

BROOKHAVEN NATIONAL LABORATORY

LMFR PROGRESS LETTER FOR FEBRUARY 1954  
F. T. Miles  
10 March 1954

BNL-1782

MA 419-4

REPLICATION CANCELLED  
The Atomic Energy Commission  
W. H. Conell  
Washington, D. C.

Photostat Price \$ 1.80  
Microfilm Price \$ 1.80  
Available from the  
Office of Technical Services  
Department of Commerce  
Washington 25, D. C.

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In a third run with the fluorine torch, the settling chamber walls were kept hotter than before ( $\geq 625^{\circ}\text{C}$ ); the flame was cooled by diluting the fluorine with helium. In the analysis of the products, 99% of the thorium fluoride fed in was accounted for, but only 64% of the protactinium activity. Part of this was carried in the exhaust gases past the cold trap and into the soda lime disposal column, where it was detected by survey meters. The stripping of protactinium from the solid was somewhat more efficient than before; 77% of the feed which was recovered from the settling chamber had lost 72% of its original specific activity. About 15% of the input activity was trapped on the cold fingers with very little thorium fluoride.

The cell for measuring the e.m.f. of liquid metal electrodes is in operation, and one voltage of the right order of magnitude has been obtained in the system Mg/salt/Mg in Bi. Stability and reproducibility have yet to be tested.

The addition of uranium or magnesium has no effect on the solution of iron in Bi.

The mobility of a 10% Th in Bi dispersion was demonstrated in a visual test. The alloy which had been prepared by the exfoliation technique was transferred to a graphite capsule. The capsule, which had a lateral window, was sealed under vacuum in a pyrex test tube. The molten dispersion moved very readily after suspending the solid by mixing. However, the solid phase settled out quite rapidly if the alloy was not agitated. The liquid phase could be decanted leaving a pasty mass at the bottom of the capsule.

The particle growth studies of  $\text{Th}_3\text{Bi}_5$  in Bi and Pb-Bi eutectic are summarized in Table I. These results indicate that little difficulty should be expected in the blanket from this source.

TABLE I

Growth of  $\text{Th}_3\text{Bi}_5$  Particles in Bi PbBi Eutectic

Composition	Treatment	Duration of Test (Hrs.)	Particle Size	
			Initial	Final*
5% Th in Bi	6 cycles/min. $350^{\circ}\text{--}600^{\circ}\text{C}$	100	15	30
" "	Isothermal $500^{\circ}\text{C}$	500	"	25
" "	" "	1000	"	30
" "	" "	2000	"	80
" "	" $700^{\circ}\text{C}$	500	"	50
" "	" "	1000	"	100
" "	" "	2000	"	300
5% Th as $\text{Th}_3\text{Bi}_5$ in PbBi eutectic	6 cycles/min. $350^{\circ}\text{--}600^{\circ}\text{C}$	100	"	115
" "	Isothermal $500^{\circ}\text{C}$	500	"	25
" "	" "	1000	"	60
" "	" $700^{\circ}\text{C}$	500	"	110
" "	" "	1000	"	160

\*This is the largest dimension of the largest particle.

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STATUS OF LGR LOOPS - FEBRUARY 28, 1954

Name	Group	Mat'l. of Construction (Min. I. D.)	Contents	Circulation	Temp. °C	Started	Hours Operation	Remarks
B	Chem. Process.	347 SS (.662)	U-Bi solution & Salt (LiCl-KCl)	E.M. Pump	500			Parts being radiographed and leak tested Cold runs scheduled for May 1 at Pile
C	"	"	Bi, 1000 ppm U, 1000 ppm Mg, 250 ppm Er, LiCl-KCl eutectic with 3% MgCl <sub>2</sub>	"	"	1/12/53	9652	Tracer run made
F	"	"	LiCl-KCl eutectic	Thermal Convection	575-420	6/30/53	5507	Shutdown 2/26/54 for examination
2A	Metallurgy	Groloy 5 Si (1.7" I.D.)	Bi-U, Mg, Er	"	550-520	3/11/53	8189	Fe concentration is 21 ppm in hot and cold legs. ΔT will be increased. Fe conc. to be redetermined
5A	"	Groloy 2½ (1.3" I.D.)	"	"	570-505	6/29/53	5914	No change
8A	"	"	"	"	568-512	10/15/53	3170	Graph. sample has not been in hot leg for 750 hrs. No change
9A	"	Groloy 2½ (.622" I.D.)	"	"	550-480	11/2/53	2300	No change in ΔT
10A	"	"	"	"	550-460	12/16/53	1783	No change in ΔT
11A	"	"	Bi-Sr, U	"	538-458	1/15/54	1122	U added after stabiliza- tion of Er
12A	"	Groloy 5 Si (1.7" I.D.)	Bi, Mg	"	564-506	1/26/54	684	Mg conc. being studied vs. time
13A	"	Groloy 5 Si & 5 Cr-Mo (0.312" I.D.)	Bi-U, Mg, Er	"	550-396	2/2/54	642	U-Bi-Mg in melt pot, H <sub>2</sub> treated and filtered into loop. Er was then added.

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**END**