

CHEMICAL, RADIOCHEMICAL, SPECTROCHEMICAL AND ISOTOPIC CHARACTERIZATION OF URANIUM HEXAFLUORIDE USED IN THE PREPARATION OF NUCLEAR REACTOR FUEL

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Uranium hexafluoride plays a central role in the nuclear fuel cycle because it is the most used compound in the isotope enrichment process. It is stable at room temperature but its high volatility and chemical reactivity poses a big challenge to processing facilities. Uranium is enriched approximately up to 3.5 to 4.0 % ²³⁵U in mass and then converted to uranium dioxide, form in which it is used in the preparation of the sintered pellets that eventually feed nuclear reactors. Once enriched, uranium hexafluoride is stored in large cylinders used for transportation and processing. It is then sampled and transferred to small laboratory cylinders to allow its characterization, which requires the use of chemical, radiochemical, spectrochemical and mass spectrometry techniques. This paper describes the technical requirements, analytical instrumentation and techniques required to fulfill this task.