

Fig. 1 assuming the neutron temperature to be the same as the thermal-column temperature. The experimental curve is normalized to the calculated value at 577°C.

Also appearing in Fig. 1 is a curve which is to be compared to the activity ratios obtained with the lutetium foils. This curve appears as a broken line and shows the changes in the ratio of the fission product activities of  $\text{Pu}^{239}$  to those of  $\text{U}^{235}$  as a function of neutron temperature. These ratios were obtained (1) from plutonium and uranium foils which were irradiated in the same manner as the lutetium foils. For the comparison the values obtained with the fission foils have been normalized at 20°C to the curve for the lutetium foils. From a comparison of the slopes of the curves in Fig. 1, it is evident that the lutetium "thermometer" is  $\sim 7$  times more sensitive at room temperature than the  $\text{Pu}^{239}$ - $\text{U}^{235}$  "thermometer" and remains more sensitive up to  $\sim 400^\circ\text{C}$ .

#### REFERENCES

1. W. P. STINSON, L. C. SCHMID, AND R. E. HEINEMAN, *Nuclear Sci. and Eng.*, 435 (1960).
2. BETTS, DAHLINGER, AND MUNRO, *Can. J. Phys.* **36**, I, 73 (1958).
3. C. H. WESTCOTT, CRRP-787.

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### Void Coefficient Measurement

A quantity which has proven somewhat difficult to measure for tank type reactors with plate spacing of the order of  $\frac{1}{8}$  in. is the void coefficient for voids in the moderator between the plates. It is difficult to simulate the voids properly. Methods have been used which depended on a knowledge of the compositions of plastics such as polyethylene and involved calculation of the reduction in hydrogen density when the material was inserted between fuel plates (1). Use has also been made of Styrofoam. In the first case a large amount of foreign material must be inserted in the core per unit of equivalent void; in the second case the variations in effective void fraction with pressure, time under water, and surface-to-volume ratio of the Styrofoam are unknown and enters the calculations directly if the effective void is calculated from physical dimensions.

If, however, the void equivalent of Styrofoam is measured by measuring the buoyant force on a submerged fuel element loaded with it, considerably greater precision can be obtained. It can be shown that

$$\Delta V = \frac{\Delta W}{\rho_{\text{H}_2\text{O}}} \left( \frac{1 - k_{\text{H}}\delta}{1 - k\delta} \right)$$

where  $\Delta V$  is the equivalent void introduced,  $\Delta W$  is the buoyant force,  $k_{\text{H}}$  is the relative hydrogen atom density of polystyrene with respect to water,  $k$  is its relative weight density, and  $\delta$  is the volume fraction of Styrofoam which is solid material. It will be found that this expression has only a slow and indirect dependence on  $\delta$  for Styrofoam of

the usual characteristics. One can construct a simple balance and measure  $\Delta W$  *in situ*, using a long wire to suspend the fuel element under water near the grid plate of the reactor. As a counterweight one can use a second fuel element. A simple measurement of the weight required to rebalance the two when Styrofoam is added to one of them gives the void equivalent directly to an approximation sufficiently good for most purposes.

#### REFERENCES

1. J. DESHONG, ANL-5697 (1957).

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### Dejacketing Pellets Using RF Heat

Pellets of  $\text{Be}_3\text{N}_2$  are irradiated in aluminum cans to produce  $\text{C}^{14}$ . Removing these pellets from the cans is difficult because they swell against the wall, the characteristics of aluminum are changed by radiation, and radiation from cobalt impurity in the target material is high, 5 to 10 r/hr per can at 1-ft gamma activity.

The pellets cannot be dejacketed by chemical methods because of the danger of introducing normal carbon. Therefore several mechanical methods were tried. One involved sawing the cans lengthwise and then sawing the ends off.

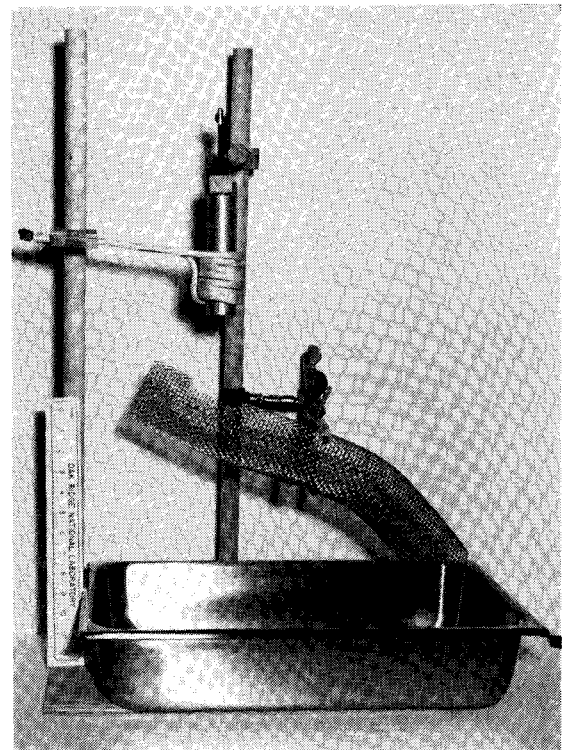


FIG 1. In cell set-up.