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## Using microemulsion for recovery of uranium from phosphoric acid of Annaba (Algeria)

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### Abstract

In this work the microemulsion liquid membrane operation of reversed type water-in-oil was applied to extraction of uranium from phosphoric acid produced at Annaba plant in Algeria. Obtained results show that an extraction yield of more than 90% of uranium present in the phosphoric acid may be reached in three theoretical stages with aqueous/organic phase ratio = 12:1 without acid pretreatment for the removal of organic matter. The extracted uranium was precipitated and the microemulsion was recycled for further use as solvent phase.

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### 1. Introduction

Phosphoric acid produced by the wet dihydrate process contains 40–300 g uranium/ton, depending on the origin of the phosphate rocks from which it is produced. Uranium not recovered will be lost forever and, furthermore, it may be a source of pollution for soil and plants when the phosphoric fertilizer spreads to the soil.

At the present time, all known commercial recovery plants of uranium from phosphoric acid are based on solvent extraction (Krea and Khalaf, 2000). The acidic organophosphoric extractants, such as di-2-ethylhexyl phosphoric acid (D2EHPA) and a mixture of di- and mono-(octyl phenyl) phosphoric

acid (OPPA), are the representative examples of current generation of the most efficient extractants in the uranium extraction from phosphoric acid. These two extractants are often used in synergetic mixtures with trioctyl phosphine oxide (TOPO) (Krea and Khalaf, 2000; Hurst et al., 1972).

Various factors can affect the economic feasibility of the solvent extraction process. Among them the most important, of course, is the uranium price. Actually, owing to the low price of uranium, this method is not considered cost-effective, and an alternative process, surfactant liquid membrane extraction, was developed by Li and his co-workers (Hayworth et al., 1983). However, in this operation the emulsification or making the water-in-oil (w/o) emulsion and the de-emulsification problems still need a solution. To get rid of these drawbacks, research is continuing in order to decrease the overall process cost by the exclusion of the emulsification and de-emulsification

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