Studies of the Behavior of Trivalent Uranium in Aqueous Solution. I : Its Reduction and Its Stability in Various Acid Solutions

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Akiko SATÔ

The Research Institute for Iron, Steel and Other Metals

Abstract

Various methods for the reduction of hexavalent uranium to the trivalent state were examined. It was found that the liquid-zinc-amalgam method is simple and rapid, and gives a high yield with a good reproducibility in hydrochloric, sulfuric, and perchloric acid solutions. The percentage of reduction is over 99% in a 0.5 N hydrochloric acid solution. Next, the stability of trivalent uranium in these media was investigated; it was observed that the trivalent uranium ion is fairly stable in any hydrochloric, sulfuric and perchloric acid solutions at a low concentration of the acids in the absence of atmospheric oxygen, but that it becomes unstable as the acid concentration increases. Both the percentage of reduction by the liquid-zinc-amalgam method and the stability of trivalent uranium are highest in a hydrochloric acid solution, next highest in a perchloric acid solution, and lowest in a sulfuric acid solution.

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