MAY 3 1966

CHEMISTRY RESEARCH AND DEVELOPMENT
BASIC CHEMISTRY REPORT**MASTER**

Report No: 65-3

Title: The Corrosion of Unalloyed and Alloyed Plutonium in Monobromobenzene and Freon-113 fluorocarbon.

Work Performed by: M. R. Dringman

Requestor: D. N. Taylor

Man Hours: 20

Date Work Completed: May 10, 1965

Date This Report: May 14, 1965

Report Written by: M. R. Dringman

Distribution:

D. A. Brown
Attn: J. D. Livingston
J. T. Byrne
J. E. Dorr
R. D. Forest
B. A. Fortner
D. N. Taylor
M. A. Thompson
File

RELEASED FOR ANNOUNCEMENT
IN NUCLEAR SCIENCE ABSTRACTS

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of 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. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

INTRODUCTION

Freon-113 trichlorotrifluoroethane is being considered as a replacement liquid for monobromobenzene as the liquid for density measurements. The corrosive properties of these two liquids on unalloyed and 1% Ga-alloyed plutonium were investigated.

EXPERIMENTAL

Coupons, one and one-half inches in diameter, of unalloyed and alloyed plutonium were cleaned, weighed, and placed in monobromobenzene, Freon-113, and air at 25°C and approximately 35% relative humidity. At the end of 26, 72, and 140 hours the coupons were removed from the liquid. They were wire brushed, rinsed in trichloroethane, wiped dry, and reweighed. The loss in weight represents the amount of corrosion.

RESULTS

Although the metal is in the liquid for a maximum of one hour during a density determination, this test was carried on for a longer period of time. For unalloyed plutonium (Figure 1) over a 26 hour period, monobromobenzene is 2.5 times more corrosive than Freon-113. For alloyed plutonium (Figure 2) over a 26 hour period, monobromobenzene is 2 times more corrosive than Freon-113.

Corrosion rates estimated for the first hour of exposure to the fluids are as follows:

	UNALLOYED Pu	ALLOYED Pu
air	0.11 $\mu\text{g}/\text{cm}^2/\text{min.}$	0.15 $\mu\text{g}/\text{cm}^2/\text{min.}$
Freon-113	0.09 $\mu\text{g}/\text{cm}^2/\text{min.}$	0.49 $\mu\text{g}/\text{cm}^2/\text{min.}$
monobromobenzene	0.24 $\mu\text{g}/\text{cm}^2/\text{min.}$	0.67 $\mu\text{g}/\text{cm}^2/\text{min.}$

The results should be considered only as comparative for each type of metal rather than absolute, since it is well established that unalloyed plutonium will corrode faster in air than will alloyed plutonium. The sample cleaning technique prior to each measurement could account for this difference.

FIGURE 1

THE CORROSION OF UNHANNITIZED PLUTONIUM
IN AIR, MONOBROMOBENZENE, AND FREON 113

FIGURE 2

THE CORROSION OF ALLOYED PLUTONIUM
IN AIR, MONOBROMOBENZENE, AND FREON 113