

Structural studies of actinide complexes with organic ligands



Laboratory / Team	Institute of Nuclear Physics, Orsay (IPNO) – physics and radiochemistry of nuclear energy - Back-end of the Nuclear Cycle and Scenarios Team (PACS) http://ipnwww.in2p3.fr/Physique-et-Radiochimie-de-l-energie-Nucleaire
Contact	Dr Melody Maloubier: maloubier@ipno.in2p3.fr
Main topics	Radiochemistry
Objectives/context	Spectroscopic studies on the coordination of actinides with organic ligands are performed to provide fundamental information on the bonding and the coordination structure. The knowledge of the complexes formed with these ligands is crucial to understand and predict the behavior of actinides in the environment.
Equipment / resources / tools / software used	Glove box or fume hood, UV-Vis spectrophotometry, Fourier Transform Infrared Spectroscopy
Level / Duration / Period Number of trainees	L3, M1 or M2 / 2 to 5 months / October 2018 – July 2019 Possible pairing / training period - certificate of fitness to work under ionising radiation mandatory
Course description / main tasks	
<p>The aqueous speciation of actinides in the presence of organic ligands will be investigated in the pH range 1 - 13. The speciation of Th(IV), U(IV) and U(VI) with these ligands will be studied using various analytical techniques (ATR-FTIR, UV-Vis spectrophotometry...). The ligands studied will be ligands of environmental interest like phthalates, carboxylates, catecholates and hydroxamates. The training will be divided in several tasks:</p> <ul style="list-style-type: none"> - Summarize the literature data about spectroscopic characteristics of actinides - Preparation and characterization of actinide and ligand stock solutions - Preparation of the complexes <p>Their stability will be monitoring over time. According to the pH and the way to prepare the samples, oxidation or hydrolysis of actinides can occur. An appropriate protocol would be developed if necessary.</p> <ul style="list-style-type: none"> - Collecting and analyzing IR and UV-Vis spectra - Writing report - Presentation of data within the team 	
Skills acquired on completion of the course	
<ul style="list-style-type: none"> • Spectroscopy techniques : acquisition and analyzing • Radiochemistry, Actinide chemistry (introduction) • Knowledge of regulations associated with work in a controlled area 	