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Complexation of plutonium, protactinium and trivalent actinides with organic ligands

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The application of nuclear technology in industry, research and medicine leads to the production of radionuclides that are likely to cause environmental pollution or internal contamination (through inhalation, ingestion or wound) of nuclear workers and/or public. Indeed, contaminations are present in the surroundings of uranium mining sites, radwaste disposal facilities, or after accidental releases of radionuclides. The interaction of actinides with organic molecules, such as aminopolycarboxylic acids or hydroxypyridone derivatives, could trap the elements or inversely favor their migration. These phenomenons must be characterized in order to predict the behavior of actinides in the environment and in the human body. In this study, the chelating agents of interest possess hard donor atoms (oxygen and nitrogen) that bind strongly to f-element ions. These ligands may be present in the environment or they can be used as model of complex molecules, or considered as decorporation agents.
The aim of my thesis is the determination of thermodynamic and structural data of some complexes that Plutonium (Pu), Protactinium (Pa), Americium (Am), Curium (Cm) and Californium (Cf) can form with these organic molecules.
This poster reports the first data obtained for the complexation of Pa at the +5 oxidized state with NTA (nitrilotriacetic acid). The experiments have been performed with the isotope 233Pa at ultra–trace level.

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