

## Liquid-Liquid Extraction of Uranium(vi) from Aqueous Solution Using 1-Hydroxyalkylidene-1,1-Diphosphonic Acids

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**Abstract :** The extraction of uranium(VI) from aqueous solutions has been investigated using 1-hydroxyhexadecylidene-1,1-diphosphonic acid (HHDPa) and 1-hydroxydodecylidene-1,1-diphosphonic acid (HDDPa), which were synthesized and characterized by elemental analysis and by FT-IR, <sup>1</sup>H NMR, <sup>31</sup>P NMR spectroscopy. In this paper, we propose a tentative assignment for the shifts of those two ligands and their specific complexes with uranium(VI). We carried out the extraction of uranium(VI) by HHDPa and HDDPa from [carbon tetrachloride + 2-octanol (v/v: 90%/10%)] solutions. Various factors such as contact time, pH, organic/aqueous phase ratio and extractant concentration were considered. The optimum conditions obtained were: contact time= 20 min, organic/aqueous phase ratio = 1, pH value = 3.0 and extractant concentration = 0.3M. The extraction yields are more significant in the case of the HHDPa which is equipped with a hydrocarbon chain, longer than that of the HDDPa. Logarithmic plots of the uranium(VI) distribution ratio vs. pH<sub>eq</sub> and the extractant concentration showed that the ratio of extractant to extracted uranium(VI) (ligand/metal) is 2:1. The formula of the complex of uranium(VI) with the HHDPa and the HDDPa is UO<sub>2</sub>(H<sub>3</sub>L)<sub>2</sub> (HHDPa and HDDPa are denoted as H<sub>4</sub>L). A spectroscopic analysis has showed that coordination of uranium(VI) takes place via oxygen atoms.

**Keywords :** liquid-liquid extraction, uranium(vi), 1-hydroxyalkylidene-1,1-diphosphonic acids, hhdpa, hddpa, aqueous solution

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