

<b>COMPONENTS:</b> (1) Radioactive Elements (2) Mercury; Hg; [7439-97-6]	<b>EVALUATOR:</b> C. Guminski; Z. Galus Department of Chemistry University of Warsaw Warsaw, Poland July, 1985
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**CRITICAL EVALUATION:**

No experimental determinations have been reported for the solubility of technetium, promethium, polonium, francium, radium, actinium, and protactinium in mercury. On the other hand, experimental data have been reported for the actinides which are of importance to the nuclear energy programs, and the solubility of these elements have been reported separately. The only data reported for the former seven elements are the predicted solubilities of Kozin (1,2) at 298 K; these are summarized in Table I. It is the opinion of the evaluators that the data from (2) are nearer to the correct value, although some of these data also are clearly incorrect. The value predicted for promethium (2) appears to be of the correct magnitude by comparison with the solubility of the other lanthanides in mercury at 298 K. However, by comparison with the solubility of elements in the same groups, those predicted for polonium, francium, and radium appear too high to the evaluators. In the case of francium, the predicted value of 99.9 at % would be of the correct magnitude for the Fr-rich region, similar to that for the Cs-Hg system.

The saturated polonium amalgam should be in equilibrium with solid PoHg (3).

TABLE I

Kozin's Predicted Solubility of Radioactive Elements in Mercury at 298 K

<u>Element</u>	<u>Soly/at %</u>	<u>Reference</u>
Technetium; Tc; [7440-26-8]	$3.0 \times 10^{-13}$	1
	$1.1 \times 10^{-9}$	2
Promethium, Pm; [7440-12-2]	$6.2 \times 10^{-3}$	1
	$1.1 \times 10^{-2}$	2
Polonium; Po; [7440-08-6]	1.6	2
Francium; Fr; [7440-73-5]	99.9	2
Radium; Ra; [7440-14-4]	1.1	1
Actinium; Ac; [7440-34-8]	$3.6 \times 10^{-4}$	1
	$1.2 \times 10^{-3}$	2
Protactinium; Pa; [7440-13-3]	$2.4 \times 10^{-4}$	1
	$6.9 \times 10^{-4}$	2

References

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2. Kozin, L.F. *Fiziko Khimicheskie Osnovy Amalgamnoi Metallurgii*, Nauka, Alma-Ata, 1964.
3. Witteman, G.W.; Giorgi, A.L.; Vier, D.T. *J. Phys. Chem.* 1960, 64, 434.