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Under Irradiation
TO: HRT Steering Committee
FROM: G. H. Jenks

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For The Atomic Energy Commission

H. P. Canale
Chief, Declassification Branch

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Corrosion of Platinum by UO_2-SO_4 Solutions Under Irradiation

A few tests of the effect of reactor radiation on the corrosion of platinum by uranyl sulfate solutions have been carried out. The results of these tests indicate that corrosion of the metal is accelerated to a small extent during irradiation. A resume of the results obtained to date is given here in order that this information may be available when consideration is given to the use of platinum in homogeneous reactors.

One in-pile loop and two in-pile autoclave experiments which were equipped with platinum specimens have been completed. The experimental conditions and results are summarized in the accompanying tables.

With one exception, each specimen which was exposed to reactor radiations exhibited an appreciable, though small, weight loss. The uncertainty in these weight determinations is believed to be ± 0.2 mg. The specimen which is marked with an asterisk and for which a large weight loss was found is believed to have been damaged in the removal from the rod assembly in which it was mounted during exposure. No weight loss was observed for either of the two specimens which were located in in-line positions of the loop. These specimens were not exposed to reactor radiations.

Values for the corrosion rate which are calculated from the weight data are tabulated in the final column. Radiation time was a basis for these calculations. The rate values are in the range 0.03 to 0.7 mpy. No conclusions as to the dependence of corrosion rate upon power density or temperature can be drawn from these data.

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Platinum Corrosion Data from In-Pile Autoclaves

Experiment Number	Autoclave Material	Solution (m)	Temperature (°C)	Fission Power Density (w/ml)	Change in Weight of Specimen (mg)	Corrosion Rate (mpy)
Z-15 ¹	Zircaloy-2	0.17 UO ₂ SO ₄ 0.04 CuSO ₄ 0.04 H ₂ SO ₄	280	12	-0.6	0.4
ORNL-15-3 ²	Titanium	0.04 UO ₂ SO ₄ 0.05 CuSO ₄ 0.02 H ₂ SO ₄	280	30	-0.3	0.7

- 1) G. H. Jenks et al., HRP Quarterly Progress Report for period ending January 31, 1956, ORNL-2057, p. 96.
- 2) G. H. Jenks et al., HRP Quarterly Progress Report for period ending April 30, 1956, ORNL-2096, p. 95.

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Platinum Corrosion Data from In-Pile Loop L-4-11¹

Initial Solution 0.17 m UO_2SO_4

0.03 m CuSO_4

0.04 m H_2SO_4

Specimen Location	Temperature (°C)	Fission Power Density (w/ml)	Change in Weight of Specimen (mg)	Corrosion Rate (mpy)
Core Holder	250	7	-0.2	0.03
Core Rod Assembly				
1	250	5	-2.2	0.14
2	250	2.6	-5.1	0.34
3*	250	3.6	-24.4	1.6*
In-Line Holder	250	0	+0.1	--
In-Line Rod Assembly	250	0	+0.2	--

* Probably damaged in handling.

- 1) E. G. Bohlmann et al., Radiation Corrosion Studies - In-Pile Loop L-4-11, ORNL-2152 (in press).

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