

NOV 6 1961

UCRL-9828

MASTER

UNIVERSITY OF CALIFORNIA
Lawrence Radiation Laboratory
Berkeley, California
Contract No. W-7405-eng-48

This paper was submitted for publication in the open literature at least 6 months prior to the issuance date of this Microcard. Since the U.S.A.E.C. has no evidence that it has been published, the paper is being distributed in Microcard form as a preprint.

SHEET METAL CAN FURNACE

Richard C. Doyle and Will D. Phillips

August 17, 1961

LEGAL NOTICE

This report was prepared as an account of Government sponsored work. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission:
A. Makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or
B. Accepts any liability with respect to the use of, or for damages resulting from the use of any information, apparatus, method, or process disclosed in this report.
It is the policy of the Commission to make available as promptly as possible the results of work performed by its employees or contractors, or employees of such contractors, in the execution of work sponsored by the Commission, or employees of such contractor agencies, manufacturers, or persons acting in, for information pertinent to the employment or contract with the Commission, or the performance of such contract.

Facsimile Price \$ 1.60
Microfilm Price \$.80

Available from the
Office of Technical Services
Department of Commerce
Washington 25, D. C.

366 001

SHEET METAL CAN FURNACE*
Richard C. Boyle and Will D. Phillips

Lawrence Radiation Laboratory
University of California
Berkeley, California

August 17, 1961

A need for a small vertical cylinder-type furnace arises frequently in the Chemistry Department at the Lawrence Radiation Laboratory (LRL). Adequate heat is the major requirement; close control or calibration is not usually necessary. A heating unit of this type can either be used for quickly concentrating solutions in centrifuge cones or, by the addition of a refractory pedestal--can be made into a crucible furnace for size 0 and 00 crucibles.

Because much of the chemistry done at LRL is with radioisotopes, disposal of contaminated equipment is an important consideration. In general, furnaces are difficult to decontaminate, hence there was a need for a disposable type. Because nothing meeting the requirements seemed to be commercially available, the Health Chemistry Department made up a simple furnace that has proved useful.

The furnace requirements that we judged to be important are listed below. The furnace should:

- (1) be small enough to pass through a gloved-box door opening (5-1/2 x 8 in.),
- (2) open at the top,
- (3) have a simple means of external heat control,
- (4) be adaptable to use for both 50-ml centrifuge cones and 0 or 00 crucibles,
- (5) be inexpensive, and
- (6) not be subject to corrosion from acid vapors.

After studying the furnace requirements, we decided that an electric resistance type furnace could be made compact, simple to construct, and safe and easy to operate.

Semicircular ceramic heating elements wound with nichrome resistance wire were available in several sizes. A pair of these heating elements of a size suited to heating 50-ml cones could, by use of a ceramic pedestal, heat 0 or 00 size porcelain crucibles. Vertical alignment of the heating elements provided the required top opening.

A variable transformer could be used to provide temperature control from outside the radioisotope enclosure.

A metal shell to contain the furnace parts and insulation could be protected from corrosion with a coating of epoxy and phenolic resins. This mixture is relatively stable in the temperature range reached outside the furnace insulation.

Such a furnace could be considered as inexpensive from the point of view of parts and assembly cost.

Several experimental furnace models were made before all the requirements were satisfactorily met. The resultant model now in use by a number of researchers is shown in the accompanying photographs and drawing. Figures 1 and 2 show the components necessary to assemble the furnace. Figure 3 shows the assembled furnace. This furnace is generally used for heating 40-ml cones, but it may also be used to heat other small objects, with the addition of appropriate spacers and/or adapters. An example of another use is shown in Figs. 4 and 5. Figure 4 shows the furnace with a spacing pedestal installed, for supporting a small crucible in an accessible position. Figure 5 shows the crucible resting on the pedestal. The pedestal was designed to allow air circulation through the furnace core, to prevent overheating (see Figure 6).

Some of the parts shown are commercially available from laboratory supply houses and manufacturers; the other parts are relatively simple to fabricate.

The following is a list of those parts which are commercially available, and the names of the manufacturers and/or suppliers.

| <u>Item</u> | <u>Manufacturer and part number .</u> | <u>Laboratory supplier and part number</u> |
|---|--|--|
| Heating unit | Hevi-Duty Electric Co., Milwaukee, Wisconsin Type 73-S 210 Watts 1800° F \$4.60 per unit (approx) | Braun-Knecht-Helmann Co. 30787 |
| Thru-Panel Insulator- Dushing (Steatite) | E. F. Johnson Co. Waseca, Minnesota #135-42 | L. R. L. #286 (Insulator Service) |
| Porcelain beads | American Lava Co. Chatanooga, Tennessee P-2496 | |

FOOTNOTE

*Work done under auspices of the U. S. Atomic Energy Commission.

Figure Legends

Fig. 1. Furnace components.

Fig. 2. Assembly drawing of furnace.

Fig. 3. Assembled furnace.

Fig. 4. Furnace with crucible pedestal installed.

Fig. 5. Furnace with crucible and cover in place.

Fig. 6. Crucible pedestal.



Fig. 1.

HP-801

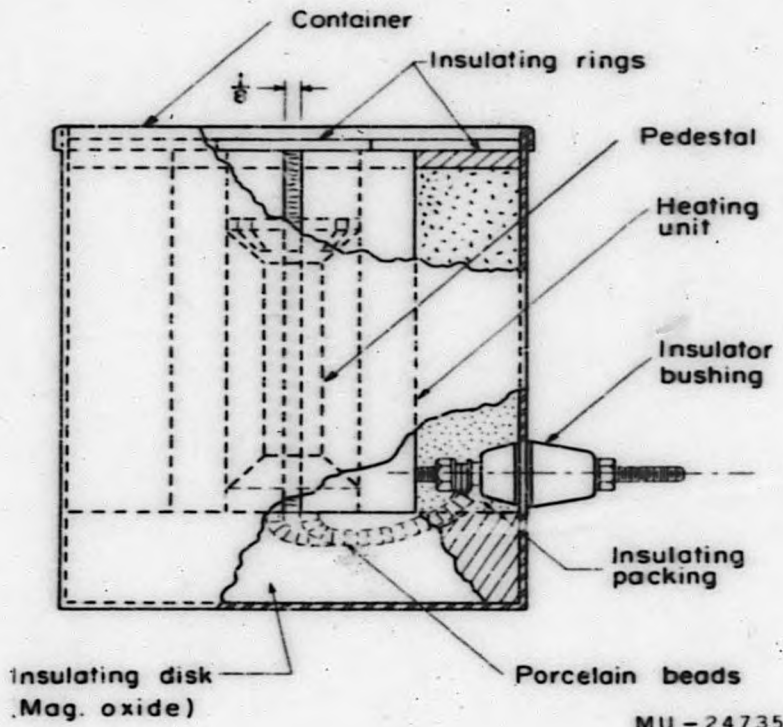


Fig. 2.

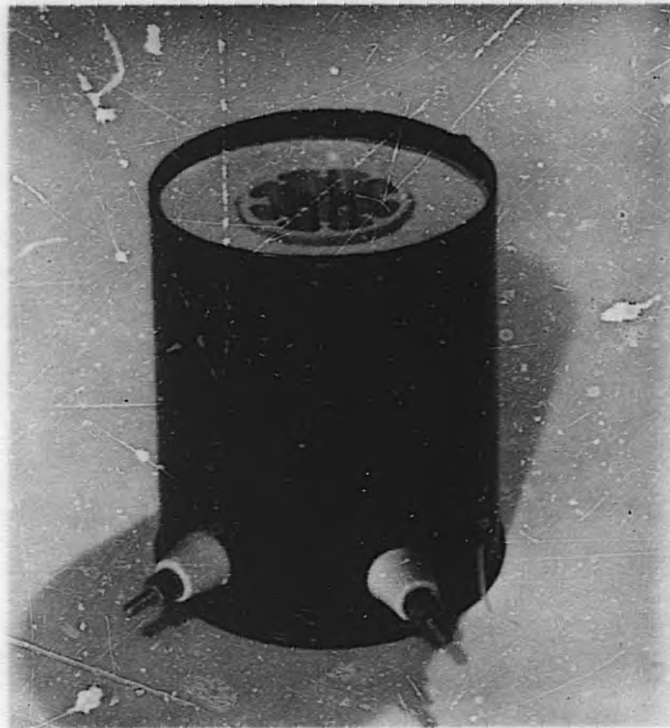


Fig. 3.

HP-775



Fig. 4.

HP-764



Fig. 5.

HP-763

306 011



Fig. 6.

HP-817

END

306 012