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To cite this version:
Kateryna Omelchuk, Moncef Stambouli, Alexandre Chagnes. Diphasic acid-basic properties of new organophosphorus extractants. The 21st International Solvent Extraction Conference - ISEC 2017, Nov 2017, Miyazaki, Japan. hal-01814007

HAL Id: hal-01814007
https://hal.science/hal-01814007
Submitted on 12 Jun 2018

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Diphasic acid-basic properties of new organophosphorus extractants

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Acidic organophosphorus compounds have been extensively studied as extractants for numerous metals and have been shown to exhibit a good extraction and separation efficiency [1]. The overall distribution equilibrium of an organophosphorus extractant $\text{HL}$ between organic and aqueous phases involves a great number of individual equilibria [2]. However, only three of them are usually taken into account in the literature: the dimerization of $\text{HL}$ in organic phase, the partition equilibrium of $\text{HL}$ between the two phases and its acid dissociation in aqueous phase [3]-[4]. The metal extraction by organophosphorus extractants requires to increase the pH of acid leaching solution by adding of alkaline reactive such as sodium hydroxide for instance. In some cases, saponification of extractants can occurs and may lead to change in extraction equilibria of metals.

In the present work, saponification of the following extractants diluted in kerosene has been investigated by performing biphasic titration:

![Figure 1. Structure of organic extractants synthesized in the laboratory.](image)

The titration curves have been modelled by means of a physicochemical model including the equilibria reported in Figure 2. The formation constant $\beta_1$, $\beta'$, $\beta''$ and $\beta_n$, the dimerization constant ($k_2$) and the dissociation constant ($k_a$) of the acidic extractant have been used in the model. The values of $\beta_1$, $\beta'$, $\beta''$ and $\beta_n$ have been determined by fitting the experimental data of biphasic titration with the model while $k_2$ and $k_a$ values have been determined by VPO measurement and monophasic titration, respectively. Finally, the physicochemical model is used to investigate the speciation of the extractants as a function of the pH.


Key words: ORGANOPHOSPHORUS EXTRACTANTS, MODEL, SAPONIFICATION, EQUILIBRIA