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Uranium Concentration Measurement Development of a Routine Spectroscopic Analysis Technique

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ABSTRACT

LANL is supporting efforts by SHINE™ Medical Technologies to produce ^{99}Mo within the National Nuclear Security Administration (NNSA) office of Materials Minimization and Management (M^3) program to accelerate the establishment of a reliable domestic supply of ^{99}Mo without the use of highly enriched uranium (HEU). The SHINE technology uses a subcritical accelerator-driven system to produce fission ^{99}Mo from Low Enriched Uranium (LEU) sulfate solutions. Uranium concentration analysis in sulfuric acid solutions is thus of importance to SHINE, both operationally and for material accountancy. In this context we have developed an absorption spectroscopy based uranium analysis method, the techniques simplicity complimenting more established analysis methods. Accuracy and precision has been increased through temperature control, minimizing standard solution uncertainties and maximizing spectrophotometer performance. While the focus has been on sulfuric acid solutions an evaluation of technique application in other solution media, such as nitric and hydrochloric acids, has also been performed.