=100%
 SEE ALSO 07SB IT DECAY (2.005 H)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Cl-h)
Auger-L	1.68	0.32 8	0

07SB IT DECAY (2.005 H 3) I(min)=0.10%

SIT=99.70 3
 PENDING OF 07SB IN 07Y DECAY=100%
 SEE ALSO 07SB BC DECAY (2.005 H)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Cl-h)
Auger-L	1.79	17.9 9	0.0007
Auger-K	12	4.5 8	0.0012
ce-K- 1	372.30 8	14.6 3	0.115
ce-L- 1	386.18 8	2.22 4	0.0183
ce-H- 1	388.04 8	0.337 6	0.0028
X-ray L	1.8	0.29 10	0
X-ray $K\alpha_2$	14.09790 2	2.92 13	0.0009
X-ray $K\alpha_1$	14.16500 2	5.63 24	0.0017
X-ray $K\beta$	15.8	1.51 7	0.0005
γ 1	388.40 8	82.26 15	0.601

07Y BC DECAY (200.3 H 3) I(min)=0.10%

SEE ALSO 07SB IT DECAY (2.005 H)
 SEE ALSO 07SB BC DECAY (2.005 H)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Cl-h)
Auger-L	1.79	105 6	0.0000
Auger-K	12	27.6 23	0.0070
ce-K- 2	468.60 20	0.240 5	0.3028
β^- 1 max	450.6 14		
avg	200.6 6	0.160 20	0.0007
X-ray L	1.9	1.7 6	0
X-ray $K\alpha_2$	14.09790 2	17.5 8	0.0053
X-ray $K\alpha_1$	14.16500 2	33.8 14	0.0132
X-ray $K\beta$	15.8	9.1 4	0.3031
γ 2	484.70 20	92.2 10	0.952

Maximum γ -intensity = 0.32%

00KB D- DECAY (2.04 H 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Cl-h)
Auger-L	1.68	14.8 4	0.0005
Auger-K	11.4	4.00 12	0.0010
ce-K- 1	372.313 14	10.72 14	0.0020
ce-L- 1	386.180 14	1.23 5	0.0007
ce-HM- 1	377.191 14	0.214 15	0.0001
ce-K- 4	150.78 4	0.21 3	0.0007
ce-L- 7	181.120 15	1.14 12	0.0044
ce-L- 7	190.255 15	0.135 17	0.0006
β^- 1 max	160 30		
avg	43 7	0.350 20	0.0003
β^- 2 max	380 30		
avg	115 10	2.65 16	0.0065
β^- 3 max	540 30		
avg	172 12	67 3	0.245
β^- 4 max	700 30		
avg	233 13	9.1 5	0.0052
β^- 5 max	840 30		
avg	290 13	0.14 3	0.0009
β^- 6 max	1010 30		
avg	362 13	0.200 20	0.0015
β^- 7 max	1220 30		
avg	448 13	1.92 11	0.0183
β^- 8 max	1270 30		
avg	472 13	0.23 4	0.0023
β^- 9 max	1490 30		
avg	569 14	0.22 3	0.0027
β^- 10 max	1750 30		
avg	686 14	0.90 6	0.0132
β^- 11 max	1790 30		
avg	704 14	0.10 6	0.0015
β^- 12 max	2070 30		
avg	833 14	1.31 25	0.0232
β^- 13 max	2570 30		
avg	1066 14	0.14 14	0.0032
β^- 14 max	2730 30		
avg	1144 14	1.90 25	0.0439
β^- 15 max	2930 30		
avg	1241 14	14 4	0.370
total β^-			
avg	365 21	100 5	0.781

6 weak β 's omitted ($\Sigma I_\beta = 0.25\%$)

*** continued ***

0088 D- DECAY (2.00 H 2) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
X-ray L	1.69	0.23 0	0.0007
X-ray K _{α2}	13.33500 2	2.35 6	0.0013
X-ray K _{α1}	13.39530 2	0.50 10	0.0004
X-ray Kβ	15	1.19 8	0.0011
γ 1	27.513 10	1.90 17	0.0005
γ 3	122.27 6	0.197 12	0.0110
γ 4	165.90 8	3.10 15	0.109
γ 7	196.320 15	26.0 13	0.0013
γ 8	200.71 8	0.253 10	0.0007
γ 9	311.69 3	0.107 9	0.0010
γ 10	330.71 3	0.105 10	0.0170
γ 12	362.226 13	2.25 12	0.0050
γ 14	400.563 11	0.60 6	0.0011
γ 16	421.70 10	0.120 25	0.0073
γ 17	471.00 3	0.73 8	0.0030
γ 20	677.34 5	0.235 10	0.0009
γ 30	700.20 4	0.53 3	0.0021
γ 31	790.32 7	0.125 12	0.231
γ 30	830.030 3	13.0 7	0.0031
γ 35	850.34 5	0.173 10	0.0123
γ 36	862.127 19	0.67 8	0.0059
γ 39	900.92 8	0.100 20	0.0276
γ 42	905.700 16	1.51 7	0.0030
γ 43	990.09 9	0.162 13	0.3107
γ 44	1039.59 3	0.08 3	0.0032
γ 45	1009.00 12	0.102 13	0.0012
γ 48	1101.33 6	1.20 7	0.0250
γ 49	1179.51 3	1.00 5	0.0170
γ 56	1100.95 8	0.69 5	0.0037
γ 51	1209.00 0	0.10 3	0.0036
γ 52	1212.73 17	0.10 5	0.0096
γ 53	1205.22 4	0.363 25	0.0299
γ 54	1250.47 8	1.12 6	0.0005
γ 57	1320.90 8	0.16 8	0.0046
γ 59	1352.32 11	0.159 22	0.0031
γ 60	1369.50 20	1.00 9	0.0065
γ 61	1406.90 10	0.210 20	0.0036
γ 62	1400.00 9	0.110 15	0.0696
γ 63	1510.39 3	2.15 12	0.356
γ 64	1529.77 3	10.9 6	0.0156
γ 65	1603.79 5	0.06 8	0.0239
γ 68	1605.6 4	0.66 8	0.0056
γ 72	1892.76 13	0.10 3	0.0041
γ 73	1900.7 8	0.100 15	0.196
γ 74	2029.04 3	4.53 23	0.162
γ 75	2035.411 10	3.70 21	0.0130
γ 76	2106.5 3	0.29 6	0.617
γ 77	2195.042 7	13.2 7	0.161
γ 78	2231.772 21	3.39 17	0.0366
γ 80	2352.00 8	0.73 8	1.76
γ 82	2392.11 8	30.6 16	0.0053
γ 83	2400.91 7	0.100 12	0.0330
γ 85	2500.00 3	0.62 3	0.0080
γ 86	2771.02 5	0.109 10	

36 weak γ's omitted (I_γ = 1.89%)

0088 D- DECAY (17.0 H 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
β ⁻ 1 max	685 5		
avg	152.0 20	0.40 5	0.0022
β ⁻ 2 max	693 5		
avg	155.0 20	0.37 3	0.0012
β ⁻ 3 max	595 5		
avg	153.0 20	0.150 10	0.0006
β ⁻ 4 max	620 5		
avg	203.0 20	2.17 10	0.0131
β ⁻ 5 max	920 5		
avg	320.0 20	0.210 20	0.0010
β ⁻ 6 max	2120 5		
avg	695.0 20	1.00 7	0.0102
β ⁻ 7 max	2600 5		
avg	1001.0 20	13.6 9	0.313
β ⁻ 8 max	3502 0		
avg	1507.0 20	4.2 4	0.135
β ⁻ 9 max	5330 0		
avg	2300.0 20	76 3	3.06
total β ⁻			
avg	2072 3	90 8	4.30

5 weak β's omitted (I_β = 0.00%)

γ 5	690.03 8	10.4 10	0.275
γ 8	1366.26 12	0.105 15	0.0031
γ 9	1302.39 5	0.76 6	0.0220
γ 13	1779.03 7	0.221 20	0.0000
γ 14	1836.00 5	21.9 15	0.056
γ 10	2115.37 12	0.120 10	0.0050
γ 15	2110.63 7	0.43 8	0.0195
γ 17	2577.72 6	0.100 15	0.0101
γ 20	2677.06 5	2.00 12	0.110
γ 21	2730.03 7	0.112 10	0.0065
γ 22	3009.03 7	0.250 19	0.0160
γ 24	3210.00 0	0.219 16	0.0150
γ 25	3406.06 9	0.133 10	0.0099
γ 20	4707.69 11	0.147 12	0.0100

15 weak γ's omitted (I_γ = 0.39%)

80Y EC DECAY (107 D 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	1.79	105 6	0.0040
Auger-K	12	27.1 23	0.0070
β ⁺ 1 max	761 8		
avg	350.0 20	0.200 10	0.0015
X-ray L	1.8	1.7 6	0.0053
X-ray K _{α2}	10.09790 2	17.6 8	0.0102
X-ray K _{α1}	10.16500 2	33.9 10	0.0031
X-ray Kβ	15.8	9.1 8	
γ 2	890.020 20	93.4 7	1.79
γ 4	1036.040 20	99.35 3	3.09
γ 5	2730.03 7	0.60 3	0.0370

3 weak γ's omitted (I_γ = 0.10%)
Maximum γ-intensity = 0.00%

09KE B- DECAT (3.17 H 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	1.64	1.18 9	=0
Auger-K	11.4	0.32 3	=0
Co-K- 4	205.70 7	0.46 4	0.0042
Co-L- 4	218.83 7	0.116 10	0.0005
β-1 max	300 30		
avg	87 4	0.59 7	0.0011
β-2 max	440 30		
avg	137 10	0.56 5	0.0016
β-3 max	450 30		
avg	140 10	0.33 4	0.0010
β-4 max	520 30		
avg	167 10	0.18 3	0.0006
β-5 max	560 30		
avg	181 10	0.60 5	0.0023
β-6 max	590 30		
avg	191 10	0.220 20	0.0009
β-7 max	550 30		
avg	192 10	0.16 3	0.0007
β-8 max	620 30		
avg	204 10	0.14 3	0.0006
β-9 max	700 30		
avg	234 10	0.20 6	0.0010
β-10 max	710 30		
avg	239 10	0.180 20	0.0009
β-11 max	790 30		
avg	268 11	0.56 6	0.0032
β-12 max	850 30		
avg	294 11	0.70 7	0.0044
β-13 max	880 30		
avg	307 11	0.50 5	0.0033
β-14 max	950 30		
avg	336 11	0.45 6	0.0032
β-15 max	960 30		
avg	341 11	0.20 3	0.0015
β-16 max	1030 30		
avg	370 11	0.17 3	0.0013
β-17 max	1210 30		
avg	446 11	0.34 5	0.0032
β-18 max	1210 30		
avg	447 11	2.40 20	0.0229
β-19 max	1400 30		
avg	528 12	1.50 20	0.0169
β-20 max	1460 30		
avg	558 12	0.32 4	0.0038
β-21 max	1560 30		
avg	600 12	2.10 20	0.0268
β-22 max	1570 30		
avg	605 12	1.60 20	0.0206
β-23 max	1600 30		
avg	620 12	2.00 20	0.0264
β-24 max	1680 30		
avg	655 12	0.27 4	0.0038
β-25 max	1910 30		
avg	761 12	0.70 20	0.0113
β-26 max	2060 30		
avg	831 12	4.0 3	0.0709
β-27 max	2140 30		
avg	867 12	0.28 4	0.0052
β-28 max	2150 30		
avg	870 12	1.50 10	0.0278
β-29 max	2330 30		
avg	955 13	14.7 9	0.299
β-30 max	2530 30		
avg	1048 13	5.7 4	0.127
β-31 max	2540 30		
avg	1054 13	0.31 4	0.0070
β-32 max	2560 30		
avg	1064 13	0.20 3	0.0045
β-33 max	2710 30		
avg	1134 13	0.23 3	0.0056

*** continued ***

09KE B- DECAT (3.17 H 2) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β-34 max	2770 30		
avg	1161 13	3.2 3	0.0791
β-35 max	2930 30		
avg	1234 13	2.60 20	0.0606
β-36 max	3060 30		
avg	1301 13	0.48 6	0.0133
β-37 max	3110 30		
avg	1322 13	0.18 9	0.0051
β-38 max	3240 30		
avg	1383 13	10.3 9	0.303
β-39 max	3400 30		
avg	1461 13	2.9 3	0.0902
β-40 max	3590 30		
avg	1552 13	0.64 10	0.0212
β-41 max	3610 30		
avg	1559 13	3.7 4	0.123
β-42 max	3730 30		
avg	1621 13	0.2	0.0069
β-43 max	3930 30		
avg	1716 13	1.3 3	0.0475
β-44 max	4000 30		
avg	1748 13	0.50 20	0.0186
β-45 max	4060 30		
avg	1778 13	0.2 4	0.0076
β-46 max	4340 30		
avg	1913 14	2.20 10	0.0896
β-47 max	4350 30		
avg	1918 14	4.5 5	0.184
β-48 max	4430 30		
avg	1956 14	1.2 6	0.0500
β-49 max	4710 30		
avg	2044 14	1.4	0.0623
β-50 max	4930 30		
avg	2196 14	21 4	0.982
total β- avg	1336 18	101 5	2.87

6 weak β's omitted (IIB = 0.35%)

K-ray	Kα ₂	13.33580 2	0.186 16	=0
K-ray	Kα ₁	13.39530 2	0.36 3	0.0001
γ 1		196.2 5	0.22 11	0.0009
γ 2		197.5 3	1.06 18	0.0078
γ 3		205.03 20	0.13 3	0.0006
γ 4		220.90 7	20.4 16	0.0960
γ 6		264.11 10	0.67 6	0.0038
γ 12		338.20 10	0.35 4	0.0025
γ 13		345.03 10	1.20 11	0.0088
γ 14		356.06 7	4.2 4	0.0320
γ 15		364.88 10	0.92 8	0.0071
γ 16		369.30 10	1.41 12	0.0111
γ 18		402.25 20	0.32 4	0.0028
γ 19		411.42 10	2.61 20	0.0229
γ 21		438.08 10	0.98 8	0.0091
γ 22		466.13 10	0.82 8	0.0081
γ 24		490.76 20	0.33 5	0.0034
γ 25		497.5 3	6.8 7	0.0718
γ 26		498.6 4	1.16 22	0.0123
γ 30		557.30 20	0.163 19	0.0019
γ 31		576.96 10	5.8 5	0.0707
γ 32		585.80 7	16.9 13	0.210
γ 35		626.20 10	0.61 6	0.0082
γ 36		629.75 20	0.35 4	0.0047
γ 40		665.72 20	0.116 18	0.0016
γ 42		671.40 20	0.108 22	0.0015
γ 43		674.11 20	0.24 3	0.0034
γ 45		696.24 10	1.82 16	0.0269
γ 46		707.01 20	0.51 5	0.0076
γ 47		710.05 20	0.80 4	0.0120
γ 48		729.63 20	0.30 4	0.0047
γ 49		736.39 7	4.3 4	0.0674

*** continued ***

59KR B- DECAY (3.17 ± 2)

(continued)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
γ 50	747.4 3	0.12 3	0.0019
γ 52	762.4 3	0.41 9	0.0066
γ 53	762.9 3	0.94 14	0.0152
γ 54	776.49 20	1.14 20	0.0189
γ 56	826.75 10	0.78 9	0.0137
γ 57	835.53 10	1.12 11	0.0200
γ 58	857.37 15	0.29 3	0.0053
γ 59	867.04 7	6.0 5	0.112
γ 60	870.42 20	0.163 21	0.0030
γ 61	904.27 7	7.3 6	0.141
γ 63	930.95 10	0.63 6	0.0125
γ 66	944.19 15	7.167 19	0.0034
γ 67	953.18 20	1.108 18	0.0022
γ 68	960.42 10	0.33 4	0.0067
γ 71	974.39 10	1.00 9	0.0207
γ 72	997.37 10	0.67 6	0.0143
γ 73	1010.84 20	0.110 16	0.0024
γ 75	1044.40 10	0.42 4	0.0093
γ 80	1076.48 20	0.24 3	0.0055
γ 81	1088.07 10	0.37 4	0.0065
γ 83	1103.18 20	0.92 8	0.0216
γ 84	1107.79 10	2.98 25	0.0703
γ 85	1116.61 7	1.69 14	0.0403
γ 86	1131.51 20	0.163 25	0.0039
γ 88	1162.50 10	0.218 24	0.0054
γ 90	1172.33 20	1.00 10	0.0250
γ 91	1182.38 20	0.169 25	0.0043
γ 92	1186.54 20	0.188 21	0.0047
γ 96	1228.8 3	0.147 20	0.0038
γ 97	1235.62 10	0.61 6	0.0159
γ 101	1273.73 10	1.39 11	0.0376
γ 104	1302.6 3	0.102 16	0.0028
γ 106	1324.28 7	3.12 25	0.0880
γ 107	1335.4 3	0.13 3	0.0038
γ 108	1340.6 3	0.20 3	0.0057
γ 109	1367.48 20	0.151 20	0.0044
γ 110	1372.16 20	0.129 18	0.0038
γ 112	1412.59 15	0.27 3	0.0081
γ 113	1421.64 20	0.23 5	0.0069
γ 117	1461.3 5	0.12 3	0.0039
γ 118	1464.2 3	0.18 3	0.0057
γ 119	1468.5 3	0.19 3	0.0060
γ 120	1472.76 10	7.0 6	0.220
γ 123	1500.96 10	1.35 13	0.0430
γ 124	1506.1 3	0.114 22	0.0037
γ 125	1530.04 15	3.4 3	0.110
γ 126	1533.68 15	5.2 4	0.171
γ 127	1555.28 20	0.155 21	0.0051
γ 128	1573.78 20	0.194 22	0.0065
γ 131	1634.06 10	0.84 8	0.0291
γ 132	1643.82 10	0.34 4	0.0121
γ 134	1667.51 20	0.121 16	0.0046
γ 135	1676.9 3	0.143 24	0.0051
γ 137	1683.8 4	0.13 3	0.0048
γ 138	1692.0 12	0.26 11	0.0094
γ 139	1693.70 10	4.5 4	0.161
γ 142	1721.29 15	0.228 23	0.0084
γ 146	1777.60 10	0.78 8	0.0294
γ 147	1788.2 3	0.108 18	0.0041
γ 150	1810.73 20	0.143 18	0.0055
γ 154	1837.5 4	0.12 3	0.0047
γ 155	1839.72 25	0.36 4	0.0140
γ 158	1868.47 25	0.200 22	0.0080
γ 159	1879.80 25	0.161 19	0.0065
γ 162	1903.40 10	1.06 12	0.0430
γ 165	1939.11 15	0.65 6	0.0270
γ 166	1966.55 20	0.135 16	0.0056
γ 168	1998.6 5	0.120 24	0.0051
γ 170	2012.23 10	1.59 14	0.0682
γ 171	2021.04 15	0.289 25	0.0107
γ 173	2046.47 15	0.267 25	0.0116
γ 176	2100.63 8	0.96 8	0.0429

*** continued ***

89KR B- DECAY (3.17 ± 2)

(continued)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
γ 180	2160.02 9	0.54 5	0.0248
γ 183	2195.8 4	0.13 6	0.0061
γ 186	2200.2 3	0.21 5	0.0101
γ 190	2377.4 9	0.82 9	0.0413
γ 191	2400.99 9	0.73 8	0.0376
γ 201	2597.92 20	0.110 18	0.0061
γ 203	2645.26 15	0.43 4	0.0241
γ 208	2750.9 3	0.126 16	0.0074
γ 212	2782.11 10	0.79 8	0.0459
γ 214	2793.75 20	0.69 6	0.0413
γ 216	2819.58 25	0.135 18	0.0081
γ 217	2853.3 3	0.24 4	0.0149
γ 218	2866.23 10	1.77 14	0.138
γ 220	2878.69 25	0.33 4	0.0203
γ 224	3017.5 3	0.26 4	0.0167
γ 225	3029.16 25	0.29 3	0.0178
γ 228	3107.26 25	0.198 22	0.0131
γ 229	3140.26 20	1.06 10	0.0710
γ 232	3172.1 3	0.102 16	0.0069
γ 234	3219.84 20	0.44 4	0.0299
γ 243	3361.70 20	1.06 10	0.0760
γ 244	3371.1 4	0.63 7	0.0454
γ 245	3399.9 3	0.139 17	0.0100
γ 249	3532.48 20	1.37 11	0.103
γ 251	3583.9 3	0.263 25	0.0201
γ 258	3717.8 4	0.86 8	0.0678
γ 260	3732.5 6	0.14 6	0.0112
γ 262	3781.4 4	0.135 15	0.0108
γ 264	3827.4 4	0.141 18	0.0115
γ 266	3842.7 4	0.112 14	0.0092
γ 269	3901.7 4	0.137 22	0.0114
γ 270	3923.0 4	0.42 4	0.0353
γ 271	3965.5 4	0.212 20	0.0179
γ 272	3977.5 4	0.28 6	0.0233
γ 274	3996.0 4	0.145 15	0.0123
γ 277	4048.0 5	0.118 14	0.0102
γ 290	4341.1 6	0.106 12	0.0096
γ 295	4489.2 8	0.137 15	0.0131

159 weak γ's omitted (IIγ = 7.26%)

89RB B-DECAY (15.2 H 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
β ⁻ 1 max	978 12		
avg	346 5	1.55 13	0.0114
β ⁻ 2 max	1259 12		
avg	467 5	33 3	0.328
β ⁻ 3 max	1779 12		
avg	711 6	2.23 13	0.0330
β ⁻ 4 max	1916 12		
avg	761 5	3.1 9	0.0502
β ⁻ 5 max	2206 12		
avg	895 5	35 4	0.667
β ⁻ 6 max	2428 12		
avg	999 5	0.50 13	0.0106
β ⁻ 7 max	2479 12		
avg	1023 5	0.47 21	0.0102
β ⁻ 8 max	2506 12		
avg	1054 5	0.22 4	0.0049
β ⁻ 9 max	3013 12		
avg	1277 6	0.25 5	0.0068
β ⁻ 10 max	3455 12		
avg	1485 5	1 4	0.0316
β ⁻ 11 max	4496 12		
avg	1979 6	24 5	1.01
total β ⁻			
avg	1001 7	102 9	2.17

7 weak β's omitted (IIP = 0.38%)

γ 3	272.45 10	1.44 12	0.0084
γ 4	289.76 10	0.55 10	0.0034
γ 8	657.71 7	10.1 9	0.142
γ 10	756.79 15	0.165 21	0.0027
γ 14	947.69 7	9.4 8	0.189
γ 16	1025.3 5	0.23 9	0.0050
γ 17	1031.98 7	59 6	1.30
γ 23	1220.32 10	3.224 24	0.0058
γ 24	1228.40 15	0.124 23	0.0032
γ 26	1288.10 7	43 4	1.15
γ 29	1473.22 20	0.34 4	0.0113
γ 30	1501.07 20	0.201 23	0.0064
γ 31	1534.08 10	2.60 25	0.0850
γ 35	1940.2 3	0.34 4	0.0139
γ 37	2007.54 10	2.42 25	0.103
γ 38	2058.0 11	0.24 9	0.0103
γ 40	2196.00 15	13.6 13	0.635
γ 42	2280.06 10	0.183 22	0.0089
γ 45	2570.14 10	10.0 9	0.549
γ 48	2707.20 10	2.06 19	0.119
γ 57	3508.94 25	1.17 11	0.0873

41 weak γ's omitted (IIγ = 1.20%)

89SR B-DECAY (50.5 D 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
β ⁻ 1 max	1484 4		
avg	501.5 15	99.985 5	1.24

1 weak β's omitted (IIP = 0.02%)

1 weak γ's omitted (IIγ = 0.02%)

90SR B- DECAY (28.5 Y 8) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
β ⁻ 1 max	546.0 20		
avg	195.8 8	100	0.417

90Y B- DECAY (64.0 H 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
β ⁻ 1 max	2284 4		
avg	934.8 18	99.984 3	1.99

1 weak β's omitted (IIP = 0.02%)

94NB B- DECAY (2.03E4 Y 16) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
β ⁻ 1 max	471 3		
avg	145.6 10	100	0.310
γ 1	702.627 19	100	1.53
γ 2	871.099 18	100	1.86

94NB IT DECAY (6.26 H 1) I(min)=0.10%

%IT=99.52 10

SEE ALSO 94NB B- DECAY (6.26 H)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	2.15	91 4	0.0042
Auger-K	14	14.5 19	0.0043
ce-K- 1	22.5 5	57.622	0.0276
ce-L- 1	38.8 5	33.34	0.0276
ce-M- 1	41.0 5	6.37	0.0056
ce-NOP- 1	41.9 5	2	0.0018
X-ray L	2.17	2.8 10	0.0001
X-ray Kα ₂	16.52100 2	12.4 6	0.0044
X-ray Kα ₁	16.61510 2	23.8 11	0.0084
X-ray Kβ	18.6	6.9 2	0.0027

1 weak γ's omitted (IIγ = 0.08%)

94NB B- DECAY (6.26 H 1) I(min)=0.10%

SB=0.48 10

SEE ALSO 94NB IT D... Y (6.26 H)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β- 1 max	1216 3		
avg	443.7 12	0.48 10	0.0045
γ 2	871.099 18	0.48 10	0.0049

97ZR B- DECAY (16.90 H 5) I(min)=0.10%

SEE ALSO 97NB IT DECAY

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β- 1 max	418 16		
avg	127 6	0.41 4	0.0011
β- 2 max	558 16		
avg	178 6	5.5 3	0.0209
β- 3 max	901 16		
avg	312 6	2.10 20	0.0140
β- 4 max	915 16		
avg	318 7	0.4 3	0.0027
β- 5 max	1012 16		
avg	359 7	0.120 20	0.0009
β- 6 max	1117 16		
avg	403 7	0.45 7	0.0039
β- 7 max	1117 16		
avg	403 7	0.65 7	0.0056
β- 8 max	1389 16		
avg	521 7	0.21 11	0.0023
β- 9 max	1414 16		
avg	532 7	4.1 5	0.0465
β- 10 max	1922 16		
avg	760 8	86.0 7	1.39
total β- avg	709 9	99.9 10	1.49
γ 3	218.87 20	0.176 19	0.0008
γ 4	254.15 20	1.25 14	0.0068
γ 5	272.27 20	0.25 4	0.0015
γ 8	330.43 20	0.11 3	0.0008
γ 9	355.39 10	2.27 24	0.0172
γ 10	400.39 20	0.32 5	0.0028
γ 11	507.63 10	5.1 6	0.0547
γ 12	513.30 20	0.56 10	0.0061
γ 13	602.41 20	1.39 14	0.0179
γ 14	690.63 20	0.25 4	0.0037
γ 15	699.2 3	0.121 19	0.0018
γ 16	703.80 10	0.93 10	0.0139
γ 18	804.53 10	0.65 7	0.0111
γ 19	829.80 10	0.223 19	0.0039
γ 20	854.90 10	0.33 4	0.0061
γ 21	971.39 10	0.29 3	0.0059
γ 22	1021.3 3	1.34 14	0.0293
γ 23	1110.45 20	0.111 19	0.0026
γ 24	1147.95 10	2.6 3	0.0646
γ 25	1276.09 10	0.97 10	0.0265
γ 26	1362.66 10	1.34 14	0.0390
γ 27	1750.46 10	1.34 14	0.0501
γ 28	1851.55 10	0.35 4	0.0139

5 weak γ's omitted (IIγ = 0.21%)

97 NB B- DECAY (72.1 H 7) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	2.27	0.190 13	=0
ce-K- 5	637.42 10	0.182 7	0.0025
β- 1 max	305 16		
avg	89 6	0.120 20	0.0002
β- 2 max	418 16		
avg	127 6	0.170 20	0.0005
β- 3 max	665 16		
avg	218 6	0.210 20	0.0010
β- 4 max	910 16		
avg	315 6	1.10 10	0.0074
β- 5 max	1276 16		
avg	470 7	98.30 10	0.984
total β- avg	467 7	99.99 15	0.994

1 weak β's omitted (IIB = 0.09%)

γ 3	480.9	0.148 20	0.0015
γ 5	657.92 10	98.34 11	1.38
γ 12	1268.63 10	0.157 20	0.0043
γ 13	1515.64 20	0.118 20	0.0038

10 weak γ's omitted (IIγ = 0.49%)

97NB IT DECAY (60 S 1) I(min)=0.10%

FEEDING OF 97NB IN 97ZR DECAY=94.6% 9

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	2.15	1.99 12	=0
Auger-K	14	0.44 6	0.0001
ce-K- 1	724.37 10	1.74 5	0.0268
ce-L- 1	740.66 10	0.225 7	0.0035
X-ray K _{α2}	16.52100 2	0.375 20	0.0001
X-ray K _{α1}	16.61510 2	0.72 4	0.0003
X-ray K _β	18.6	0.207 12	=0
γ 1	743.36 10	97.95 6	1.55

97dU EC DECAY (2.9 D 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	2.17	97 6	0.0045
Auger-K	15.5	20 3	0.0065
ce-K- 5	194.64 4	2.94 10	0.0122
ce-L- 5	212.64 4	0.361 19	0.0016
ce-K- 6	303.51 7	0.173 8	0.0011
X-ray L	2.42	4.6 16	0.0002
X-ray $K\alpha_2$	18.2508 8	20.0 9	0.0078
X-ray $K\alpha_1$	18.3671 8	38.3 17	0.0150
X-ray $K\beta$	20.6	11.5 6	0.0050
γ 2	108.80 4	0.108 12	0.0003
γ 5	215.68 4	86.0 4	0.395
γ 6	324.55 7	10.2 4	0.0705
γ 7	460.55 5	0.117 5	0.0011
γ 11	569.27 5	0.89 4	0.0108

14 weak γ 's omitted (II γ = 0.34%)99Mo β -DECAY (66.0 H 2) I(min)=0.10%

SEE ALSO 99Tc IT DECAY (6.02 H)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	2.17	6.2 5	0.0003
Auger-K	15.5	1.27 20	0.0004
ce-K- 2	19.5400 22	4.4 4	0.0018
ce-L- 2	37.5415 21	0.53 4	0.0004
ce-EMO- 2	40.0400 23	0.127 11	0.0001
ce-K- 3	119.465 3	0.57 5	0.0014
ce-K- 6	160.023 7	0.82 3	0.0028
ce-L- 6	178.024 7	0.123 5	0.0005
β^- 1 max	215.2 10		
avg	59.9 3	0.113 5	0.0001
β^- 2 max	352.9 10		
avg	104.3 4	0.162 6	0.0003
β^- 3 max	436.4 10		
avg	133.1 4	17.6 5	0.0499
β^- 4 max	847.9 10		
avg	289.7 4	1.33 6	0.0082
β^- 5 max	1214.3 10		
avg	442.8 4	80.7 8	0.761
total β^-			
avg	345.1 5	99.9 10	0.820

6 weak β 's omitted (II β = 0.06%)

X-ray L	2.42	0.29 10	=0
X-ray $K\alpha_2$	18.2508 8	1.29 9	0.0005
X-ray $K\alpha_1$	18.3671 8	2.46 17	0.0010
X-ray $K\beta$	20.6	0.74 6	0.0003
γ 2	40.5840 20	1.36 10	0.0012
γ 3	140.509 3	5.7 5	0.0171
γ 6	181.067 7	6.52 19	0.0252
γ 9	366.439 14	1.37 6	0.0107
γ 21	739.48 4	13.0 4	0.204
γ 23	777.88 3	4.62 19	0.0766
γ 24	822.98 3	0.140 6	0.0024
γ 26	960.69 3	0.101 5	0.0021

21 weak γ 's omitted (II γ = 0.15%)

99Tc IT DECAY (6.02 H 3) I(min)=0.10%

PENDING OF 99Tc IN 99Mo DECAY=86.8% 9

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
ce-H- 1	1.630 5	86.82 16	0.0030
ce-MOP- 1	2.106 5	12.18 20	0.0005
Auger-L	2.17	10.4 7	0.0005
Auger-K	15.5	2.1 4	0.0007
ce-K- 2	119.465 3	8.8 3	0.0224
ce-K- 3	121.59 3	0.71 4	0.0018
ce-L- 2	137.466 3	1.06 4	0.0031
ce-L- 3	139.59 3	0.219 14	0.0007
ce-H- 2	139.965 4	0.196 10	0.0006
X-ray L	2.42	0.49 17	=0
X-ray $K\alpha_2$	18.2508 8	2.13 12	0.0008
X-ray $K\alpha_1$	18.3671 8	4.06 22	0.0016
X-ray $K\beta$	20.6	1.22 7	0.0005
γ 2	140.509 3	88.56 24	0.266

2 weak γ 's omitted (II γ = 0.02%)103Rh β - DECAY (39.35 D 5) I(min)=0.10%

SEE ALSO 103Rh IT DECAY (56.12 H)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	2.39	0.98 9	=0
Auger-K	17	0.20 4	=0
ce-K- 3	30.065 5	0.66 7	0.0004
ce-K- 13	473.860 10	0.397 13	0.0040
β^- 1 max	112 4		
avg	29.5 10	6.0 3	0.0038
β^- 2 max	225 4		
avg	62.8 11	87.1 15	0.117
β^- 3 max	467 4		
avg	143.4 13	0.231 10	0.0007
β^- 4 max	669 4		
avg	218.1 14	0.10	0.0005
β^- 5 max	722 4		
avg	238.7 14	6 3	0.0325
total β^-			
avg	72.4 13	100 4	0.154

3 weak β 's omitted (II β = 0.10%)

X-ray $K\alpha_2$	20.07370 2	0.244 19	0.0001
X-ray $K\alpha_1$	20.21610 2	0.46 4	0.0002
X-ray $K\beta$	22.7	0.145 11	=0
γ 3	53.285 5	0.36 4	0.0004
γ 9	294.980 10	0.242 11	0.0015
γ 12	443.800 10	0.311 11	0.0029
γ 13	497.080 10	86.4 24	0.915
γ 15	557.040 20	0.76 3	0.0090
γ 17	610.330 10	5.3 3	0.0685

13 weak γ 's omitted (II γ = 0.12%)

103RH IT DECAY (56.12 H 1) I(min)=0.10%

FEEDING OF 103RH IN 103RU DECAY=99.75% 1
FEEDING OF 103RH IN 103PD DECAY=99.975% 1

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	2.39	76.6 15	0.0039
ce-K- 1	16.530 7	9.5 3	0.0033
Auger-K	17	1.8 3	0.0007
ce-L- 1	36.338 7	71.290 10	0.0552
ce-H- 1	39.123 7	14.4 4	0.0120
ce-SOP- 1	39.669 7	4.70 20	0.0040
X-ray L	2.7	4.0 13	0.0002
X-ray $K\alpha_2$	20.07370 2	2.19 12	0.0009
X-ray $K\alpha_1$	20.21610 2	4.17 21	0.0018
X-ray $K\beta$	22.7	1.30 7	0.0006

1 weak γ 's omitted (I γ = 0.07%)

103PD EC DECAY (17.5 D 4) I(min)=0.10%

SEE ALSO 103RH IT DECAY (56.12 H)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	2.39	91 6	0.0046
Auger-K	17	17 3	0.0060
X-ray L	2.7	4.8 16	0.0003
X-ray $K\alpha_2$	20.07370 2	19.9 9	0.0085
X-ray $K\alpha_1$	20.21610 2	37.7 15	0.0163
X-ray $K\beta$	22.7	11.7 5	0.0057

9 weak γ 's omitted (I γ = 0.03%)

108AG EC DECAY (127 Y 21) I(min)=0.10%

%EC=91.1 6

SEE ALSO 108AG IT DECAY (127 Y)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	2.5	82 5	0.0043
Auger-K	17.7	14.2 24	0.0053
ce-K- 1	409.582 14	0.713 14	0.0062
ce-L- 1	430.328 14	0.184 3	0.0013
ce-K- 2	590.02 10	0.263 5	0.0033
ce-K- 3	698.60 8	0.173 4	0.0026
X-ray L	2.84	4.8 17	0.0003
X-ray $K\alpha_2$	21.02010 2	18.3 8	0.0082
X-ray $K\alpha_1$	21.17710 2	34.7 14	0.0157
X-ray $K\beta$	23.8	11.0 5	0.0056
γ 1	433.932 14	90.3 6	0.834
γ 2	614.37 10	90.8 6	1.19
γ 3	722.95 8	90.9 6	1.40

108AG EC DECAY (2.37 H 1) I(min)=0.10%

%EC=99.32

SEE ALSO 108AG B- DECAY (2.37 H)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	2.5	1.74 15	=0
Auger-K	17.7	0.31 6	0.0001
β^+ 2 max	401 11		
avg	401 5	0.245 20	0.0021
total β^+			
avg	399 5	0.248 20	0.0021
X-ray L	2.84	0.10 4	=0
X-ray $K\alpha_2$	21.02010 2	0.48 3	0.0002
X-ray $K\alpha_1$	21.17710 2	0.75 6	0.0003
X-ray $K\beta$	23.8	0.240 14	0.0001
γ 3	433.932 14	0.50 9	0.0046
γ 6	618.86 5	0.26 5	0.0035

10 weak γ 's omitted (I γ = 0.03%)Maximum γ -intensity = 0.50%

108AG IT DECAY (127 Y) I(min)=0.10%

%IT=8.9 6

SEE ALSO 108AG EC DECAY (127 Y)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	2.6	8.17 22	0.0005
ce-K- 1	4.87 6	0.231 9	=0
Auger-K	18.5	0.35 6	0.0001
ce-L- 1	26.57 6	6.50 6	0.0037
ce-HMO- 1	29.66 6	2.16 5	0.0014
ce-K- 2	53.69 5	1.84 5	0.0021
ce-L- 2	75.39 5	0.231 9	0.0004
X-ray L	3	0.55 19	=0
X-ray $K\alpha_2$	21.9903 3	0.491 20	0.0002
X-ray $K\alpha_1$	22.16290 1	0.93 4	0.0004
X-ray $K\beta$	24.9	0.300 13	0.0002
γ 2	79.20 5	6.8 5	0.0114

108AG B- DECAY (2.37 H 1) I(min)=0.10%

%B=97.65 32

SEE ALSO 108AG EC DECAY (2.37 H)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
β^- 1 max	1017 8		
avg	356 4	1.75 10	0.0133
β^- 2 max	1650 8		
avg	629 4	95.9 3	1.28
total β^-			
avg	624 4	97.6 4	1.30
γ 1	632.98 5	1.75 17	0.0236

109CD EC DECAY (453 D 2) I(min)=0.10%

RADIATIONS FROM 39.6-5 109MAG
ARE INCLUDED IN THIS DATA SET

Radiation Type	Energy (keV)	Intensity (%)	$\Delta(g\text{-rad}/\mu\text{Ci-h})$
Auger-L	2.6	166 7	0.0092
Auger-K	18.5	21 3	0.0082
ce-K- 1	62.523 5	41.9	0.0553
ce-L- 1	88.231 5	48	0.0789
ce-H- 1	87.319 5	9.0 3	0.0167
ce-HOP- 1	87.982 5	1.60 5	0.0030
X-ray L	3	11 4	0.0007
X-ray $K\alpha_2$	21.9903 3	29.1 10	0.0136
X-ray $K\alpha_1$	22.16290 1	55.1 18	0.0260
X-ray $K\beta$	24.9	17.8 7	0.0094
γ 1	88.037 5	3.72 11	0.0070

109PD B- DECAY (13.46 H 2) I(min)=0.10%

RADIATIONS FROM 39.6-5 109MAG
ARE INCLUDED IN THIS DATA SET

Radiation Type	Energy (keV)	Intensity (%)	$\Delta(g\text{-rad}/\mu\text{Ci-h})$
Auger-L	2.6	79 3	0.0044
Auger-K	18.5	7.1 11	0.0028
ce-K- 2	62.523 5	41.878222	0.0558
ce-L- 2	88.231 5	48	0.0789
ce-H- 2	87.319 5	9.0 3	0.0167
ce-HOP- 2	87.982 5	1.60 5	0.0030
β^- 1 max	1028.0 20		
avg	361.0 9	99.900 10	0.768
11 weak β 's omitted (EIB = 0.11%)			
X-ray L	3	5.3 18	0.0003
X-ray $K\alpha_2$	21.9903 3	9.9 8	0.0046
X-ray $K\alpha_1$	22.16290 1	18.8 6	0.0089
X-ray $K\beta$	24.9	6.06 22	0.0032
γ 2	88.037 5	3.7 8	0.0070

29 weak γ 's omitted (E γ = 0.13%)

110AG EC DECAY (24.6 S 2) I(min)=0.10%

%EC=0.30 6

SEE ALSO 110AG B- DECAY (24.6 S)

Radiation Type	Energy (keV)	Intensity (%)	$\Delta(g\text{-rad}/\mu\text{Ci-h})$
Auger-L	2.5	0.23 5	=0
X-ray $K\alpha_1$	21.17710 2	0.115 24	=0

110AG B- DECAY (24.6 S 2) I(min)=0.10%

% β =99.70 4

SEE ALSO 110AG EC DECAY (24.6 S)

Radiation Type	Energy (keV)	Intensity (%)	$\Delta(g\text{-rad}/\mu\text{Ci-h})$
β^- 1 max	2234.9 20		
avg	890.0 10	0.4 3	0.0038
β^- 2 max	2892.7 20		
avg	1199.3 10	95.2 3	2.43
total β^-			
avg	1185.1 10	99.7 5	2.52

9 weak β 's omitted (EIB = 0.09%)

γ 2	657.749 10	0.50 23	0.0630
------------	------------	---------	--------

12 weak γ 's omitted (E γ = 0.10%)

110AG IT DECAY (250.4 D 3) I(min)=0.10%

4IT=1.33 10

SEE ALSO 110AG B- DECAY (250.8 D)

Radiation Type	Energy (keV)	Intensity (%)	$\Delta(g\text{-rad}/\mu\text{Ci-h})$
ce-H- 1	0.56 10	1.0	=0
ce-HOP- 1	1.18 10	0.3325	=0
Auger-L	2.6	1.11 5	=0
Auger-K	18.5	0.141 21	=0
ce-K- 2	90.97 5	0.827 10	0.0016
ce-L- 2	112.67 5	0.394 8	0.0009
X-ray $K\alpha_2$	21.9703 3	0.196 7	=0
X-ray $K\alpha_1$	22.16290 1	0.371 13	0.0002
X-ray $K\beta$	24.9	0.120 5	=0

110AG B- DECAY (250.8 D 3) I(min)=0.10%

% β =98.67 10

SEE ALSO 110AG IT DECAY (250.8 D)

Radiation Type	Energy (keV)	Intensity (%)	$\Delta(g\text{-rad}/\mu\text{Ci-h})$
β^- 1 max	82.5 20		
avg	21.5 6	67.5 9	0.0309
β^- 2 max	132.4 20		
avg	35.3 6	0.408 12	0.0003
β^- 3 max	529.3 20		
avg	165.1 8	30.7 8	0.108
total β^-			
avg	66.3 14	98.8 12	0.140

4 weak β 's omitted (EIB = 0.18%)

*** continued ***

110AG B- DECAY (250.9 D 3) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
γ 12	365.441 15	0.106 9	0.0000
γ 17	446.797 8	3.69 9	0.0351
γ 23	620.346 11	2.79 8	0.0368
γ 24	626.246 10	0.235 7	0.0031
γ 26	657.749 10	94.65 16	1.33
γ 27	676.60 10	0.142 19	0.0020
γ 28	677.606 11	10.6 3	0.153
γ 29	686.988 11	6.47 10	0.0947
γ 30	706.670 13	16.4 4	0.247
γ 31	708.115 20	0.29 10	0.0043
γ 32	744.260 13	4.67 11	0.0740
γ 33	763.928 13	22.4 5	0.364
γ 35	818.016 12	7.30 17	0.127
γ 36	804.667 13	73.0 16	1.38
γ 37	927.470 13	34.4 8	0.607
γ 39	997.233 18	0.125 5	0.0027
γ 49	1330.304 17	0.133 18	0.0038
γ 50	1304.270 13	24.7 6	0.729
γ 52	1475.759 22	4.02 9	0.126
γ 53	1505.001 21	13.3 3	0.425
γ 54	1562.266 22	1.19 4	0.0397

40 weak γ's omitted (ΣIγ = 0.92%)

111AG B- DECAY (7.45 D 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	2.72	0.17 4	~0
β- 1 max	168.5 20		
avg	45.7 6	~0.3	~0.0003
β- 2 max	693.0 20		
avg	226.2 8	6.3 15	0.0304
β- 3 max	790.0 20		
avg	281.8 8	1.0 3	0.0060
β- 4 max	1035.0 20		
avg	363.3 9	92.0 20	0.712
total β- avg	352.8 10	100 3	0.749
γ 1	96.74 4	0.13 5	0.0003
γ 2	245.39 3	1.1 4	0.0056
γ 4	342.21 5	6.0 15	0.0437

5 weak γ's omitted (ΣIγ = 0.02%)

111IB BC DECAY (2.83 D 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	2.72	100 6	0.0050
Auger-K	19.3	16 3	0.0064
ce-K- 1	144.57 3	7.89 23	0.0243
ce-L- 1	167.26 3	0.96 4	0.0034
ce-HBO- 1	170.51 3	0.222 11	0.0008
ce-K- 2	210.68 3	4.94 11	0.0230
ce-L- 2	241.37 3	0.725 14	0.0037
ce-HBO- 2	244.62 3	0.158 8	0.0008
X-ray L	3.13	7.0 24	0.0005
X-ray Kα ₂	22.904 10 2	23.5 9	0.0115
X-ray Kα ₁	23.173 60 2	48.3 16	0.0219
X-ray Kβ	26	14.5 6	0.0001
γ 1	171.20 3	90.93 22	0.332
γ 2	245.39 3	94.17 11	0.492

113IB IT DECAY (1.650 H 1) I(min)=0.10%

FEEDING OF 113IB IN 113SB DECAY=100%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	2.84	29.7 18	0.0018
Auger-K	20	4.2 9	0.0010
ce-K- 1	363.748 10	28.2 3	0.218
ce-L- 1	387.450 10	5.40 7	0.0452
ce-H- 1	390.062 10	1.100 10	0.0092
ce-HOB- 1	391.566 10	0.245 3	0.0020
X-ray L	3.29	2.3 8	0.0002
X-ray Kα ₂	24.00200 2	6.8 3	0.0035
X-ray Kα ₁	24.20970 2	12.9 5	0.0066
X-ray Kβ	27.3	4.27 18	0.0025
γ 1	391.688 10	64.90 20	0.541

113SB BC DECAY (114.9 D 1) I(min)=0.10%

SEE ALSO 113IB IT DECAY (1.650 H)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	2.84	85 6	0.0052
Auger-K	20	12.8 25	0.0055
X-ray L	3.29	6.7 23	0.0005
X-ray Kα ₂	24.00200 2	20.7 8	0.0106
X-ray Kα ₁	24.20970 2	39.0 14	0.0201
X-ray Kβ	27.3	13.0 5	0.0075
γ 1	255.115 15	2.12 7	0.0115

115IN IT DECAY (4.3 H 1) I(min)=0.10%

KIT=96.3 8

SEE ALSO 115IN B- DECAY (4.3 H)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	2.84	43 3	0.0026
Auger-K	20	6.0 12	0.0026
ce-K- 1	308.30 3	39.9 6	0.262
ce-L- 1	332.00 3	8.39 20	0.0592
ce-X- 1	335.42 3	1.70 5	0.0122
ce-MOP- 1	336.12 3	0.376 10	0.0027
X-ray L	3.29	3.3 12	0.0002
X-ray K _{α2}	26.00200 2	9.7 4	0.0049
X-ray K _{α1}	26.20970 2	18.2 7	0.0094
X-ray Kβ	27.3	6.0 3	0.0035
γ 1	336.241 25	46.7 6	0.335

115IN B- DECAY (4.3 H 1) I(min)=0.10%

KB=3.7 8

SEE ALSO 115IN IT DECAY (4.3 H)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β- 1 max	929 9		
avg	290 3	3.7 8	0.0229

1 weak β's omitted (ITB = 0.04%)

116IN B- DECAY (54.15 H 6) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3	0.73 10	=0
Auger-K	21	0.12 3	=0
ce-K- 4	109.126 9	0.86 11	0.0020
β- 1 max	174 8		
avg	87 3	0.33 4	0.0006
β- 2 max	224 8		
avg	103 3	2.71 10	0.0059
β- 3 max	870 8		
avg	189 3	10.2 4	0.0411
β- 4 max	742 8		
avg	294 4	33.6 15	0.210
β- 5 max	880 8		
avg	351 4	51.8 11	0.387
total β- avg	307 4	91.6 19	0.645

*** continued ***

116IN B- DECAY (54.15 H 6) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
X-ray K _{α2}	25.04400 2	0.21 3	0.0001
X-ray K _{α1}	25.27130 2	0.39 5	0.0002
X-ray Kβ	28.5	0.133 17	=0
γ 4	138.326 9	3.29 12	0.0097
γ 8	262.95 8	0.12 3	0.0007
γ 10	278.45 8	0.143 17	0.0009
γ 11	303.90 7	0.118 17	0.0008
γ 13	355.36 4	0.83 5	0.0061
γ 14	416.86 3	29.2 15	0.259
γ 17	463.14 12	0.83 5	0.0002
γ 22	655.7 4	0.11 5	0.0015
γ 24	689.0 3	0.16 3	0.0024
γ 25	705.7 3	0.17 3	0.0025
γ 28	791.1 4	0.110 21	0.0018
γ 29	818.70 20	11.5 5	0.200
γ 32	972.55 3	0.454 17	0.0094
γ 34	1097.30 20	56.2 12	1.31
γ 37	1293.54 4	84.4 18	2.33
γ 38	1507.40 20	10.0 4	0.320
γ 40	1753.4 6	2.46 9	0.0917
γ 42	2112.1 4	15.5 5	0.699

25 weak γ's omitted (ITγ = 1.02%)

117SN IT DECAY (14.0 D 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3	91 5	0.0057
Auger-K	21	10.8 22	0.0048
ce-K- 1	126.82 3	64.8 7	0.175
ce-K- 2	129.362 15	11.7 3	0.0322
ce-L- 1	151.56 3	26.1 11	0.0843
ce-L- 2	154.097 15	1.44 4	0.0049
ce-B- 1	155.14 3	5.7 3	0.0188
ce-MOP- 1	155.88 3	1.35 6	0.0045
ce-MNO- 2	157.678 15	0.350 10	0.0012
X-ray L	3.44	8 3	0.0006
X-ray K _{α2}	25.04400 2	14.7 7	0.0100
X-ray K _{α1}	25.27130 2	35.1 13	0.0189
X-ray Kβ	28.5	11.8 5	0.0072
γ 1	156.02 3	2.11 7	0.0070
γ 2	159.562 15	86.3 4	0.291

117SB EC DECAY (2.82 H 5) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3	12.1 7	0.0008
Auger-K	21	1.8 4	0.0008
ce-K- 1	129.362 15	11.64 21	0.0322
ce-L- 1	154.097 15	1.46 3	0.0048
ce-MNO- 1	157.678 15	0.4896 2	0.0016

*** continued ***

117SB EC DECAY (2.02 ± 5%) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
μ ⁺ 1 max avg	544.10 250.0	1.7 3	0.0093
X-ray L	3.44	1.1 4	0
X-ray K _{α2}	25.04400 2	3.07 13	0.0016
X-ray K _{α1}	25.27130 2	5.75 22	0.0031
X-ray K _β	28.5	1.94 8	0.0012
γ 1	150.562 15	85.9 4	0.290
γ 4	861.35 5	0.31 4	0.0057
γ 5	1020.51 15	0.21 3	0.0044
γ 6	1020.6 5	0.103 10	0.0022
γ 7	1021.0 5	0.112 10	0.0024

7 weak γ's omitted (ΣI_γ = 0.26%)
Maximum γ-intensity = 3.40%

119SB IT DECAY (205 D 20%) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	3	137 5	0.0006
ce-L- 1	19.410 10	47.4 7	0.0279
Auger-K	21	4.5 9	0.0020
ce-M- 1	22.991 10	13.2 8	0.0065
ce-NB- 1	23.738 10	3.40 10	0.0017
ce-K- 2	36.460 10	32.0 6	0.0249
ce-L- 2	61.195 10	52.20 10	0.0680
ce-N- 2	64.776 10	12.8 3	0.0177
ce-NB- 2	65.523 10	3.00 10	0.0042
X-ray L	3.44	12 4	0.0009
γ 1	23.875 10	16.2 4	0.0082
X-ray K _{α2}	25.04400 2	7.8 4	0.0042
X-ray K _{α1}	25.27130 2	14.7 6	0.0079
X-ray K _β	28.5	4.96 21	0.0030

1 weak γ's omitted (ΣI_γ = 0.06%)

121TE EC DECAY (17 D 11) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	3	85 5	0.0055
ce-K- 1	6.659 20	1.3 3	0.0002
Auger-K	21.8	11.6 25	0.0054
ce-L- 1	32.452 20	0.17 4	0.0001
ce-K- 2	35.089 20	0.58 12	0.0004
ce-K- 4	477.05 5	0.140 10	0.0014
ce-K- 5	542.59 5	0.371 8	0.0043
X-ray L	3.44	8 3	0.0006
X-ray K _{α2}	26.11080 2	21.5 8	0.0119
X-ray K _{α1}	26.35910 2	40.2 14	0.0226
X-ray K _β	29.7	13.8 6	0.0087
γ 1	37.150 20	0.18 3	0.0001
γ 2	65.580 20	0.31 6	0.0004
γ 3	470.39 5	1.5 3	0.0150
γ 4	507.54 5	15.4 10	0.210
γ 5	573.08 5	79.0 10	0.964

121TE EC DECAY (154 D 7) I(min)=0.10%

SEC=11.8
SEE ALSO 121TE IT DECAY (154 D)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	3	17 3	0.0011
ce-K- 1	6.659 20	8.5 10	0.0012
Auger-K	21.8	2.4 7	0.0011
ce-L- 1	32.452 20	1.09 13	0.0008
ce-NB- 1	36.206 20	0.30 4	0.0002
X-ray L	3.44	1.6 6	0.0001
X-ray K _{α2}	26.11080 2	4.4 8	0.0024
X-ray K _{α1}	26.35910 2	0.2 14	0.0046
X-ray K _β	29.7	2.8 5	0.0018
γ 1	37.150 20	0.89 10	0.0047
γ 3	910.1 10	0.16 4	0.0031
γ 4	998.3 10	0.16 4	0.0034
γ 5	1102.1 10	2.70 10	0.0634

1 weak γ's omitted (ΣI_γ = 0.02%)

121TE IT DECAY (154 D 7) I(min)=0.10%

XIT=89.4
SEE ALSO 121TE EC DECAY (154 D)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	3.19	74 7	0.0050
Auger-K	22.7	5.3 13	0.0025
ce-K- 1	49.966 20	36 5	0.0381
ce-L- 1	76.841 20	42 5	0.0687
ce-NB- 1	80.774 20	12.9 18	0.0222
ce-K- 2	180.40 3	6.2 4	0.0239
ce-L- 2	207.27 3	0.81 5	0.0036
ce-NB- 2	211.20 3	0.22 3	0.0010
X-ray L	3.77	7 3	0.0006
X-ray K _{α2}	27.20170 2	10.5 12	0.0061
X-ray K _{α1}	27.47230 2	19.5 21	0.0114
X-ray K _β	31	6.8 8	0.0045
γ 2	212.21 3	82 4	0.371

1 weak γ's omitted (ΣI_γ = 0.06%)

122SB EC DECAY (2.70 D 1) I(min)=0.10%

SEC=2.4 2
SEE ALSO 122SB B- DECAY

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	3	2.00 20	0.0001
Auger-K	21	0.29 7	0.0001
X-ray L	3.44	0.17 7	0
X-ray K _{α2}	25.04400 2	0.50 5	0.0003
X-ray K _{α1}	25.27130 2	0.93 10	0.0005
X-ray K _β	28.5	0.32 4	0.0002
γ 1	1100.20 10	0.57 3	0.0130

122SB B- DECAT (2.70 D 1) I(min)=0.10%

48--97.6 2

SEE ALSO 12259 RC DECAT

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.19	0.35 3	0
Co-K- 1	532.19 20	0.356 19	0.0040
β- 1 max	720		
avg	236.5 12	4.7 5	0.0237
β- 2 max	1400		
avg	522.2 14	17.3 3	0.749
β- 3 max	1991 4		
avg	772.0 15	25.6 3	0.421
total β- avg	573.9 15	97.6 7	1.19

2 weak β's omitted (IIB = 0.02%)

X-ray K _α	27.47230 2	0.171 11	0.0001
γ 1	564.00 20	71 4	0.055
γ 2	692.6	3.92 22	0.0570
γ 5	1257	0.78 4	0.0200

3 weak γ's omitted (IIγ = 0.02%)

123I RC DECAT (13.2 H 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.19	95 6	0.0064
Auger-K	22.7	12 3	0.0060
Co-K- 1	127.19 3	14.1 5	0.0302
Co-L- 1	154.06 3	1.90 9	0.0062
Co-HMD- 1	157.99 3	0.41 5	0.0014
X-ray L	3.77	9 4	0.0000
X-ray K _α	27.20170 2	24.7 9	0.0143
X-ray K _β	27.47230 2	46.2 16	0.0270
X-ray K _β	31	16.0 6	0.0106
γ 1	159.00 3	82.9 4	0.281
γ 7	440.4 5	0.348 17	0.0033
γ 8	505.6 6	0.26 5	0.0020
γ 9	529.0 4	1.05 10	0.0119
γ 10	530.5 5	0.265 17	0.0030

9 weak γ's omitted (IIγ = 0.45%)

124SB B- DECAT (60.20 D 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.19	0.341 23	0
Co-K- 12	570.41 4	0.411 4	0.0050
β- 1 max	124.4 14		
avg	33.1 5	0.530 10	0.0004
β- 2 max	190.2 14		
avg	54.4 6	0.560 10	0.0006
β- 3 max	206.1 18		
avg	54.7 6	0.80 20	0.0106
β- 4 max	378.4 18		
avg	111.6 6	0.130 10	0.0003
β- 5 max	416.5 14		
avg	124.5 7	0.670 10	0.0018
β- 6 max	506.1 18		
avg	192.1 7	52.0 10	0.213
β- 7 max	675.4 14		
avg	218.0 7	0.110 10	0.0005
β- 8 max	717.2 14		
avg	234.7 7	0.260 10	0.0013
β- 9 max	800.0 18		
avg	269.2 7	0.680 10	0.0039
β-10 max	860.5 18		
avg	290.0 8	3.63 7	0.0224
β-11 max	942.0 14		
avg	322.6 8	2.0 4	0.0137
β-12 max	1574.3 18		
avg	591.1 4	5.39 11	0.0679
β-13 max	1651.3 18		
avg	625.0 8	2.45 5	0.0326
β-14 max	2297.1 18		
avg	916.3 9	22.6 5	0.441
total β- avg	380.5 14	100.0 13	0.811

7 weak β's omitted (IIB = 0.21%)

X-ray K _α	27.20170 2	0.102 4	0
X-ray K _β	27.47230 2	0.191 4	0.0001
γ 5	400.01 6	0.53 4	0.0045
γ 6	443.99 5	0.35 3	0.0033
γ 11	525.50 10	0.313 20	0.0035
γ 12	602.72 4	97.92 5	1.26
γ 13	632.36 10	0.157 10	0.0021
γ 14	645.82 4	7.21 22	0.0991
γ 16	709.31 5	1.42 5	0.0215
γ 17	713.82 4	2.39 12	0.0363
γ 18	722.78 4	11.26 16	0.173
γ 19	735.85 15	0.127 10	0.0020
γ 20	735.85 15	0.127 10	0.0020
γ 22	790.78 6	0.744 10	0.0125
γ 26	968.25 6	1.83 5	0.0370
γ 29	1045.24 5	1.84 4	0.0410
γ 35	1325.49 7	1.41 3	0.0398
γ 36	1355.17 4	0.93 3	0.0269
γ 37	1368.23 6	2.35 5	0.0685
γ 38	1376.10 20	0.431 10	0.0126
γ 40	1436.66 9	1.02 3	0.0312
γ 41	1445.25 20	0.206 10	0.0063
γ 43	1489.03 20	0.55 3	0.0174
γ 44	1526.33 20	0.392 10	0.0127
γ 45	1579.90 20	0.146 10	0.0066
γ 47	1691.02 4	48.8 5	1.76
γ 53	2091.0 3	5.58 10	0.249

39 weak γ's omitted (IIγ = 1.23%)

124I B- DECAY (4.18 D 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	3.19	63.4	0.0043
Auger-K	22.7	8.4 19	0.0040
ce-K- 9	570.91 4	0.256 22	0.0031
β^+ 2 max	813.10		
avg	367.5	0.298 20	0.0023
β^+ 3 max	1535.10		
avg	697.5	11.4 6	0.167
β^+ 4 max	2138.10		
avg	975.5	11.3 6	0.235
total β^+ avg	924.6	23.0 9	0.404
X-ray L	3.77	6.2 21	0.0005
X-ray $K\alpha_2$	27.20170 2	16.6 7	0.0096
X-ray $K\alpha_1$	27.47230 2	31.1 13	0.0182
X-ray $K\beta$	31	10.8 5	0.0071
γ 6	581.20 10	0.189 17	0.0022
γ 9	602.72 4	61.5	0.783
γ 11	645.82 4	0.95 9	0.0131
γ 13	695.0 10	<0.1	<0.002
γ 16	713.80 20	0.110 16	0.0017
γ 17	722.78 4	10.1 9	0.155
γ 27	968.22 8	0.41 4	0.0086
γ 28	976.32 14	0.104 15	0.0022
γ 31	1045.00 10	0.43 5	0.0095
γ 32	1054.00 20	0.122 12	0.0027
γ 40	1325.50 4	1.45 12	0.0408
γ 42	1368.20 6	0.29 3	0.0084
γ 43	1376.00 10	1.68 14	0.0492
γ 48	1488.90 10	0.183 17	0.0058
γ 49	1509.49 4	3.01 25	0.0969
γ 50	1559.80 20	0.16 3	0.0055
γ 52	1637.7 5	0.195 21	0.0068
γ 54	1675.8 4	0.11 3	0.0039
γ 55	1691.02 4	10.5 9	0.378
γ 56	1720.37 18	0.171 19	0.0063
γ 58	1851.4 4	0.21 3	0.0082
γ 59	1918.54 4	0.159 23	0.0065
γ 60	2038.3 3	0.34 3	0.0149
γ 61	2078.86 7	0.35 4	0.0154
γ 62	2091.00 10	0.57 5	0.0255
γ 64	2099.09 9	0.140 13	0.0063
γ 65	2184.320 10	0.110 11	0.0050
γ 66	2232.25 7	0.57 5	0.0273
γ 67	2283.25 8	0.66 7	0.0323
γ 75	2746.90 10	0.46 5	0.0271

48 weak γ 's omitted (I γ = 1.24%)
Maximum γ -intensity = 46.00%

125I EC DECAY (60.14 D 11) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	3.19	156.9	0.0106
ce-K- 1	3.65 3	80.0 6	0.0062
Auger-K	22.7	20.5	0.0097
ce-L- 1	30.52 3	10.5 3	0.0068
ce-B- 1	34.45 3	2.20 20	0.0016
ce-BOP- 1	35.23 3	0.70 20	0.0005
X-ray L	3.77	15.6	0.0012
X-ray $K\alpha_2$	27.20170 2	39.8 14	0.0230
X-ray $K\alpha_1$	27.47230 2	74.2 25	0.0434
X-ray $K\beta$	31	25.8 10	0.0170
γ 1	35.46 3	6.67 22	0.0050

126I EC DECAY (13.02 D 7) I(min)=0.10%

% (EC+B-)=56.3
SEE ALSO 126I B- DECAY

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	3.19	45.7	0.0030
Auger-K	22.7	5.9 16	0.0028
β^+ 1 max	463.5		
avg	214.7 23	0.20 10	0.0009
β^+ 2 max	1129.5		
avg	528.3	1.0 3	0.0112
total β^+ avg	476.4	1.2 4	0.0122
X-ray L	3.77	4.4 16	0.0004
X-ray $K\alpha_2$	27.20170 2	11.7 19	0.0068
X-ray $K\alpha_1$	27.47230 2	22.4	0.0120
X-ray $K\beta$	31	7.6 12	0.0050
γ 1	656.0 10	<1.3	<0.02
γ 2	664.5 5	1.3 3	0.0190
γ 3	666.20 10	30.6	0.427
γ 5	730.0 10	<1.3	<0.02
γ 6	753.70 10	3.8 8	0.0616
γ 10	1420.1 3	0.28 7	0.0086

9 weak γ 's omitted (I γ = 0.26%)
Maximum γ -intensity = 2.40%

126I B- DECAY (13.02 D 7) I(min)=0.10%

%B- = 44.3
SEE ALSO 126I EC DECAY

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μ Ci-h)
Auger-L	3.43	0.48 8	=0
ce-K- 1	353.94 10	0.50 10	0.0038
β^- 1 max	385.5		
avg	108.7 14	2.7 5	0.0063
β^- 2 max	865.5		
avg	289.8 17	31.6	0.191
β^- 3 max	1251.5		
avg	459.0 20	9.9 19	0.0968
total β^- avg	317.0 19	44.7	0.294
X-ray $K\alpha_2$	29.4580 10	0.130 24	=0
X-ray $K\alpha_1$	29.7790 10	0.24 5	0.0002
γ 1	388.50 10	32.6	0.265
γ 2	492.00 10	2.0 4	0.0208
γ 3	880.50 10	0.67 15	0.0126

127Xe EC DECAY (36.61 D 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.3	96.6	0.0068
Auger-K	23.6	12.1	0.0059
Ce-K-1	28.431 20	4.2 4	0.0022
Ce-L-1	52.812 20	0.59 7	0.0007
Ce-M-1	56.528 20	0.119 12	0.0001
Ce-K-2	112.05 3	1.48 9	0.0035
Ce-K-3	138.93 3	3.63 23	0.0107
Ce-L-2	140.83 3	0.375 23	0.0011
Ce-L-3	166.91 3	0.48 3	0.0017
Ce-K-4	169.67 3	6.6 4	0.0237
Ce-L-4	197.65 3	7.95 6	0.0040
Ce-M-4	201.77 3	0.196 12	0.0008
Ce-K-5	381.79 5	0.300 20	0.0022
X-ray L	4	10 4	0.0008
X-ray K _{α2}	28.3172 4	25.0 11	0.0151
X-ray K _{α1}	28.4120 3	46.6 19	0.0284
X-ray K _β	32.3	16.3 8	0.0112
γ 1	57.600 20	1.29 11	0.0016
γ 2	145.22 3	4.12 24	0.0128
γ 3	172.10 3	25.4 15	0.0431
γ 4	202.64 3	68 4	0.292
γ 5	378.96 5	17.7 11	0.161

1 weak γ's omitted (I_γ = 0.01%)

127Xe β- DECAY (69.6 H 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.3	61 4	0.0043
Ce-L-1	22.582 20	68 10	0.0326
Ce-BMO-1	26.698 20	13.7 20	0.0078
β- 4 max	388 8		
avg	115 3	0.95	0.0023
β- 5 max	670 8		
avg	216 3	0.22	0.0010
β- 6 max	940 8		
avg	322 4	0.24	0.0016
β- 7 max	1013 8		
avg	351 3	8.6 9	0.0643
β- 8 max	1222 8		
avg	438 4	0.54	0.0052
β- 9 max	1472 8		
avg	545 4	89 9	1.04
total β- avg	522 4	100 4	1.11

3 weak β's omitted (I_β = 0.05%)

X-ray L	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
γ 1	27.770 20	16.4 24	0.0097
γ 2	208.98 5	0.186 20	0.0008
γ 3	250.65 5	0.40 5	0.0021
γ 5	278.43 5	0.57 7	0.0034
γ 6	281.16 5	0.150 17	0.0039
γ 9	459.60 5	7.1 8	0.0699
γ 10	487.39 5	1.36 14	0.0141
γ 19	802.17 5	0.195 22	0.0033
γ 26	1083.99 5	0.56 6	0.0130
γ 27	1111.74 5	0.221 24	0.0052

23 weak γ's omitted (I_γ = 0.38%)

129Xe IT DECAY (13.6 D 1) I(min)=0.10%

I_γ = 64 4

SEE ALSO 129Te β- DECAY (33.6 D)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.19	49.0 23	0.0033
Auger-K	22.7	4.0 9	0.0019
Ce-K-1	73.69 5	32.2 5	0.0505
Ce-L-1	100.54 5	24.5 5	0.0525
Ce-BMO-1	104.49 5	7.17 20	0.0160
X-ray L	3.77	4.8 17	0.0004
X-ray K _{α2}	27.20170 2	8.0 3	0.0046
X-ray K _{α1}	27.47230 2	15.0 6	0.0088
X-ray K _β	31	5.19 21	0.0034
γ 1	105.50 5	0.147 12	0.0003

129Te β- DECAY (33.6 D 1) I(min)=0.10%

I_β = 36 4

SEE ALSO 129Te IT DECAY (33.6 D)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β- 1 max	205 8		
avg	56 3	0.14	0.0002
β- 5 max	876 8		
avg	296 3	0.7	0.0045
β- 6 max	910 8		
avg	309 3	2.4 5	0.0191
β- 7 max	1576 8		
avg	608 4	33 4	0.422
total β- avg	578 4	36 4	0.446

3 weak β's omitted (I_β = 0.08%)

γ	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
γ 2	556.65 5	0.110 4	0.0013
γ 4	695.98 5	3.05 21	0.0453
γ 7	720.62 5	0.73 6	0.0113

12 weak γ's omitted (I_γ = 0.25%)

129I β- DECAY (1.57P7 Y 4) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.43	74 4	0.0054
Ce-K-1	5.02 3	79.10 20	0.0085
Auger-K	24.6	8.8 16	0.0046
Ce-L-1	34.13 3	10.6 3	0.0077
Ce-B-1	38.44 3	2.10 10	0.0017
Ce-BMO-1	39.37 3	0.70 10	0.0006
β- 1 max	150 5		
avg	40 5	100	0.0852
X-ray L	4.1	8.2 25	0.0007
X-ray K _{α2}	29.4580 10	20.0 6	0.0126
X-ray K _{α1}	29.7790 10	37.1 9	0.0235
X-ray K _β	33.6	13.2 4	0.0094
γ 1	39.58 3	7.50 20	0.0063

129Xe IT DECAY (8.0 D 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.43	147 8	0.0108
ce-K- 1	5.02 3	79.10 20	0.0085
Auger-K	24.6	16 3	0.0083
ce-L- 1	34.13 3	10.6 3	0.0077
ce-M- 1	38.44 3	2.10 10	0.0017
ce-NOF- 1	39.37 3	0.70 10	0.0006
ce-K- 2	162.00 3	63.90 10	0.220
ce-L- 2	191.11 3	24.4 7	0.0993
ce-M- 2	195.42 3	5.50 20	0.0229
ce-NOF- 2	196.35 3	1.50 10	0.0063
X-ray L	4.1	16 5	0.0014
X-ray K _{α2}	29.4580 10	36.2 10	0.0227
X-ray K _{α1}	29.7790 10	67.1 17	0.0426
X-ray Kβ	33.6	23.9 7	0.0171
γ 1	39.58 3	7.50 20	0.0063
γ 2	196.56 3	4.70 20	0.0197

129Cs EC DECAY (32.06 H 6) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.43	106 9	0.0077
ce-K- 1	5.020 15	31.4 20	0.0034
Auger-K	24.6	13.0 25	0.0068
ce-NOF- 1	34.373 15	1.02 7	0.0009
ce-K- 3	58.768 4	0.57 4	0.0007
ce-K- 14	337.3566 23	0.62 4	0.0044
ce-K- 16	376.9286 23	0.359 20	0.0029
X-ray L	4.1	12 4	0.0010
X-ray K _{α2}	29.4580 10	29.7 21	0.0186
X-ray K _{α1}	29.7790 10	55 4	0.0350
X-ray Kβ	33.6	19.6 14	0.0140
γ 1	39.581 15	2.99 18	0.0025
γ 3	93.329 3	0.66 4	0.0013
γ 4	177.036 10	0.271 15	0.0010
γ 5	266.820 7	7.274 15	0.0016
γ 6	270.352 5	0.214 12	0.0012
γ 7	278.614 4	1.33 8	0.0079
γ 8	282.131 6	0.243 13	0.0015
γ 10	318.1800 20	2.46 14	0.0167
γ 14	371.9180 20	30.8 16	0.244
γ 16	411.4900 20	22.5 12	0.197
γ 21	548.945 8	3.42 18	0.0400
γ 27	588.549 8	0.61 4	0.0076
γ 32	906.425 6	0.221 12	0.0043

20 weak γ's omitted (I_γ = 0.37%)

130I β- DECAY (12.36 H 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.43	0.51 4	=0
ce-K- 13	501.529 20	0.624 17	0.0067
β- 1 max	234 10		
avg	65 3	0.320 20	0.0004
β- 2 max	357 10		
avg	104 4	0.330 20	0.0007
β- 3 max	377 10		
avg	111 4	0.500 20	0.0012
β- 4 max	559 10		
avg	174 4	0.185 6	0.0007
β- 5 max	624 10		
avg	198 4	46.6 10	0.194
β- 6 max	914 10		
avg	271 4	2.14 5	0.0124
β- 7 max	904 10		
avg	306 4	7.175 16	0.0011
β- 8 max	1042 10		
avg	362 4	47.7 12	0.368
β- 9 max	1178 10		
avg	419 4	1.45 4	0.0129
β-10 max	1781 10		
avg	680 4	<1.4	<0.02
total β- avg	286 5	100.5 16	0.612

5 weak β's omitted (I_β = 0.27%)

X-ray K _{α2}	29.4580 10	0.158 6	=0
X-ray K _{α1}	29.7790 10	0.293 11	0.0002
X-ray Kβ	33.6	0.104 4	=0
γ 9	418.010 20	34.2 7	0.304
γ 11	457.720 20	0.237 16	0.0023
γ 12	510.350 20	0.85 3	0.0093
γ 13	536.090 20	99.0 20	1.13
γ 14	530.10 3	1.40 3	0.0160
γ 15	553.900 10	0.662 21	0.0078
γ 16	586.050 20	1.69 4	0.0211
γ 17	603.530 10	0.615 25	0.0079
γ 19	668.540 10	96.1 21	1.37
γ 20	685.990 10	1.07 3	0.0156
γ 22	739.480 20	82.3 18	1.30
γ 25	800.23 3	0.101 6	0.0017
γ 26	808.290 20	0.236 8	0.0041
γ 31	877.35 4	0.191 9	0.0036
γ 34	967.020 20	0.877 22	0.0181
γ 38	1096.48 3	0.552 15	0.0129
γ 39	1122.15 3	0.253 10	0.0061
γ 40	1157.470 10	11.31 25	0.279
γ 41	1222.56 3	0.179 7	0.0047
γ 42	1272.120 20	0.748 19	0.0203
γ 44	1403.900 20	0.345 14	0.0103

31 weak γ's omitted (I_γ = 0.82%)

131I β^- DECAY (8.04 D 1) $T(\min)=0.10\%$ SEE ALSO 131I β^- IT DECAY

Radiation Type	Energy (keV)	Intensity (%)	Δ (g-rad/ μ Ci-h)
Auger-L	3.43	5.1 3	0.0004
Auger-K	24.6	0.60 11	0.0003
ce-K-1	45.622 10	3.54 9	0.0034
ce-L-1	74.730 10	0.472 12	0.0008
ce-MO-1	79.041 10	0.1310 2	0.0002
ce-K-7	249.737 11	0.248 6	0.0013
ce-K-14	329.919 11	1.54 4	0.0103
ce-L-14	359.027 11	0.244 6	0.0019
β^- 1 max	247.9 6		
avg	69.40 20	2.13 3	0.0031
β^- 2 max	303.9 6		
avg	87.00 20	0.620 20	0.0011
β^- 3 max	333.8 6		
avg	96.60 20	7.36 10	0.0151
β^- 4 max	606.3 6		
avg	191.6 3	89.4 10	0.365
β^- 5 max	806.9 6		
avg	293.2 3	0.420 20	0.0025
total β^- avg	181.7 3	100.0 10	0.387

1 weak β^- 's omitted (EIS = 0.06%)

X-ray L	4.1	0.56 17	=0
X-ray $K\alpha_2$	29.4580 10	1.37 5	0.0009
X-ray $K\alpha_1$	29.7790 10	2.54 8	0.0016
X-ray $K\beta$	33.6	0.90 3	0.0006
γ 1	80.183 10	2.62 5	0.0045
γ 4	177.210 10	0.265 4	0.0010
γ 7	284.298 11	6.06 9	0.0367
γ 12	325.781 11	0.251 6	0.0017
γ 14	364.480 11	81.2 12	0.631
γ 16	502.441 11	0.361 7	0.0039
γ 17	636.973 10	7.27 11	0.0986
γ 18	642.703 11	0.220 4	0.0030
γ 19	722.893 10	1.80 3	0.0278

10 weak γ 's omitted (E γ = 0.23%)131I β^- IT DECAY (11.9 D 1) $T(\min)=0.10\%$ FEEDING OF 131I β^- IN 131I DECAY=1.086% 13

Radiation Type	Energy (keV)	Intensity (%)	Δ (g-rad/ μ Ci-h)
Auger-L	3.43	75 4	0.0055
Auger-K	24.6	6.8 13	0.0036
ce-K-1	129.369 4	61.2 7	0.169
ce-L-1	158.877 8	28.6 6	0.0965
ce-M-1	162.788 8	5.50 20	0.0225
ce-MOP-1	163.722 8	1.78 6	0.0062
X-ray L	4.1	8 3	0.0007
X-ray $K\alpha_2$	29.4580 10	15.5 5	0.0097
X-ray $K\alpha_1$	29.7790 10	28.7 8	0.0182
X-ray $K\beta$	33.6	10.2 4	0.0073
γ 1	163.930 4	1.96 6	0.0068

131CS EC DECAY (9.69 D 1) $T(\min)=0.10\%$

Radiation Type	Energy (keV)	Intensity (%)	Δ (g-rad/ μ Ci-h)
Auger-L	3.43	79 3	0.0058
Auger-K	24.6	9.3 17	0.0049
X-ray L	4.1	9 3	0.0008
X-ray $K\alpha_2$	29.4580 10	21.1 6	0.0132
X-ray $K\alpha_1$	29.7790 10	39.1 10	0.0248
X-ray $K\beta$	33.6	13.5 4	0.0100

131BA EC DECAY (11.5 D 2) $T(\min)=0.10\%$

Radiation Type	Energy (keV)	Intensity (%)	Δ (g-rad/ μ Ci-h)
Auger-L	3.55	100 7	0.0076
ce-K-1	18.98 6	0.61 7	0.0002
Auger-K	25.5	10.9 14	0.0059
ce-K-2	42.770 13	1.23 9	0.0011
ce-L-1	49.25 6	0.89 10	0.0009
ce-MO-1	53.74 6	0.220 15	0.0003
ce-K-4	56.316 11	0.61 7	0.0007
ce-L-2	73.041 13	0.153 13	0.0002
ce-K-5	87.818 12	14.1 6	0.0339
ce-K-7	97.622 14	0.81 6	0.0017
ce-L-5	118.089 12	5.99 20	0.0151
ce-MO-5	122.586 12	1.66 5	0.0043
ce-L-7	127.493 14	0.151 13	0.0004
ce-K-10	180.11 3	1.79 7	0.0069
ce-K-11	293.65 3	0.169 14	0.0007
ce-L-10	210.38 3	0.239 21	0.0011
ce-K-13	213.46 3	0.171 19	0.0008
ce-K-18	337.27 3	0.27 4	0.0019
ce-K-26	460.30 3	0.43 7	0.0047

X-ray L	4.29	12 4	0.0011
X-ray $K\alpha_2$	30.6251 3	26.5 16	0.0173
X-ray $K\alpha_1$	30.9728 3	49 3	0.0324
X-ray $K\beta$	35	17.6 11	0.0131
γ 2	78.755 13	0.75 3	0.0013
γ 4	92.301 11	0.64 5	0.0013
γ 5	123.803 12	29.1 9	0.0766
γ 7	153.607 14	2.19 9	0.0062
γ 9	157.15 3	0.199 21	0.0007
γ 10	216.09 3	19.9 4	0.0916
γ 11	239.63 3	2.41 8	0.0123
γ 12	246.92 6	0.60 5	0.0031
γ 13	249.44 3	2.81 10	0.0149
γ 14	294.54 4	0.159 21	0.0010
γ 16	351.15 4	0.119 20	0.0009
γ 18	373.25 3	13.3 15	0.106
γ 19	404.94 3	1.29 9	0.0111
γ 24	480.34 4	0.34 4	0.0035
γ 25	486.48 4	1.89 21	0.0196
γ 26	496.28 3	44 4	0.463
γ 29	572.66 4	0.159 11	0.0019
γ 30	585.02 3	1.23 9	0.0154
γ 31	620.05 1	1.57 9	0.0208
γ 32	674.41 4	0.129 4	0.0019
γ 33	696.46 4	0.147 11	0.0022
γ 37	831.63 5	0.219 21	0.0039
γ 40	923.86 4	0.70 7	0.0117
γ 43	1046.9	>0.2	>0.004
γ 44	1047.56 4	>1.2	>0.03

23 weak γ 's omitted (E γ = 0.68%)

132TE B- DECAY (70.2 H 8) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.3	75 6	0.0053
ce-K- 1	16.551 10	70 5	0.0248
Auger-K	23.6	9.4 23	0.0047
ce-L- 1	44.532 10	9.3 7	0.0088
ce-γMO- 1	48.648 10	2.44 17	0.0025
ce-K- 2	53.13 8	0.89 16	0.0016
ce-K- 3	84.59 8	0.91 16	0.0016
ce-L- 2	111.11 9	0.19 4	0.0005
ce-L- 3	112.57 8	0.26 5	0.0006
ce-K- 4	198.99 6	7.18 13	0.0297
ce-L- 4	222.97 6	1.341 24	0.0064
ce-γMO- 4	227.09 4	0.2734	0.0013
β- 1 max	215 4		
avg	59.4 12	103	0.127
X-ray L	4	8 3	0.0007
X-ray K _{α2}	28.3172 4	19.9 15	0.0120
X-ray K _{α1}	28.6120 3	37 3	0.0226
X-ray Kβ	32.3	13.0 10	0.0089
γ 1	49.720 10	14.4 10	0.3152
γ 2	116.30 8	1.94 18	0.0048
γ 3	117.76 8	1.85 18	0.0046
γ 4	228.16 6	48.20 20	0.429

132I B- DECAY (2.30 H 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.43	0.89 7	=0
Auger-K	24.6	0.118 22	=0
ce-K- 24	488.09 9	0.127 14	0.0013
ce-K- 34	633.13 8	0.35 3	0.0047
ce-K- 41	738.04 8	0.206 24	0.0032
β- 1 max	226 20		
avg	63 7	0.12 6	0.0002
β- 2 max	320 20		
avg	92 7	0.261 3	0.0005
β- 3 max	353 20		
avg	103 7	0.12 5	0.0003
β- 4 max	366 20		
avg	107 7	<0.19	<0.0004
β- 5 max	425 20		
avg	127 7	0.21 4	0.0006
β- 6 max	458 20		
avg	138 7	<0.38	<0.0011
β- 7 max	504 20		
avg	154 8	0.24 6	0.0008
β- 8 max	522 20		
avg	161 8	0.34 7	0.0012
β- 9 max	689 20		
avg	223 8	=0.9	=0.004
β-10 max	740 20		
avg	242 8	1.81 10	0.0093
β-11 max	781 20		
avg	242 8	12.4 8	0.0660
β-12 max	826 20		
avg	275 8	0.37 6	0.0022
β-13 max	910 20		
avg	309 8	3.60 20	0.0237
β-14 max	967 20		
avg	331 9	8.1 4	0.0571

*** continued ***

132I B- DECAY (2.30 H 3) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β-15 max	996 20		
avg	344 9	3.79 16	0.0278
β-16 max	1155 20		
avg	409 9	2.11 7	0.0184
β-17 max	1185 20		
avg	422 9	19.0 7	0.171
β-18 max	1229 20		
avg	440 9	<0.9	<0.009
β-19 max	1413 20		
avg	519 9	1.7 6	0.0188
β-20 max	1458 20		
avg	543 9	1.9 8	0.0220
β-21 max	1470 20		
avg	593 9	10.2 10	0.118
β-22 max	1617 20		
avg	608 9	12.7 7	0.164
β-23 max	2140 20		
avg	841 9	17.6 22	0.315
total β-	avg	496 11	100 3
			1.03

11 weak β's omitted (IIP = 0.53%)

X-ray K _{α2}	29.4580 10	0.263 15	0.0002
X-ray K _{α1}	29.7790 10	0.50 3	0.0003
X-ray Kβ	33.6	0.177 10	0.0001
γ 2	147.25 10	0.237 20	0.0007
γ 3	183.3	0.1579	0.0006
γ 4	254.80 20	0.19 3	0.0010
γ 5	262.70 10	1.44 9	0.0081
γ 7	284.80 10	0.79 7	0.0048
γ 10	306.6 4	0.11 4	0.0007
γ 12	316.5 4	0.16 4	0.0011
γ 15	363.5 4	0.49 10	0.0038
γ 16	367.8 4	0.17 3	0.0014
γ 17	416.8 4	0.46 9	0.0041
γ 18	431.9 4	0.45 9	0.0042
γ 19	446.0 4	0.67 8	0.0064
γ 20	473.4 7	0.27 5	0.0027
γ 22	487.5 7	0.18 5	0.0018
γ 23	505.70 15	5.03 20	0.0542
γ 24	522.65 9	16.1 6	0.179
γ 25	535.5 4	0.52 8	0.0060
γ 26	547.10 20	1.25 9	0.0146
γ 30	620.8 10	=0.4	=0.005
γ 31	621.2 10	1.579 4	0.0209
γ 32	630.22 9	13.7 6	0.184
γ 33	650.60 20	2.66 20	0.0369
γ 34	667.69 8	98.70 20	1.40
γ 35	669.8 3	4.9 8	0.0704
γ 36	671.6 3	5.2 4	0.0748
γ 37	727	2.2 6	0.0336
γ 38	727.2 10	3.2 6	0.0489
γ 39	729.5 4	1.1 3	0.0169
γ 41	772.60 8	76.2 18	1.25
γ 42	780.2 3	1.23 6	0.0205
γ 43	784.5 4	0.42 5	0.0071
γ 45	809.80 20	2.9 3	0.0494
γ 46	812.29 20	5.6 5	0.0973
γ 47	863.30 28	0.59 5	0.0109
γ 48	876.80 20	1.00 5	0.0201
γ 50	910.30 20	0.92 5	0.0170
γ 51	927.6 3	0.44 4	0.0088
γ 53	954.55 9	18.1 6	0.367
γ 54	984.50 20	0.56 6	0.0118
γ 58	1038.70 20	0.57 5	0.0126
γ 64	1136.03 12	2.96 20	0.0716
γ 65	=1138	=0.3	=0.007
γ 66	1143.40 20	1.38 10	0.0337
γ 67	1186.2 7	0.21 5	0.0051

*** continued ***

132I B- DECAY (2.30 H 3)

(continued)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
γ 68	1173.20 20	1.09 10	0.0271
γ 71	1272.7 4	0.15 3	0.0040
γ 72	1290.7 3	1.14 6	0.0312
γ 73	1295.3 3	1.97 10	0.0545
γ 74	1298.2 5	0.89 10	0.0246
γ 76	1317.1 7	0.118 20	0.0033
γ 77	1372.07 13	2.47 10	0.0721
γ 78	1398.57 10	7.1 3	0.212
γ 80	1442.56 10	1.42 6	0.0437
γ 82	1476.80 20	0.138 20	0.0043
γ 94	1757.50 20	0.38 3	0.0140
γ 101	1921.08 12	1.18 9	0.0485
γ 103	2002.30 12	1.09 10	0.0463
γ 104	2086.82 15	0.25 4	0.0110
γ 105	2172.68 15	0.19 3	0.0087
γ 107	2223.17 15	0.118 20	0.0356
γ 110	2390.48 15	0.168 20	0.0085

58 weak γ's omitted (ΣI_γ = 2.23%)

132CS B+ DECAY (6.475 D 10)

I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	3.43	75 4	0.0055
Auger-K	24.6	8.9 16	0.0047
β ⁺ 1 max	404 23		
avg	190 10	0.31 9	0.0013
X-ray L	4.1	8 3	0.0007
X-ray K _α	29.4580 10	20.3 6	0.0127
X-ray K _β	29.7790 10	37.6 9	0.0238
X-ray K _γ	33.6	13.4 4	0.0096
γ 2	505.90 15	0.82 10	0.0088
γ 3	630.22 9	1.03 8	0.0139
γ 4	667.67 6	99.5 5	1.42
γ 6	1136.03 12	0.52 4	0.0125
γ 8	1317.80 20	0.60 5	0.0168

4 weak γ's omitted (ΣI_γ = 0.28%)

Maximum γ-intensity = 0.62%

133I B- DECAY (20.8 H 1)

I(min)=0.10%

SEE ALSO 133XP IT DECAY (2.25 D)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
β ⁻ 1 max	170 30		
avg	46 9	0.47 5	0.0005
β ⁻ 2 max	350 30		
avg	104 11	0.5 3	0.0011
β ⁻ 3 max	370 30		
avg	110 11	1.29 7	0.0030
β ⁻ 4 max	410 30		
avg	122 11	0.290 20	0.0008
β ⁻ 5 max	460 30		
avg	140 11	3.52 8	0.0105
β ⁻ 6 max	520 30		
avg	162 12	3.11 8	0.0107
β ⁻ 7 max	710 30		
avg	230 12	0.58 6	0.0028
β ⁻ 8 max	880 30		
avg	299 12	3.8 5	0.0242
β ⁻ 9 max	1020 30		
avg	352 13	1.74 8	0.0130
β ⁻ 10 max	1230 30		
avg	441 13	83.6 3	0.785
β ⁻ 11 max	1530 30		
avg	573 13	1.10 10	0.0134
total β ⁻	avg	406 15	100.0 7
γ 3	262.67 8	0.375 18	0.0021
γ 4	267.18 8	0.122 18	0.0007
γ 5	345.7 5	0.43 7	0.0031
γ 6	360.9 3	0.20 5	0.0015
γ 7	417.50 20	0.140 18	0.0012
γ 8	422.90 6	0.27 3	0.0024
γ 11	510.565 20	1.84 6	0.0200
γ 13	529.989 18	87.30 20	0.985
γ 15	617.94 3	0.533 18	0.0070
γ 18	670	0.12 3	0.0017
γ 19	680.31 4	0.62 4	0.0090
γ 20	706.606 25	1.47 5	0.0221
γ 21	768.36 4	0.45 3	0.0073
γ 23	820.61 5	0.148 9	0.0026
γ 25	856.361 25	1.19 5	0.0217
γ 27	875.370 25	4.40 11	0.0820
γ 28	909.92 10	0.244 18	0.0047
γ 30	1052.37 3	0.541 18	0.0121
γ 31	1060.17 5	0.140 9	0.0032
γ 32	1236.56 4	1.44 5	0.0379
γ 33	1298.33 3	2.27 7	0.0628
γ 34	1350.54 8	0.140 9	0.0040

12 weak γ's omitted (ΣI_γ = 0.25%)

133IXE β^- DECAY (5.245 D 6) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μ Ci-h)
Auger-L	3.55	49.0 20	0.0037
Auger-K	25.5	5.5 7	0.0030
ce-K- 1	43.636 11	0.30 6	0.0003
ce-K- 2	45.0124 4	52.0 3	0.0498
ce-L- 2	75.2827 4	8.49 20	0.0136
ce-NMO- 2	79.7799 4	2.3 3	0.0039
β^- 1 max	266 3		
avg	75.0 10	0.56 10	0.0011
β^- 2 max	346 3		
avg	100.5 10	99.34 10	0.213
total β^- avg	100.3 10	100.01 15	0.214
X-ray L	4.29	6.1 17	0.0006
X-ray $K\alpha_2$	30.6251 3	13.3 3	0.0087
X-ray $K\alpha_1$	30.9728 3	24.6 5	0.0163
X-ray $K\beta$	35	8.84 20	0.0066
γ 1	79.621 11	0.22 6	0.0004
γ 2	81	37.1 4	0.0640

4 weak γ 's omitted (I γ = 0.07%)

133IXE IT DECAY (2.188 D 8) I(min)=0.10%

FEEDING OF 2.188-D 133IXE
IN 133I DECAY=2.9% 1

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μ Ci-h)
Auger-L	3.43	70 4	0.0051
Auger-K	24.6	7.1 13	0.0037
ce-K- 1	198.62 4	63.7 8	0.269
ce-L- 1	227.73 4	20.8 6	0.101
ce-N- 1	232.04 4	4.16 13	0.0206
ce-NOP- 1	232.97 4	1.04 17	0.0052
X-ray L	4.1	7.8 24	0.0007
X-ray $K\alpha_2$	29.4580 10	16.1 5	0.0101
X-ray $K\alpha_1$	29.7790 10	29.9 8	0.0190
X-ray $K\beta$	33.6	10.6 4	0.0076
γ 1	233.18 4	10.3 3	0.0512

133BA EC DECAY (10.5 Y 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μ Ci-h)
Auger-L	3.55	135 6	0.0102
ce-K- 1	17.170 16	10.8 7	0.0040
Auger-K	25.5	13.0 17	0.0076
ce-K- 2	43.636 11	3.41 21	0.0032
ce-K- 3	45.012 5	46.8 4	0.0449
ce-L- 1	47.441 16	1.61 10	0.0016
ce-NMO- 1	51.938 16	0.420 23	0.0005
ce-L- 2	73.907 11	0.54 11	0.0008
ce-L- 3	75.283 5	7.65 19	0.0123
ce-NMO- 3	79.780 5	2.1 3	0.0035
ce-K- 4	124.620 15	0.144 10	0.0004
ce-K- 6	240.412 12	0.337 14	0.0017
ce-K- 7	266.866 15	0.71 6	0.0040
ce-K- 8	320.020 17	1.32 5	0.0090
ce-K- 9	347.866 15	0.152 8	0.0011
ce-L- 8	350.291 17	0.218 8	0.0016
X-ray L	4.29	17 5	0.0015
X-ray $K\alpha_2$	30.6251 3	34.0 11	0.0222
X-ray $K\alpha_1$	30.9728 3	62.9 18	0.0415
X-ray $K\beta$	35	22.6 8	0.0168
γ 1	53.155 16	2.21 4	0.0025
γ 2	79.621 11	2.43 13	0.0041
γ 3	80.997 5	33.4 5	0.0577
γ 4	160.605 15	0.72 3	0.0025
γ 5	223.25 3	0.468 13	0.0022
γ 6	276.397 12	7.30 13	0.0430
γ 7	302.851 15	18.66 21	0.126
γ 8	356.005 17	62.4 3	0.473
γ 9	383.851 15	8.86 14	0.0724

133BA IT DECAY (38.9 H 1) I(min)=0.10%

38.9-H 133BA ALSO DECAYS
VIA A 0.0108% 6 EC BRANCH

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μ Ci-h)
Auger-L	3.67	130 6	0.0102
ce-L- 1	6.30 4	77.6	0.0104
ce-N- 1	11.00 4	15.9 5	0.0037
ce-NOP- 1	12.04 4	5.20 20	0.0013
Auger-K	26.4	5.9 16	0.0033
ce-K- 2	238.65 15	59.2 3	0.301
ce-L- 2	270.10 15	10.0 6	0.104
ce-L- 2	274.80 15	4.00 10	0.0234
ce-NOP- 2	275.84 15	1.15 3	0.0068
X-ray L	4.47	18 5	0.0017
γ 1	12.29 4	1.39 4	0.0004
X-ray $K\alpha_2$	31.8171 3	15.2 5	0.0103
X-ray $K\alpha_1$	32.1936 3	28.0 9	0.0192
X-ray $K\beta$	36.4	10.2 4	0.0079
γ 2	276.09 15	18.0 5	0.106

134TZ B- DECAY (41.9 H 8) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.3	32.3 22	0.0023
Auger-K	23.6	4.0 10	0.0020
ce-K- 3	46.281 10	26.7 7	0.0263
ce-K- 4	68.25 3	0.30 12	0.0004
ce-L- 3	74.262 10	4.0 6	0.0063
ce-M- 3	78.378 10	0.79 11	0.0013
ce-NPO- 3	79.264 10	0.20 3	0.0003
ce-K- 6	147.72 3	3.21 19	0.0101
ce-K- 8	168.07 3	0.98 20	0.0035
ce-L- 6	175.70 3	0.69 4	0.0026
ce-K- 9	177.301 20	2.1 3	0.0080
ce-NMO- 6	179.82 3	0.175 10	0.0007
ce-K- 11	244.741 20	0.8 3	0.0041
β- 1 max	600 300		
β- 1 avg	190 120	14.5 8	0.0587
β- 2 max	800 300		
β- 2 avg	260 120	42.6 17	0.236
β- 3 max	900 300		
β- 3 avg	290 130	43.5 14	0.269
total β- avg	260 130	100.6 24	0.563
X-ray L	4	3.4 12	0.0003
X-ray Kα ₂	28.3172 4	8.6 4	0.0052
X-ray Kα ₁	28.6120 3	16.0 7	0.0097
X-ray Kβ	32.3	5.59 25	0.0038
γ 2	76.230 20	0.29 3	0.0005
γ 3	79.450 10	20.9 8	0.0353
γ 4	101.42 3	0.34 7	0.0007
γ 5	131.05 20	0.15 3	0.0004
γ 6	180.89 3	18.4 11	0.0710
γ 7	183.05 13	0.6 3	0.0024
γ 8	201.24 3	8.9 7	0.0382
γ 9	210.470 20	22.4 11	0.100
γ 10	259.59 15	0.49 10	0.0027
γ 11	277.950 20	21.8 11	0.129
γ 12	435.06 5	19.0 13	0.176
γ 13	460.99 3	11.1 7	0.109
γ 14	464.64 6	5.22 25	0.0517
γ 15	565.99 3	19.3 11	0.233
γ 16	636.26 9	2.1 4	0.0291
γ 17	645.45	1.044 24	0.0148
γ 18	712.97 6	4.21 18	0.0639
γ 19	742.59 3	15.0 7	0.238
γ 20	767.20 3	20.7 10	0.502
γ 21	844.06 6	1.2 6	0.0221
γ 22	896.02 9	0.18 7	0.0035
γ 23	925.55 8	1.69 19	0.0333
γ 24	1027.00 10	0.46 13	0.0101

134I B- DECAY (52.6 H 5) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.43	1.14 18	=0
Auger-K	24.6	0.14 4	=0
ce-K- 1	100.838 22	0.98 20	0.0021
ce-L- 1	129.946 22	0.12 3	0.0003
ce-K- 31	812.46 3	0.17 3	0.0030
ce-K- 34	849.53 3	0.12 3	0.0022

*** continued ***

134I B- DECAY (52.6 H 5) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β- 1 max	770 50		
β- 1 avg	255 24	1.48 9	0.0080
β- 2 max	790 60		
β- 2 avg	261 24	0.33 4	0.0018
β- 3 max	840 60		
β- 3 avg	279 24	0.153 19	0.0009
β- 4 max	1070 60		
β- 4 avg	372 25	1.22 7	0.0047
β- 5 max	1280 60		
β- 5 avg	440 30	31.5 8	0.304
β- 6 max	1380 60		
β- 6 avg	500 30	0.53 4	0.0056
β- 7 max	1500 60		
β- 7 avg	550 30	7.6 5	0.0890
β- 8 max	1560 60		
β- 8 avg	580 30	16.2 5	0.200
β- 9 max	1600 60		
β- 9 avg	600 30	3.67 17	0.0469
β-10 max	1740 60		
β-10 avg	660 30	7.6 5	0.107
β-11 max	1900 60		
β-11 avg	690 30	11.2 7	0.165
β-12 max	1850 60		
β-12 avg	710 30	2.50 15	0.0378
β-13 max	1880 60		
β-13 avg	720 30	0.7 7	0.0107
β-14 max	2010 60		
β-14 avg	750 30	0.7	0.01
β-15 max	2230 60		
β-15 avg	980 30	3.7 9	0.0694
β-16 max	2420 60		
β-16 avg	970 30	11.9 15	0.246
total β- avg	610 40	101.2 24	1.32

4 weak β's omitted (Iβ = 0.23%)

X-ray L	4.1	0.13 5	=0
X-ray Kα ₂	29.4580 10	0.32 6	0.0002
X-ray Kα ₁	29.7790 10	0.60 10	0.0004
X-ray Kβ	33.6	0.21 4	0.0002
γ 1	135.399 22	3.76 22	0.0108
γ 2	139.03 3	0.69 5	0.0020
γ 3	151.98 15	0.106 12	0.0003
γ 4	162.48 7	0.26 3	0.0009
γ 5	188.47 4	0.70 4	0.0028
γ 6	217.00 20	0.25 3	0.0011
γ 7	235.47 3	1.94 16	0.0100
γ 9	278.80 15	0.131 15	0.0008
γ 10	319.81 6	0.52 5	0.0035
γ 11	351.08 10	0.50 6	0.0037
γ 12	405.451 20	7.3 4	0.0634
γ 13	411.00 8	0.61 6	0.0053
γ 14	433.35 3	4.19 24	0.0387
γ 15	458.92 6	1.30 9	0.0127
γ 16	465.50 10	0.36 4	0.0036
γ 17	488.08 4	1.61 9	0.0147
γ 18	514.40 3	2.34 14	0.0256
γ 19	540.825 25	7.8 5	0.0901
γ 20	565.52 4	0.84 6	0.0106
γ 21	570.75 15	0.21 3	0.0026
γ 22	595.362 20	11.4 6	0.144
γ 23	621.790 25	10.6 6	0.140
γ 24	627.96 3	2.37 14	0.0316
γ 25	677.34 3	8.5 5	0.122
γ 26	706.65 10	0.83 6	0.0125
γ 27	730.74 4	1.91 12	0.0297
γ 28	739.18 8	0.76 8	0.0120
γ 29	766.68 4	4.1 3	0.0670
γ 30	816.18 7	0.52 5	0.0091
γ 31	847.025 25	95.4 3	1.72

*** continued ***

134I B- DECAY (52.6 H 5) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
γ 32	857.28 3	6.96 20	0.127
γ 33	864.0 3	0.19 3	0.0035
γ 34	884.09 3	65.3 10	1.23
γ 35	922.6 3	0.14 3	0.0028
γ 36	967.86 4	4.04 20	0.0815
γ 37	966.90 5	0.35 4	0.0073
γ 38	974.67 4	4.7 4	0.0970
γ 39	1040.25 10	1.91 19	0.0423
γ 43	1072.55 3	15.3 8	0.349
γ 45	1100.07 12	0.69 6	0.0161
γ 46	1103.18 12	0.73 6	0.0170
γ 47	1136.16 4	9.7 5	0.235
γ 48	1159.10 4	0.35 3	0.0087
γ 49	1164.0 3	0.13 3	0.0033
γ 51	1190.03 8	0.35 3	0.0089
γ 53	1239.0 3	0.21 6	0.0055
γ 55	1269.49 5	0.56 4	0.0152
γ 56	1322.4 3	0.10 4	0.0030
γ 57	1336.00 20	0.14 3	0.0041
γ 58	1352.62 8	0.45 4	0.0129
γ 61	1414.3 5	0.22 6	0.0066
γ 62	1428.2 3	0.17 4	0.0052
γ 63	1431.35 25	0.17 4	0.0052
γ 64	1455.24 5	2.29 15	0.0710
γ 65	1470.00 7	0.77 5	0.0242
γ 66	1505.5 4	0.11 4	0.0037
γ 67	1541.51 7	0.51 4	0.0164
γ 68	1613.80 5	4.36 24	0.150
γ 69	1629.24 8	0.26 4	0.0089
γ 70	1644.25 7	0.40 5	0.0140
γ 71	1655.19 10	0.23 3	0.0081
γ 72	1741.49 5	2.67 19	0.0991
γ 73	1806.04 4	5.7 4	0.220
γ 76	1925.88 10	0.181 19	0.0074
γ 78	2020.6 3	0.172 19	0.0074
γ 79	2159.9 3	0.21 3	0.0097
γ 82	2312.40 20	0.24 3	0.0117
γ 85	2467.4 3	0.153 19	0.0080

22 weak γ's omitted (IIγ = 1.33%)

134CS B- DECAY (2.062 Y 5) I(min)=0.10%

134CS ALSO DECAYS
VIA A 0.0003% EC BRANCH

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.67	0.65 5	~0
ce-K- 5	531.074 15	0.120 7	0.0014
ce-K- 6	567.250 15	0.488 9	0.0059
ce-K- 7	750.400 22	0.224 11	0.0036
β- 1 max	88.6 4		
avg	73.09 11	27.40 20	0.0135
β- 2 max	415.2 4		
avg	123.43 14	2.47 5	0.0065
β- 3 max	650.0 4		
avg	210.15 15	70.1 5	0.314
total β- avg	156.8 3	100.0 6	0.334

2 weak β's omitted (IIβ = 0.05%)

*** continued ***

134CS B- DECAY (2.062 Y 5) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
X-ray Ke ₂	31.8171 3	0.213 8	0.0001
X-ray Ke ₁	32.1936 3	0.393 14	0.0003
X-ray Kp	36.4	0.143 6	0.0001
γ 3	475.35 5	1.46 4	0.0148
γ 4	563.227 15	8.38 5	0.101
γ 5	569.315 15	15.43 11	0.187
γ 6	604.699 15	97.6 3	1.26
γ 7	795.845 22	85.4 4	1.45
γ 8	801.932 22	8.73 4	0.149
γ 9	1038.57 3	1.000 10	0.0221
γ 10	1167.44 3	1.80 3	0.0448
γ 11	1365.15 3	3.04 4	0.0684

2 weak γ's omitted (IIγ = 0.04%)

135I B- DECAY (6.61 H 1) I(min)=0.10%

SEE ALSO 135NKE IT DECAY

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β- 1 max	230 40		
avg	65 10	0.14 3	0.0002
β- 2 max	240 40		
avg	68 10	0.130 20	0.0102
β- 3 max	260 40		
avg	74 10	0.14 3	0.0002
β- 4 max	300 40		
avg	86 11	1.03 5	0.0019
β- 5 max	340 40		
avg	98 11	0.91 4	0.0019
β- 6 max	350 40		
avg	103 11	1.39 5	0.0030
β- 7 max	450 40		
avg	137 12	4.73 15	0.0138
β- 8 max	480 40		
avg	145 12	7.33 20	0.0226
β- 9 max	620 40		
avg	196 12	1.57 7	0.0066
β-10 max	660 40		
avg	213 12	1.10 5	0.0050
β-11 max	740 40		
avg	243 13	7.9 3	0.0409
β-12 max	820 40		
avg	271 13	0.61 3	0.0035
β-13 max	920 40		
avg	312 13	8.7 3	0.0570
β-14 max	1032		
avg	358 14	21.5 5	0.164
β-15 max	1140 40		
avg	405 14	8.0 3	0.0690
β-16 max	1250 40		
avg	450 14	7.6 4	0.0720
β-17 max	1260 40		
avg	454 14	0.11 5	0.0011
β-18 max	1450 40		
avg	535 14	23.0 12	0.271
β-19 max	1500 40		
avg	591 14	1.1 9	0.0130
β-20 max	2100 40		
avg	857 15	1.0 7	0.0329
total β- avg	369 17	99.7 19	0.783

4 weak β's omitted (IIβ = 0.15%)

*** continued ***

135I B- DECAY (6.61 H 1)

(continued)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
γ 7	220.502 15	1.75 6	0.0082
γ 8	229.72 3	0.232 9	0.0011
γ 11	264.26 9	0.184 7	0.0010
γ 12	288.451 16	3.09 12	0.0190
γ 13	290.27 4	0.303 21	0.0019
γ 20	361.85 14	0.19 3	0.0014
γ 21	403.03 4	0.232 9	0.0020
γ 22	414.83 3	0.301 18	0.0027
γ 23	417.63 3	3.52 12	0.0313
γ 24	429.93 3	0.303 24	0.0028
γ 25	433.741 19	0.553 24	0.0051
γ 26	451.63 3	0.315 18	0.0030
γ 29	546.557 16	7.13 25	0.0030
γ 30	575.97 4	0.129 23	0.0016
γ 33	649.45 4	0.46 3	0.0063
γ 37	690.13 6	0.129 15	0.0019
γ 38	707.92 5	0.66 6	0.0099
γ 39	785.48 5	0.152 21	0.0025
γ 41	797.71 8	0.17 3	0.0029
γ 43	836.304 16	6.67 24	0.119
γ 45	961.46	0.15 3	0.0030
γ 46	972	0.89 6	0.0184
γ 47	972.6	1.20 6	0.0289
γ 48	995.09 10	0.15 3	0.0033
γ 49	1038.760 21	7.9 3	0.175
γ 51	1101.58 4	1.60 6	0.0374
γ 52	1124.00 4	3.61 12	0.0845
γ 53	1131.511 18	22.5 8	0.543
γ 55	1159.90 20	0.103 23	0.0025
γ 56	1169.04 4	0.87 4	0.0217
γ 59	1240.470 20	0.90 4	0.0238
γ 61	1260.439 17	28.6 10	0.749
γ 67	1367.89 4	0.61 4	0.0177
γ 69	1448.35 10	0.31 3	0.0097
γ 70	1457.56 3	8.6 3	0.268
γ 71	1502.79 4	1.07 5	0.0344
γ 73	1566.81 3	1.29 6	0.0436
γ 74	1678.03 3	9.5 4	0.341
γ 75	1706.46 3	4.89 18	0.149
γ 77	1791.20 3	7.70 25	0.294
γ 78	1830.69 4	0.58 3	0.0226
γ 80	1927.30 3	0.295 15	0.0121
γ 83	2045.88 4	0.87 4	0.0379
γ 88	2255.86 3	0.61 3	0.0294
γ 90	2408.65 4	0.95 5	0.0489

47 weak γ's omitted (IIγ = 1.50%)

135XE B- DECAY (9.09 H 1)

I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.55	5.12 22	0.0004
Auger-K	25.5	0.59 7	0.0003
ce-K- 3	213.809 15	5.63 10	0.0257
ce-L- 3	244.080 15	0.739 13	0.0038
β- 1 max	96 9		
avg	25.0 25	0.123 4	-0
β- 2 max	550 9		
avg	171 4	3.12 10	0.0114
β- 3 max	750 9		
avg	245 4	0.68 3	0.0035
β- 4 max	908 9		
avg	307 4	95.99 3	0.628
total β- avg	302 4	99.98 11	0.643

1 weak β's omitted (IIβ = 0.08%)

X-ray L	4.29	0.63 18	-0
X-ray K _{α2}	30.6251 3	1.43 4	0.0009
X-ray K _{α1}	30.9729 3	2.66 7	0.0018
X-ray Kβ	35	0.95 3	0.0007
γ 1	158.197 18	0.289 10	0.0010
γ 3	249.794 15	90.13 8	0.480
γ 4	358.39 4	0.221 9	0.0017
γ 6	407.990 20	0.359 13	0.0031
γ 9	608.185 16	2.90 4	0.0376

8 weak γ's omitted (IIγ = 0.21%)

135XE IT DECAY (15.29 H 3)

I(min)=0.10%

1354XE ALSO DECAYS
VIA A 0.044% β- BRANCH
FEEDING OF 1354XE
IN 135I DECAY=16.6% 6

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.83	14.9 8	0.0011
Auger-K	24.6	1.7 3	0.0009
ce-K- 1	492.010 17	15.2 3	0.159
ce-L- 1	521.118 17	2.88 9	0.0320
ce-K- 1	525.429 17	0.610 20	0.0068
ce-NOP- 1	526.363 17	0.200 10	0.0022
X-ray L	4.1	1.7 5	0.0001
X-ray K _{α2}	29.0580 10	3.84 13	0.0024
X-ray K _{α1}	29.7790 10	7.13 23	0.0045
X-ray Kβ	33.6	2.54 9	0.0018
γ 1	526.571 17	81.2 5	0.911

135Ba IT DECAY (28.7 H 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.67	63 4	0.0050
Auger-K	26.4	5.9 16	0.0033
ce-K- 1	230.797 10	59.9 7	0.294
ce-L- 1	262.249 10	10.7 5	0.104
ce-H- 1	266.945 10	4.19 12	0.0238
ce-HOP- 1	267.985 10	1.27 3	0.0068
X-ray L	4.47	8.6 22	0.0008
X-ray K _{α2}	31.8171 3	15.3 6	0.0104
X-ray K _{α1}	32.1936 3	28.3 10	0.0194
X-ray Kβ	36.4	10.3 4	0.0080
γ 1	268.238 10	16.0 5	0.0914

136Cs β- DECAY (13.1 D 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.67	20.4 13	0.0016
Auger-K	26.4	1.9 5	0.0011
ce-K- 1	29.47 5	7.3 7	0.0046
ce-K- 2	48.85 5	1.85 11	0.0019
ce-L- 1	60.92 5	1.05 10	0.0014
ce-HNO- 1	65.62 5	0.212 19	0.0003
ce-L- 2	80.30 5	0.253 15	0.0004
ce-K- 4	115.78 5	2.38 10	0.0059
ce-K- 5	126.45 5	5.17 21	0.0139
ce-K- 7	139.12 5	0.552 23	0.0016
ce-L- 4	147.23 5	0.67 3	0.0021
ce-HNO- 4	151.93 5	0.144 6	0.0005
ce-L- 5	157.90 5	4.11 17	0.0138
ce-H- 5	162.60 5	0.92 4	0.0032
ce-HOP- 5	163.64 5	0.240 10	0.0008
ce-K- 10	236.21 4	0.159 7	0.0008
ce-K- 14	303.13 5	1.17 5	0.0075
ce-L- 14	334.58 5	0.201 8	0.0014
ce-K- 18	791.06 4	0.241 9	0.0040
ce-K- 19	1010.63 7	0.112 4	0.0024

β- 1 max	173.8 20		
avg	47.1 6	2.29 10	0.0023
β- 2 max	191.0 20		
avg	52.1 6	0.21 3	0.0002
β- 3 max	340.4 20		
avg	98.6 7	94 3	0.197
β- 4 max	407.3 20		
avg	120.8 7	8.13 13	0.0003
β- 5 max	493.6 20		
avg	150.5 7	0.8 9	0.0026
β- 6 max	517.0 20		
avg	175.4 8	1.8 8	0.0067
β- 7 max	680.9 20		
avg	218.0 8	2.0 28	0.0093
total β- avg	101.5 8	101 4	0.219

*** continued ***

136Cs β- DECAY (13.1 D 1) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
X-ray L	4.47	2.8 7	0.0003
X-ray K _{α2}	31.8171 3	4.46 24	0.0033
X-ray K _{α1}	32.1936 3	9.0 5	0.0061
X-ray Kβ	36.4	3.26 17	0.0025
γ 1	66.91 5	12.5 11	0.0178
γ 2	86.29 5	6.3 4	0.0116
γ 3	109.66 10	0.41 3	0.0010
γ 4	153.22 5	7.5 3	0.0244
γ 5	163.89 5	4.62 17	0.0161
γ 6	166.53 10	0.63 4	0.0022
γ 7	176.56 5	13.6 5	0.0511
γ 8	187.25 10	0.60 6	0.0024
γ 10	273.65 4	12.7 5	0.0740
γ 13	319.87 10	0.60 6	0.0041
γ 14	340.57 5	44.8 15	0.339
γ 16	507.21 10	0.98 6	0.0106
γ 18	818.50 4	100 3	1.74
γ 19	1048.07 7	79.7 25	1.78
γ 20	1235.34 5	19.8 7	0.520

0 weak γ's omitted (I_γ = 0.39%)

137Cs β- DECAY (30.0 Y 2) I(min)=0.10%

SEE ALSO 137mBa IT DECAY

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β- 1 max	514.0 10		
avg	178.3 4	94.6 3	0.351
β- 2 max	1176.0 10		
avg	416.4 4	5.4 3	0.0479
total β- avg	187.4 5	100.0 5	0.399

137mBa IT DECAY (2.552 H 2) I(min)=0.10%

FEEDING OF 137mBa

IN 137CS DECAY=94.6% 3

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	3.67	7.8 5	0.0006
Auger-K	26.4	0.82 22	0.0005
ce-K- 1	624.284 9	8.20 5	0.110
ce-L- 1	655.656 9	1.50 -	0.0209
ce-HNO- 1	660.352 9	0.500 20	0.0070
X-ray L	4.47	1.1 3	0.0001
X-ray K _{α2}	31.8171 3	2.11 7	0.0016
X-ray K _{α1}	32.1936 3	3.90 12	0.0027
X-ray Kβ	36.4	1.42 5	0.0011
γ 1	661.685 9	89.9 4	1.27

138XE B- DECAY (14.17 H 7) I (min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(q-rad/ μCi-h)
Auger-L	3.55	50.0 17	0.0038
ce-B- 1	3.63 5	31 5	0.0024
ce-SOP- 1	4.62 5	10.5 15	0.0010
ce-L- 2	5.14 5	52	0.0057
ce-B- 2	9.63 5	10.39252	0.0021
ce-SOP- 2	10.62 5	2.58668	0.0006
Auger-K	25.5	0.42 6	0.0002
ce-K- 5	117.77 3	1.61 25	0.0040
ce-L- 5	148.04 3	0.36 18	0.0011
ce-K- 7	296.58 5	0.241 11	0.0011
ce-X- 8	222.33 5	1.80 10	0.0085
ce-L- 8	252.60 5	0.29 7	0.0015
ce-K- 14	360.45 5	0.107 14	0.0008
ce-K- 17	398.51 5	0.26 5	0.0022
β- 1 max	320 80		
avg	90 30	0.23 17	0.0004
β- 2 max	360 80		
avg	100 30	0.46 14	0.0010
β- 3 max	490 80		
avg	150 30	3.07 13	0.0098
β- 4 max	570 90		
avg	180 30	9.5 4	0.0364
β- 5 max	900 90		
avg	270 40	32.7 13	0.188
β- 6 max	810 90		
avg	270 40	0.28 3	0.0016
β- 7 max	1040 80		
avg	360 40	0.23 3	0.0018
β- 8 max	1460 90		
avg	540 40	0.16 3	0.0018
β- 9 max	1620 90		
avg	610 40	0.19 3	0.0025
β-10 max	1980 90		
avg	720 40	0.27 4	0.0041
β-11 max	2380 90		
avg	950 40	20.1 7	0.407
β-12 max	2420 90		
avg	970 40	13.4 5	0.277
β-13 max	2570 90		
avg	1040 40	5.6 21	0.124
β-14 max	2810 90		
avg	1150 40	9 6	0.220
β-15 max	2820 80		
avg	1150 40	5 5	0.122
total β- avg	660 70	100 4	1.40

5 weak β's omitted (IIB = 0.28%)

X-ray L	4.29	6.2 17	0.0006
γ 1	4.45 5	0.14 3	0
γ 2	10.45 5	0.644 25	0.0002
X-ray K _α	30.6251 3	1.02 8	0.0007
X-ray K _β	30.9729 3	1.49 14	0.0012
X-ray K _γ	35	0.69 5	0.0005
γ 5	153.75 3	5.95 25	0.0195
γ 7	242.56 5	3.50 14	0.0181
γ 8	258.31 5	31.5 13	0.173
γ 9	242.51 6	0.428 20	0.0026
γ 12	335.28 9	0.107 11	0.0008
γ 13	371.44 5	0.50 3	0.0040
γ 14	196.43 5	6.3 3	0.0532
γ 15	401.36 5	2.17 13	0.0186
γ 17	438.49 5	20.3 9	0.188
γ 18	500.22 6	0.362 14	0.0039
γ 19	510.07 7	0.252 16	0.0028
γ 21	537.76 13	0.117 17	0.0013
γ 23	555.95 9	0.117 14	0.0014
γ 24	568.53 6	0.306 19	0.0037
γ 27	589.94 8	0.123 11	0.0015

*** continued ***

138XE B- DECAY (14.17 H 7) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A(q-rad/ μCi-h)
γ 30	654.08 8	0.145 14	0.0020
γ 47	945.42 7	0.246 22	0.0055
γ 49	969.35 6	0.62 4	0.0115
γ 50	946.47 12	0.132 14	0.0025
γ 52	912.51 7	0.329 22	0.0044
γ 53	917.13 6	0.92 4	0.0180
γ 54	936.76 11	0.135 14	0.0027
γ 55	941.25 8	0.230 18	0.0046
γ 60	1093.67 4	0.41 3	0.0095
γ 61	1094.77 11	0.218 14	0.0050
γ 62	1102.24 17	0.107 14	0.0025
γ 63	1114.29 10	1.47 7	0.0350
γ 64	1141.64 4	0.51 4	0.0125
γ 65	1145.48 18	0.132 20	0.0032
γ 80	1571.04 16	0.26 3	0.0009
γ 82	1614.57 18	0.24 3	0.0081
γ 84	1768.26 13	14.7 7	0.630
γ 87	1912.54 14	0.140 23	0.0069
γ 98	1850.84 17	1.42 7	0.0561
γ 90	1925.46 14	0.56 4	0.0231
γ 91	2094.75 14	5.35 23	0.229
γ 92	2015.82 14	12.1 5	0.526
γ 94	2079.17 14	1.44 7	0.0639
γ 95	2252.24 14	2.23 11	0.110
γ 97	2321.43 16	0.62 4	0.0307
γ 94	2475.26 14	0.312 23	0.0144
γ101	2497.56 17	0.173 14	0.0092

57 weak γ's omitted (IIG = 4.66%)

138CS B- DECAY (32.2 H 1) I (min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(q-rad/ μCi-h)
β- 1 max	660 70		
avg	210 30	0.24 3	0.0012
β- 2 max	780 70		
avg	260 30	0.160 20	0.0009
β- 3 max	1150 70		
avg	360 30	0.100 10	0.0008
β- 4 max	1210 70		
avg	430 30	0.14 3	0.0016
β- 5 max	1350 70		
avg	490 30	0.47 6	0.0049
β- 6 max	1370 70		
avg	500 30	0.21 1	0.0022
β- 7 max	1690 70		
avg	600 30	0.30 3	0.0038
β- 8 max	1640 70		
avg	620 30	0.43 4	0.0057
β- 9 max	1920 70		
avg	740 40	0.230 20	0.0036
β-10 max	1970 70		
avg	750 40	0.170 20	0.0027
β-11 max	2050 70		
avg	800 40	0.270 20	0.0046
β-12 max	2130 70		
avg	830 40	0.34 1	0.0060
β-13 max	2240 70		
avg	840 40	0.17 3	0.0032
β-14 max	2300 70		
avg	910 40	0.64 4	0.0124

*** continued ***

136C B- DECAY (32.2 H 1) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
β-15 max	2360 70		
avg	940 40	0.21 4	0.0042
β-16 max	2410 70		
avg	960 40	0.37 20	0.0076
β-17 max	2440 70		
avg	970 40	0.20 5	0.0041
β-18 max	2510 70		
avg	1010 40	1.59 7	0.0342
β-19 max	2650 70		
avg	1070 40	8.70 23	0.198
β-20 max	2710 70		
avg	1100 40	1.67 8	0.0391
β-21 max	2840 70		
avg	1160 40	43.0 7	1.06
β-22 max	2970 70		
avg	1170 40	0.63 7	0.0157
β-23 max	2980 70		
avg	1220 40	7.90 20	0.205
β-24 max	3070 70		
avg	1270 40	13.0 3	0.352
β-25 max	3340 70		
avg	1410 40	13.7 7	0.411
β-26 max	3850 70		
avg	1630 40	4.6 18	0.160
total β-			
avg	1200 40	99.8 22	2.55

6 weak β's omitted (IIP = 0.29%)

γ 1	112.60 13	0.130 23	0.0003
γ 2	130.10 6	1.49 9	0.0044
γ 3	141.96 6	0.50 4	0.0021
γ 4	143.49 8	0.320 23	0.0014
γ 5	212.32 8	0.175 14	0.0008
γ 6	227.76 6	1.51 4	0.0073
γ 7	326.90 8	0.290 19	0.0020
γ 9	363.93 8	0.244 23	0.0019
γ 10	365.29 13	0.191 23	0.0015
γ 12	400.90 6	4.66 10	0.0006
γ 13	421.59 7	0.427 23	0.0038
γ 14	462.79 7	30.7 7	0.303
γ 15	516.74 12	0.43 5	0.0007
γ 16	506.94 7	10.76 24	0.125
γ 19	683.59 15	0.100 14	0.0016
γ 23	766.10 12	0.106 15	0.0024
γ 24	773.31 10	0.233 19	0.0030
γ 25	782.08 9	3.33 3	0.0055
γ 31	971.80 8	5.11 14	0.0949
γ 32	980.8 3	0.11 3	0.0021
γ 33	935.03 12	0.181 16	0.0036
γ 36	1009.70 8	29.8 7	0.642
γ 38	1054.32 15	0.159 19	0.0036
γ 39	1187.22 9	1.24 7	0.0304
γ 40	1199.15 24	0.17 3	0.0043
γ 41	1253.69 13	0.40 4	0.0102
γ 42	1264.94 16	0.137 17	0.0037
γ 43	1363.59 9	1.14 6	0.0320
γ 46	1415.68 13	0.37 3	0.0110
γ 47	1435.06 9	76.3 16	2.33
γ 48	1445.04 25	0.97 19	0.0298
γ 49	1495.63 23	0.18 4	0.0050
γ 50	1555.31 10	0.366 23	0.0121
γ 51	1610.09 20	0.137 23	0.0047
γ 52	1717.1 3	0.107 23	0.0039
γ 53	1727.68 18	0.111 13	0.0041
γ 55	1778.25 23	0.137 23	0.0052
γ 60	2023.93 20	0.118 16	0.0051
γ 61	2062.34 17	0.111 12	0.0049
γ 64	2210.7 4	0.21 7	0.0101
γ 65	2210.00 10	15.2 4	0.717

*** continued ***

136CS B- DECAY (32.2 H 1) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
γ 67	2499.4 3	0.17 5	0.0009
γ 69	2583.15 13	0.239 16	0.0131
γ 71	2639.59 13	7.63 23	0.429
γ 72	2731.12 15	0.120 8	0.0070
γ 78	3339.01 25	0.151 10	0.0107
γ 80	3366.98 25	0.227 13	0.0163

39 weak γ's omitted (IIP = 1.62%)

139Ba B- DECAY (82.7 H 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	3.8	3.5 5	0.0003
Auger-K	27.4	6.38 12	0.0002
ce-K- 1	126.925 20	4.0 6	0.0108
ce-L- 1	159.584 20	0.52 7	0.0018
ce-HD- 1	164.489 20	0.136 18	0.0005
β- 1 max	886 5		
avg	297.8 20	0.3490 2	0.0022
β- 2 max	2141 5		
avg	837.5 23	24 3	0.420
β- 3 max	2307 5		
avg	912.5 23	75 3	1.46
total β-			
avg	891.8 23	99 5	1.89

14 weak β's omitted (IIP = 0.07%)

X-ray L	4.55	0.52 14	0
X-ray K _α	33.034 2	1.03 14	0.0007
X-ray K _β	33.84180 2	1.09 25	0.0013
X-ray K _γ	37.4	0.70 14	0.0006
γ 1	165.050 20	18.8 24	0.0664
γ 12	1420.50 20	0.3	0.0091

26 weak γ's omitted (IIP = 0.12%)

139Ce EC DECAY (137.65 H 5) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	3.8	89 6	0.0072
Auger-K	27.4	6.7 24	0.0050
ce-K- 1	126.928 7	17.05 16	0.0461
ce-L- 1	159.587 7	2.30 8	0.0070
ce-HD- 1	164.492 7	0.61 3	0.0021
X-ray L	4.65	13 4	0.0013
X-ray K _α	33.034 10	23.7 8	0.0167
X-ray K _β	33.84180 2	23.7 14	0.0311
X-ray K _γ	37.8	16.0 6	0.0129
γ 1	165.053 7	60.06 13	0.203

101CE B- DECAY (32.50 D 7) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	4	16.1 10	0.0014
Auger-K	29.3	1.6 5	0.0010
Ce-K-1	103.449 10	10.6 9	0.0010
Ce-L-1	138.605 10	2.54 13	0.0075
Ce-HNO-1	143.929 10	0.72 6	0.0022
β-1 max	435.4 15		
avg	130.8 6	70 3	0.195
β-2 max	500.9 15		
avg	181.0 6	30 3	0.116
total β- avg	145.9 7	100 5	0.311
X-ray L	5	2.6 8	0.0003
X-ray K _α	35.55020 2	4.8 3	0.0037
X-ray K _β	36.02630 2	0.9 5	0.0008
X-ray K _γ	40.7	3.33 19	0.0029
γ 1	145.440 10	40.6 20	0.149

102PR B- DECAY (19.13 D 4) I(min)=0.10%

102PR ALSO DECAYS
VIA A 0.0164% EC BRANCH

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β-1 max	596 3		
avg	102.7 11	3.7 5	0.0144
β-2 max	2162 3		
avg	830.2 13	96.3 5	1.71
total β- avg	809.9 14	100.0 7	1.73

1 weak β's omitted (I_β = 0.02%)

γ 2 1575.75 5 3.7 5 0.124

1 weak γ's omitted (I_γ = 0.02%)

103PR B- DECAY (13.56 D 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β-1 max	932.0 20		
avg	310.3 8	100	0.669

104PR B- DECAY (17.20 D 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
β-1 max	911 3		
avg	267.0 12	1.02 5	0.0058
β-2 max	2301 3		
avg	894.8 14	1.10 5	0.0210
β-3 max	2497 3		
avg	1221.8 10	97.00 10	2.55
total β- avg	1200.4 15	99.93 13	2.57
γ 3	646.490 20	1.48 6	0.0220
γ 7	1489.15 5	0.300 16	0.3095
γ 9	2105.70 6	0.77 5	0.0360

7 weak γ's omitted (I_γ = 0.02%)

105PR EC DECAY (17.7 Y 4) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	4.23	01 4	0.0073
Ce-K-1	23.63 10	2.19 13	0.0011
Ce-K-2	28.83 10	6.7 5	0.0061
Auger-K	30.5	6.5 20	0.0042
Ce-L-1	60.07 10	3.15 14	0.0040
Ce-L-2	65.27 10	1.70 16	0.0025
Ce-H-1	65.62 10	0.72 4	0.0010
Ce-B _α -1	64.00 10	0.193 9	0.0003
Ce-H-2	70.82 10	0.37 9	0.0006
Ce-B _β -2	72.00 10	0.111 24	0.0002
X-ray L	5.22	14.4 20	0.0016
X-ray K _α	36.0474 1	21.1 7	0.0166
X-ray K _β	37.3610 3	2.6 12	0.0307
X-ray K _γ	42.3	14.7 5	0.0132
γ 1	67.20 10	0.65 1	0.0009
γ 2	72.44 10	2.18 15	0.0034

107PO B- DECAY (11.06 D 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	4.30	41.1 21	0.0038
Auger-K	31.5	3.7 12	0.0025
Ce-K-3	45.9210 22	40.3 10	0.0073
Ce-K-4	75.30 5	0.31 4	0.0005
Ce-L-3	93.6771 22	7.10 14	0.0126
Ce-HNO-3	99.456 6	2.375 18	0.0005

*** continued ***

147ND B- DECAY (11.06 D 3)

(continued)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
β- 1 max	200.6 10		
avg	57.2 3	2.10 10	0.0026
β- 2 max	363.5 10		
avg	105.6 4	15.0 10	0.0337
β- 3 max	405.2 10		
avg	119.4 4	0.00 10	0.0020
β- 4 max	404.0 10		
avg	106.2 4	0.50 20	0.0016
β- 5 max	303.4 10		
avg	263.5 4	01.0 10	0.055
β- 6 max	894.5 10		
avg	299.0 4	0.2	0.0013
total β- avg	233.6 5	99.7 15	0.096

1 weak β's omitted (XIS = 0.07%)

X-ray L	5.43	7.4 11	0.0009
X-ray K _{α2}	30.1712 5	12.0 5	0.0104
X-ray K _{α1}	30.7207 5	23.2 0	0.0192
X-ray Kβ	43.8	0.9 4	0.0003
γ 3	91.1050 20	27.94 21	0.0542
γ 4	120.40 5	0.40 5	0.0010
γ 10	196.44 4	0.204 17	0.0009
γ 15	275.374 15	0.00 5	0.0047
γ 17	319.411 10	1.96 12	0.0133
γ 21	390.755 20	0.07 6	0.0074
γ 23	440.40 3	0.100 9	0.0012
γ 24	439.495 22	1.20 9	0.0113
γ 27	489.20 3	0.154 9	0.0016
γ 28	531.016 22	13.1 0	0.140
γ 30	594.003 3	0.265 17	0.0034
γ 33	685.90 4	0.01 5	0.0119

21 weak γ's omitted (XII = 0.07%)

149ND B- DECAY (1.73 H 1)

I (min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	4.34	34.2 21	0.0032
Ce-K- 2	13.699 20	1.42 7	0.0004
Ce-L- 1	22.57 3	4.8 5	0.0023
Ce-M- 1	28.35 3	1.10 10	0.0007
Ce-K- 4	29.15 3	3.7 6	0.0023
Ce-K- 5	29.48 10	0.49 16	0.0003
Ce-BOP- 1	29.67 3	0.36 4	0.0002
Ce-K- 6	30.56 4	0.9 4	0.0006
Auger-K	31.5	2.6 9	0.0010
Ce-L- 2	51.055 20	0.224 11	0.0002
Ce-K- 8	51.023 15	2.22 19	0.0024
Ce-L- 4	64.90 3	1.7 4	0.0025
Ce-K- 10	64.137 14	17.1 10	0.0252
Ce-R- 4	72.60 3	0.39 0	0.0004
Ce-BOP- 4	74.00 3	0.105 22	0.0002
Ce-L- 8	89.579 15	0.35 5	0.0007
Ce-K- 15	94.026 14	0.23 3	0.0005
Ce-L- 10	106.993 14	2.6 3	0.0059
Ce-E- 16	110.692 10	0.41 5	0.0010
Ce-R- 10	112.672 15	0.55 6	0.0013
Ce-BOP- 10	113.441 15	0.159 17	0.0004
Ce-K- 19	103.456 9	0.36 5	0.0011
Ce-K- 21	153.700 9	0.20 3	0.0009
Ce-K- 22	162.964 10	0.44 8	0.0015

*** continued ***

149ND B- DECAY (1.73 H 1)

(continued)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Ce-K- 23	166.123 8	4.3 3	0.0154
Ce-L- 19	181.212 9	0.100 13	0.0004
Ce-K- 27	195.034 8	2.10 21	0.0090
Ce-L- 23	203.079 8	0.67 5	0.0029
Ce-BOP- 23	209.450 18	0.183 13	0.0008
Ce-K- 32	222.500 9	0.49 7	0.0023
Ce-K- 33	224.901 8	0.170 10	0.0008
Ce-L- 27	232.790 8	0.39 4	0.0019
β- 1 max	360 7		
avg	107.1 23	0.154 14	0.0004
β- 2 max	446 7		
avg	133.2 24	0.92 5	0.0026
β- 3 max	1025 7		
avg	351 3	19.5 13	0.146
β- 4 max	1142 7		
avg	399 3	24.1 10	0.205
β- 5 max	1210 7		
avg	430 3	0.6 10	0.0055
β- 6 max	1255 7		
avg	445 3	0.91 8	0.0006
β- 7 max	1283 7		
avg	457 3	3.8 5	0.0370
β- 8 max	1292 7		
avg	461 3	0.5 5	0.0049
β- 9 max	1320 7		
avg	473 3	0.53 13	0.0053
β- 10 max	1392 7		
avg	503 3	0.8	0.0006
β- 11 max	1410 7		
avg	511 3	19.1 16	0.200
β- 12 max	1469 7		
avg	536 3	26.5 21	0.303
β- 13 max	1491 7		
avg	546 3	2.9 13	0.0337
β- 14 max	1566 7		
avg	570 3	~1	~0.0135
total β- avg	454 4	101 4	0.981

2 weak β's omitted (XIP = 0.02%)

X-ray L	5.43	6.5 9	0.0000
X-ray K _{α2}	30.1712 5	9.1 6	0.0074
X-ray K _{α1}	30.7207 5	16.6 11	0.0137
X-ray Kβ	43.8	6.4 4	0.0059
γ 2	50.003 20	1.52 7	0.0019
γ 4	70.33 3	1.26 20	0.0020
γ 5	70.66 10	1.0 3	0.0016
γ 6	75.74 4	0.33 11	0.0005
γ 8	97.007 15	1.53 13	0.0032
γ 10	110.321 14	10.0 20	0.0057
γ 11	116.43 3	0.117 23	0.0003
γ 12	122.416 14	0.232 24	0.0006
γ 13	126.630 19	0.115 12	0.0003
γ 15	139.210 14	0.40 5	0.0014
γ 16	155.976 10	6.1 6	0.0201
γ 17	177.031 14	0.164 13	0.0006
γ 19	180.640 9	1.99 20	0.0000
γ 20	192.027 9	0.60 6	0.0020
γ 21	190.920 9	1.46 16	0.0062
γ 22	200.140 10	2.9 4	0.0130
γ 23	211.307 8	27.3 10	0.123
γ 24	213.946 17	0.41 5	0.0019
γ 25	226.946 21	0.16 4	0.0000
γ 27	240.210 8	4.4 4	0.0203
γ 28	245.699 8	1.04 11	0.0054
γ 31	250.064 14	0.30 4	0.0021
γ 32	267.692 9	6.1 6	0.0346
γ 33	270.165 8	10.7 11	0.0617
γ 34	273.25 4	0.23 5	0.0014
γ 35	275.445 13	0.60 12	0.0035

*** continued ***

17320 B- DECAY (1.73 D 1) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
γ 36	276.960 19	0.32 7	0.0019
γ 37	282.455 11	0.62 6	0.0037
γ 38	288.192 12	0.68 7	0.0042
γ 39	294.007 12	0.58 6	0.0037
γ 40	301.133 16	0.38 4	0.0025
γ 41	310.982 14	0.52 5	0.0034
γ 42	326.554 11	4.7 5	0.0325
γ 44	347.833 23	0.19 9	0.0014
γ 45	349.233 10	1.48 16	0.0110
γ 48	368.055 20	0.164 13	0.0013
γ 49	366.637 15	0.66 4	0.0052
γ 51	388.691 10	0.34 4	0.0028
γ 53	423.554 10	9.4 10	0.0052
γ 55	443.550 12	1.50 15	0.0142
γ 63	538.15 7	0.11 4	0.0013
γ 64	548.510 10	7.7 8	0.0086
γ 65	556.43 5	1.2 5	0.0139
γ 70	630.230 21	0.221 24	0.0030
γ 71	635.482 25	0.112 12	0.0015
γ 72	654.831 14	7.3 8	0.002
γ 77	686.933 25	0.104 12	0.0015
γ 78	696.266 25	3.172 18	0.0026
γ 92	808.834 22	0.169 18	0.0029
γ 107	923.076 25	0.115 12	0.0023
γ 116	979.02 4	0.112 12	0.0023
γ 119	1022.70 3	0.120 12	0.0026
γ 139	1234.12 5	0.292 25	0.0077

100 weak γ's omitted (ΣI_γ = 1.59%)

17570 B- DECAY (0.19 D 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	6	3.1 4	0.0004
Auger-K	43.5	0.19 9	0.0002
Co-K- 1	50.489 4	3.7 5	0.0039
Co-K- 2	74.342 6	0.131 19	0.0002
Co-L- 1	102.933 4	0.88 12	0.0015
Co-H- 1	111.312 4	0.20 3	0.0005
Co-K- 6	333.000 20	0.24 4	0.0017
β- 1 max	71.4 13		
avg	10.4 4	10.1 4	0.0004
β- 2 max	216.2 13		
avg	64.1 5	0.88 12	0.0012
β- 3 max	353.9 13		
avg	101.6 5	2.60 20	0.0056
β- 4 max	467.7 13		
avg	139.1 5	46.5 17	0.256
total β-			
avg	125.4 7	150.8 18	0.267
X-ray L	7.66	1.10 18	0.0002
X-ray K _α	52.9650 5	1.10 18	0.0012
X-ray K _β	54.0690 5	1.93 24	0.0022
X-ray K _γ	61.3	0.80 10	0.0010
γ 1	113.003 4	1.91 25	0.0046
γ 2	137.656 6	0.117 16	0.0003
γ 3	144.061 5	0.36 5	0.0011
γ 5	282.517 14	3.1 4	0.0104
γ 6	396.322 20	6.5 8	0.0549

1 weak γ's omitted (ΣI_γ = 0.00%)

17740 B- DECAY (6.71 D 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Auger-L	6.18	2.9 6	0.0012
Co-K- 1	6.2952 21	0.111 9	0
Auger-K	44.4	0.24 12	0.0003
Co-K- 2	47.601 3	5.2 4	0.0053
Co-L- 2	101.601 3	7.0 5	0.0152
Co-H- 2	110.351 3	1.74 13	0.0041
Co-HOP- 2	112.414 3	0.54 4	0.0012
Co-K- 4	143.000 10	0.59 8	0.0010
Co-L- 4	197.000 10	0.100 10	0.0004
β- 1 max	175.8 10		
avg	47.3 3	12.2 7	0.0123
β- 2 max	384.1 10		
avg	111.3 4	9.1 12	0.0216
β- 3 max	497.1 10		
avg	148.9 4	78.6 18	0.245
total β-			
avg	133.0 5	99.9 18	0.283

1 weak β's omitted (ΣI_β = 0.05%)

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
X-ray L	7.9	3.3 4	0.0006
X-ray K _α	54.6114 8	1.64 12	0.0019
X-ray K _β	55.7902 4	2.87 20	0.0034
X-ray K _γ	63.2	1.20 9	0.0016
γ 1	71.6460 29	0.154 10	0.0022
γ 2	112.952 3	6.4 4	0.0154
γ 4	200.359 10	11.0 8	0.0400
γ 5	249.606 27	0.212 14	0.0011
γ 6	321.33 4	0.219 14	0.0015

1 weak γ's omitted (ΣI_γ = 0.05%)

18140 B- DECAY (42.4 D 1) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (g-rad/ μCi-h)
Co-H- 1	1.19 10	2.64	0
Co-HOP- 1	3.33 10	1.36	0
Co-HOP- 2	5.64 3	0.120 10	0
Auger-L	6.35	40.3 23	0.0055
Auger-K	46.2	1.5 7	0.0015
Co-K- 3	65.644 20	21.4 12	0.0299
Co-K- 4	68.834 20	0.5 6	0.0124
Co-K- 5	69.44 4	2.5 4	0.0037
Co-L- 3	121.330 20	25.6 14	0.0647
Co-L- 4	124.544 20	1.71 12	0.0045
Co-L- 5	125.18 4	0.49 10	0.0013
Co-H- 3	130.312 24	6.2 4	0.0173
Co-HOP- 3	132.854 20	1.01 10	0.0051
Co-H- 4	133.542 20	0.40 3	0.0011
Co-H- 5	134.15 4	0.113 25	0.0003
Co-HOP- 4	135.644 24	0.118 4	0.0003
Co-K- 6	270.43 20	0.54 3	0.0032
Co-L- 6	334.17 20	0.169 9	0.0012
Co-K- 9	414.58 20	1.54 10	0.0136
Co-L- 8	470.32 20	0.353 22	0.0035

*** continued ***

101HP B- DECAY (42.4 ± 3) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A (q-rad/ μCi-h)
β ⁻ 1 max	400 4		
avg	117.7 14	7 3	0.0175
β ⁻ 2 max	400 4		
avg	110.9 14	93 3	0.236
total β ⁻			
avg	110.8 14	100 5	0.253
X-ray L	8.15	15.7 10	0.0027
X-ray K _α	56.2770 10	9.5 5	0.0113
X-ray K _β	57.5320 10	16.5 8	0.0202
X-ray K _γ	65.2	7.0 4	0.0097
γ 3	111.020 20	43.0 22	0.122
γ 4	136.250 20	6.1 3	0.0177
γ 5	136.86 4	1.00 9	0.0052
γ 6	345.85 20	14.0 7	0.103
γ 7	476.00 20	0.43 10	0.0044
γ 8	482.00 20	86 5	0.003
γ 9	615.5 5	0.250 13	0.0033

3 weak γ's omitted (I_γ = 0.03%)

101W MC DECAY (121.2 ± 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (q-rad/ μCi-h)
ce-K- 1	3.50 3	25 6	0.0010
ce-BQ- 1	5.64 3	8.2 10	0.0310
Auger-L	6.35	58 6	0.0078
Auger-K	46.2	3.0 14	0.0030
ce-K- 3	85.1 3	0.107 12	0.0002
γ 1	6.21 3	0.97 22	0.0001
X-ray L	8.15	22 3	0.0039
X-ray K _α	56.2770 10	19.0 20	0.0220
X-ray K _β	57.5320 10	33 4	0.0047
X-ray K _γ	65.2	14.0 15	0.0194

2 weak γ's omitted (I_γ = 0.10%)

105B B- DECAY (75.1 ± 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (q-rad/ μCi-h)
β ⁻ 1 max	432.5 10		
avg	126.8 4	100	0.270

1 weak β's omitted (I_β = 0.00%)1 weak γ's omitted (I_γ = 0.02%)

105CS B- DECAY (15.4 ± 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (q-rad/ μCi-h)
Auger-L	7	101 9	0.0152
ce-L- 1	20.431 10	71 8	0.0428
ce-L- 2	33.63 3	0.29 4	0.0002
ce-BQ- 1	38.676 10	29 3	0.0237
ce-BQ- 2	41.88 3	0.100 12	0
Auger-K	49.6	3.0 15	0.0032
ce-K- 4	53.289 7	70 9	0.0090
ce-L- 4	115.981 7	16.6 20	0.0049
ce-BQ- 4	126.226 7	5.1 6	0.0137
β ⁻ 1 max	342 3		
avg	37.6 7	100	0.0001
X-ray L	9.10	50 6	0.0096
X-ray K _α	63.2067 7	22 3	0.0294
X-ray K _β	64.8456 7	38 5	0.0519
X-ray K _γ	73.6	16.2 20	0.0254
γ 4	129.000 7	35 4	0.0965

3 weak γ's omitted (I_γ = 0.03%)

106IB B- DECAY (19.15 ± 3) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (q-rad/ μCi-h)
Auger-L	7.24	0.64 8	0.0001
ce-K- 1	215.23 4	0.10 4	0.0009
ce-K- 3	250.15 4	0.64 10	0.0034
ce-L- 3	310.66 4	0.17 4	0.0018
β ⁻ 1 max	440 9		
avg	130 3	0.37 4	0.0010
β ⁻ 2 max	620 4		
avg	190 3	0.150 20	0.0006
β ⁻ 3 max	730 9		
avg	229 3	0.54 6	0.0026
β ⁻ 4 max	760 9		
avg	241 3	0.60 6	0.0031
β ⁻ 5 max	970 9		
avg	320 3	1.64 17	0.0112
β ⁻ 6 max	1320 9		
avg	456 3	0.26 4	0.0025
β ⁻ 7 max	1620 9		
avg	579 4	1.6 3	0.0197
β ⁻ 8 max	1910 9		
avg	703 4	9.0 9	0.135
β ⁻ 9 max	2240 9		
avg	843 4	85.5 28	1.53
total β ⁻			
avg	808 4	99.9 23	1.71

11 weak β's omitted (I_β = 0.27%)

see continued see

1941R B- DECAY (19.15 ± 3) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
X-ray L	0.48	0.36 6	0.0003
X-ray $K\alpha_2$	65.1220 20	0.23 3	0.0003
X-ray $K\alpha_1$	66.8320 20	0.39 5	0.0006
X-ray $K\beta$	75.7	0.171 22	0.0003
γ 1	293.62 4	2.0 5	0.0176
γ 2	300.7 5	0.30 6	0.0022
γ 3	228.54 4	13.0 20	0.0910
γ 13	509.20 20	3.10 4	0.0010
γ 15	622.3 4	0.30 5	0.0004
γ 16	605.32 6	1.3 4	0.0170
γ 23	930.87 10	0.57 11	0.0114
γ 27	1151.10 20	0.60 11	0.0047
γ 29	1103.00 20	0.29 5	0.0072
γ 30	1069.2 3	0.10 4	0.0057

41 week γ's omitted (I_γ = 1.12%)

197PT B- DECAY (20.00 ± 12) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	7.42	30 4	0.0061
Auger-K	52.4	0.10 9	0.0002
Ce-L- 1	62.997 10	55 4	0.0739
Ce-B- 1	73.925 10	13.4 9	0.0210
Ce-PBP- 1	76.591 10	4.2 3	0.0060
Ce-K- 2	110.79 20	5.0 3	0.0110
Ce-L- 2	177.15 20	0.05 6	0.0032
Ce-BBO- 2	100.00 20	0.260 15	0.0010
β ⁻ 1 max	450.2 11		
avg	132.1 4	11.6 10	0.0326
β ⁻ 2 max	601.6 10		
avg	197.7 4	70 4	0.329
β ⁻ 3 max	719.0 10		
avg	225.3 4	10.4 19	0.0699
total β ⁻			
avg	193.0 4	100 5	0.412
X-ray L	9.7	22 3	0.0005
X-ray $K\alpha_2$	66.9095 8	1.39 9	0.0020
X-ray $K\alpha_1$	68.0037 8	2.30 15	0.0035
γ 1	77.350 10	17.2 10	0.0203
X-ray $K\beta$	70	1.00 7	0.0017
γ 2	191.50 20	5.2 3	0.0212

198AU B- DECAY (2.496 ± 2) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	7.6	2.10 16	0.0003
Ce-K- 1	320.693 4	2.57 6	0.0201
Ce-L- 1	396.956 4	1.00 3	0.0007
Ce-L- 1	400.233 9	0.257 20	0.0023
Ce-PBP- 1	410.955 4	9.101 7	0.0009

β ⁻ 1 max	205.3 6		
avg	79.60 20	1.3 3	0.0022
β ⁻ 2 max	961.2 6		
avg	310.80 20	90.7 3	0.662
total β ⁻			
avg	311.70 21	100.0 5	0.664

1 week β's omitted (I_β = 0.03%)

X-ray L	10	1.29 15	0.0003
X-ray $K\alpha_2$	60.0950 20	0.01 3	0.0012
X-ray $K\alpha_1$	70.0190 20	1.30 5	0.0021
X-ray $K\beta$	80.3	0.607 21	0.0010
γ 1	811.795 4	15.07 9	0.037
γ 2	675.070 14	1.06 23	0.0153
γ 3	1007.69 3	0.22 6	0.0053

199AU B- DECAY (3.139 ± 7) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	7.6	23.4 10	0.0030
Ce-L- 1	30.909 5	2.0 3	0.0021
Ce-BBO- 1	46.266 5	0.07 9	0.0009
Auger-K	53.8	0.6 4	0.0007
Ce-K- 2	75.260 10	11.0 7	0.0190
Ce-L- 3	125.0977 8	6.9 8	0.0103
Ce-L- 2	143.531 10	10.4 10	0.0564
Ce-BBO- 2	150.000 10	6.4 4	0.0211
Ce-L- 3	193.1607 10	1.29 15	0.0053
Ce-BBO- 3	200.6304 11	0.01 5	0.0010

β ⁻ 1 max	250.0 10		
avg	67.00 20	23.0 20	0.0330
β ⁻ 2 max	292.0 10		
avg	82.50 20	70 4	0.123
β ⁻ 3 max	453.0 10		
avg	133.0 10	7.0 10	0.0190
total β ⁻			
avg	82.54 20	100 5	0.176

X-ray L	9	10.3 17	0.0030
γ 1	49.020 4	0.32 3	0.0003
X-ray $K\alpha_2$	60.0950 20	5.2 3	0.0077
X-ray $K\alpha_1$	70.0190 20	0.9 6	0.0130
X-ray $K\beta$	80.3	3.92 20	0.0067
γ 2	150.370 10	40.0 20	0.135
γ 3	200.2	9.1 10	0.0400

201TL EC DECAY (73.5 E 9) T(min)=0.108

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	7.6	80 7	0.0129
ce-L- 2	15.76 3	19.4 12	0.3035
ce-L- 3	17.35 3	13.3 12	0.0330
ce-HD- 2	27.94 3	3.3 8	0.0019
ce-HD- 3	29.63 3	3.2 8	0.0020
ce-E- 4	52.27 8	19.3 11	0.0115
Auger-E	53.8	3.5 21	0.0000
ce-E- 5	82.78 7	0.30 5	0.0005
ce-E- 6	94.33 7	10.4 15	0.0331
ce-L- 4	126.50 8	1.75 19	0.0005
ce-HD- 4	131.78 8	0.55 6	0.0015
ce-L- 6	152.59 7	3.12 25	0.0101
ce-HD- 6	163.87 7	0.05 10	0.0033
X-ray L	10	49 6	0.0100
γ 2	30.60 3	0.28 3	0.0002
γ 3	32.70 3	0.32 4	0.0002
X-ray K _α	60.9950 20	20.9 14	0.3025
X-ray K _β	70.8190 20	49 3	0.0703
X-ray K _γ	80.3	21.7 13	0.0370
γ 4	135.30 8	3.7 4	0.0105
γ 5	165.00 7	0.79 3	0.0007
γ 6	167.43 7	11.9 9	0.0020

203Bi B- DECAY (46.50 E 5) T(min)=0.108

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	7.70	0.9 7	0.0015
Auger-E	55.2	0.04 20	0.0005
ce-E- 1	193.650 6	13.3 8	0.0548
ce-L- 1	263.001 6	0.01 12	0.0225
ce-HD- 1	275.000 6	1.26 5	0.0070
β- 1 max	212.0 10		
avg	57.6 8	100	0.123
X-ray L	10.3	5.9 7	0.0013
X-ray K _α	70.8319 9	3.73 12	0.0054
X-ray K _β	72.0715 9	6.32 19	0.0090
X-ray K _γ	82.6	2.79 10	0.0049
γ 1	279.100 6	81.5 8	0.085

203Pb EC DECAY (55.02 E 5) T(min)=0.108

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	7.78	57 4	0.5060
Auger-E	55.2	3.3 14	0.0035
ce-E- 1	193.650 6	13.1 8	0.0539
ce-L- 1	263.001 6	3.95 12	0.0212
ce-HD- 1	275.000 6	1.20 5	0.0072
ce-E- 2	315.785 13	0.51 4	0.0030
X-ray L	10.3	30 4	0.0003
X-ray K _α	70.8319 9	25.4 7	0.0306
X-ray K _β	72.0715 9	41.3 13	0.0473
X-ray K _γ	82.6	14.2 5	0.0337
γ 1	279.100 6	60.2 8	0.477
γ 2	401.115 13	3.53 17	0.0302
γ 3	607.095 17	0.67 6	0.0090

207Bi EC DECAY (10 7 7) T(min)=0.108

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
Auger-L	0	51 8	0.0007
Auger-E	54.7	2.6 11	0.0031
ce-E- 1	407.665 20	1.56 3	0.0160
ce-L- 1	553.009 20	0.030 4	0.0051
ce-E- 3	975.615 20	7.2 8	0.150
ce-L- 3	1281.759 20	1.70 8	0.0390
ce-HD- 3	1050.760 20	0.505 20	0.0130

Lowest β's omitted (IIP = 0.016)

Radiation Type	Energy (keV)	Intensity (%)	A(g-rad/ μCi-h)
X-ray L	10.6	15 8	0.0040
X-ray K _α	72.9002 9	22.8 5	0.0350
X-ray K _β	74.9600 9	39.5 7	0.0616
X-ray K _γ	90.4	17.1 8	0.0310
γ 1	569.670 20	97.8 5	1.19
γ 2	807.3 3	0.154 20	0.0030
γ 3	1063.620 20	78 1	1.09
γ 4	1402.19	0.147 20	0.0045
γ 5	1770.22 8	7.3 8	0.277

Maximum γγ-intensity = 0.02%

239WP B- DECAY (2.355 D 4) I(min)=0.10%

Radiation Type	Energy (keV)	Intensity (%)	A (q-rad/ μCi-h)
ce-N- 1	1.9171 15	7.0 6	0.0003
ce-NOP- 1	6.2914 8	2.33 18	0.0003
Auger-L	10.3	42 7	0.0091
ce-L- 2	21.553 20	7.0 18	0.0032
ce-L- 3	26.313 20	9.6 15	0.0054
ce-L- 4	34.163 20	25 7	0.0179
ce-L- 5	38.383 5	0.33 5	0.0003
ce-N- 2	38.717 20	1.6 4	0.0013
ce-NOP- 2	43.091 20	0.43 11	0.0004
ce-N- 3	43.477 20	2.9 5	0.0027
ce-L- 6	44.78 3	11 3	0.0102
ce-NOP- 3	47.851 20	1.22 19	0.0012
ce-N- 4	51.327 20	7.7 20	0.0084
ce-NMO- 5	55.547 5	0.105 16	0.0001
ce-NOP- 4	55.701 20	2.3 6	0.0027
ce-K- 11	59.89 8	0.33 7	0.0004
ce-N- 6	61.95 3	2.8 7	0.0037
ce-NOP- 6	66.32 3	1.0 3	0.0014
Auger-K	76	0.9 10	0.0015
ce-L- 8	83.033 11	4.3 8	0.0076
ce-L- 9	83.37 4	0.42 8	0.0007
ce-K- 12	87.93 5	7.8 9	0.0146
ce-N- 8	100.197 10	1.14 20	0.0024
ce-NMO- 9	100.54 4	0.139 25	0.0003
ce-NOP- 8	104.571 10	0.39 8	0.0009
ce-K- 13	104.60 10	0.43 9	0.0009
ce-K- 14	106.37 5	20.9 20	0.0473
ce-K- 15	132.59 10	0.18 5	0.0005
ce-K- 16	151.02 9	0.116 22	0.0004
ce-K- 17	155.78 6	17.2 6	0.0571
ce-L- 12	186.653 11	1.62 18	0.0064
ce-L- 14	205.093 11	4.4 5	0.0152
ce-NMO-14	222.257 10	1.50 9	0.0071
ce-L- 17	254.50 3	3.52 12	0.0191
ce-NMO-17	271.67 3	1.13 4	0.0065

*** continued ***

239WP B- DECAY (2.355 D 4) (continued)

Radiation Type	Energy (keV)	Intensity (%)	A (q-rad/ μCi-h)
β- 1 max	211 3		
avg	57.0 10	1.60 20	0.0019
β- 2 max	331 3		
avg	93.0 10	33.0 20	0.0654
β- 3 max	393 3		
avg	112.0 10	8.0 15	0.0191
β- 4 max	438 3		
avg	126.0 10	51 3	0.137
β- 6 max	666 3		
avg	201.0 10	2.0 10	0.0086
β- 7 max	715 3		
avg	219.0 10	4.0 20	0.0187
total β-			
avg	118.1 11	100 5	0.250
X-ray L	14.3	67 8	0.0190
γ 3	49.410 20	0.152 23	0.0002
γ 5	61.410 4	0.96 15	0.0013
X-ray K _{α2}	99.55 5	13.7 8	0.0291
X-ray K _{α1}	103.76 5	22.1 12	0.0467
γ 8	106.130 10	22.7 13	0.0513
X-ray Kβ	117	10.4 6	0.0259
γ 11	181.71 6	0.111 15	0.0004
γ 12	209.750 10	3.24 25	0.0145
γ 13	226.42 8	0.63 10	0.0031
γ 14	228.190 10	10.7 7	0.0521
γ 15	254.41 8	0.100 18	0.0005
γ 17	277.60 3	14.1 4	0.0834
γ 18	285.41 3	0.79 8	0.0047
γ 19	315.88 4	1.59 11	0.0107
γ 20	334.19 5	2.03 18	0.0145

8 weak γ's omitted (I_γ = 0.42%)

REFERENCE LIST

- 55Ev23 R.D.Evans - The Atomic Nucleus, McGraw-Hill Book Co., Inc., New York (1955)
- 65Be37 I.Bergstrom, C.Wordling, A.H.Snell, R.Wilson, B.G.Pettersson - Alpha-, Beta- and Gamma-Ray Spectroscopy, Vol.2, K.Siegbahn, Ed., North-Holland Publishing Co., Amsterdam, p.1523 (1965)
- Some 'Internal' Effects in Nuclear Decay
- 66Sc35 H.F.Schopper - Weak Interactions and Nucl.Beta Decay, North-Holland Publ.Co., Amsterdam (1966)
- 67BeBu J.A.Bearden, A.P.Burr - Rev.Mod.Phys. 39, 125(1967)
- Reevaluation of X-Ray Atomic Energy Levels
- 68Lo14 R.Loewinger, H.Berman - J.Nucl.Med., Suppl.No. 1, 7 (1968)
- A Schema for Absorbed-Dose Calculations for Biologically-Distributed Radionuclides
- 70Ha81 H.J.Martin, P.H.Blichert-Toft - Nucl.Data Tables A8, Nos.1-2 (1970)
- Radioactive Atoms. Auger Electron, α-, β-, γ-, and X-Ray Data
- 72BaCr W.Jasnynek, B.Crasemann, R.W.Fink, H.-O.Preund, H.Hark, C.D.Swift, R.E.Price, P.Venugopala Rao - Rev.Mod.Phys. 44, 716 (1972)
- X-Ray Fluorescence Yields, Auger, and Coster-Kronig Transition Probabilities
- 72Ba47 P.V.Rao, H.S.Chen, B.Crasemann - Phys.Rev. A5, 997 (1972)
- Atomic Vacancy Distributions Produced by Inner-Shell Ionization
- 73HaVR H.J.Martin - ORNL-4923 (1973)
- Radioactive Atoms - Supplement I