Optimized Flowsheet for the Dissolution of Uranium Metal

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ABSTRACT

The preparation of low enriched uranium oxide targets for irradiation and production of molybdenum-99 requires dissolution of uranium metal feedstock in a nitric acid solution as the first step in the target fabrication process. Dissolution of large pieces of uranium metal can be extremely slow unless conditions are properly selected. Uranium metal dissolution experiments were completed to measure the effects of HNO_3 concentration, temperature, and the catalytic effects of fluoride and nitric oxide (NO) gas on the rate of dissolution. The experiments demonstrated that the dissolution rate was a strong function of the acid concentration and a weaker function of temperature consistent with data in the literature. The use of fluoride and NO gas to catalyze U metal dissolution are viable options to accelerate the dissolution rate. The use of fluoride must be balanced against potential corrosion of downstream equipment and the addition of corrosion products to the U stream.