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Diphasic acid-basic properties of new organophosphorus extractants

Kateryna Omelchuk[1,*], Moncef Stambouli[2] and Alexandre Chagnes[3]

[1]*PSL Research University, Chimie ParisTech - CNRS, Institut de Recherche de Chimie Paris, 75005, Paris, France*
[2]*Central School of Paris, LGPM laboratory, 2 Avenue Sully Prudhomme, 92290 Châtenay-Malabry*
[3]*University of Lorraine, GeoRessources Lab, UMR CNRS 7359, 2 Rue Doyen Marcel Roubault, TSA 70605, 54518 Vandoeuvre Les Nancy, France*

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 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 HL in organic phase, the partition equilibrium of 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:

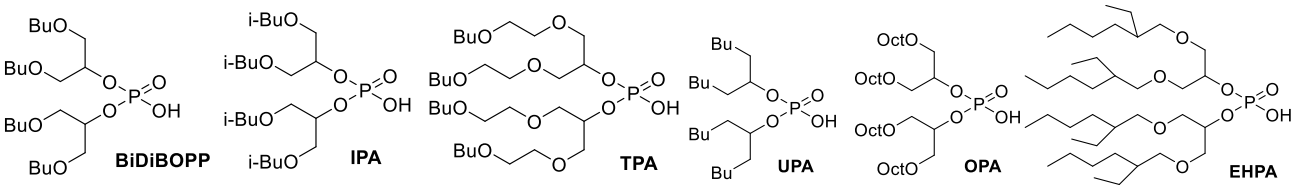

Figure 1. Structure of organic extractants synthesized in the laboratory.

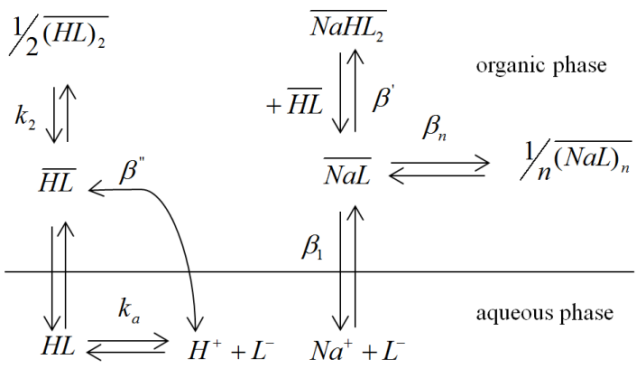

Figure 2. Equilibria included in the physicochemical model.

The titration curves have been modelled by means of a physicochemical model including the equilibria reported in Figure 2. The formation constant β_1, β', β'' and β_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 β_1, β', β'' and β_n have been determined by fitting the experimental data of biphasic titration with the model while k2 and ka 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.

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Key words: ORGANOPHOSPHORUS EXTRACTANTS, MODEL, SAPONIFICATION, EQUILIBRIA