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Abstract

Full Text

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EXTRACTION DIAGRAM OF FERRIC CHLORIDE WITH DIETHYL ETHER

The extraction of ferric chloride with diethyl ether from hydrochloric-acid solutions has been the subject of numerous investigations. However, the available data are insufficient for a more or less complete description of the extraction system $\text{FeCl}_3\text{—HCl—H}_2\text{O—}(\text{C}_2\text{H}_5)_2\text{O}$. The present investigation

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was undertaken with the aim of constructing an extraction diagram describing this quaternary system. The method for constructing the diagram was considered earlier ⁽¹⁾. The system was studied at a temperature of $20 \pm 0.1^\circ$. To establish extraction equilibrium in the system, 3–5 minutes are sufficient. Figure 1 shows an extraction diagram with isolines of the distribution coefficient K_p . The curve *BB* is the solubility isotherm of FeCl_3 in

in hydrochloric acid solutions and limits the region in which liquid phases exist. The equilibrium concentrations of the components in the aqueous phase are expressed in mol/l. The solubility of FeCl_3 in water at 20° found by us (47.5 wt.%) agrees with the value given by Roozeboom and Schreinemakers (48 wt.%)⁽²⁾.

In the system under consideration, as in other cases studied earlier, the threshold effect described by A. V. Nikolaev ⁽³⁾ is observed. At low FeCl_3 concentrations its distribution coefficient is comparatively small and increases very slowly with concentration. At the threshold FeCl_3 concentration a sharp increase in K_p is observed; then the rate of increase of K_p again decreases. As a typical curve, Fig. 2 shows the dependence of K_p on the equilibrium FeCl_3 concentration at

Fig. 2. Dependence of K_p of ferric chloride on the concentration of ferric chloride during its extraction from a solution in 1.5 M HCl (section AA, Fig. 1)

Figure 2: Fig. 2. Dependence of K_p of ferric chloride on the concentration of ferric chloride during its extraction from a solution in 1.5 M HCl (section AA, Fig. 1)

a constant equilibrium HCl concentration equal to 1.5 M (section along the isoconcentrate A—A, Fig. 1). The threshold FeCl_3 concentration at this acidity is close to 0.6 M. The FeCl_3 concentration required to reach the extraction threshold shifts toward smaller values as the acid concentration increases. At high acid concentrations, beginning with 2.5 M, the extraction threshold disappears completely. The threshold effect is also observed in the absence of HCl; this case corresponds to the maximum threshold FeCl_3 concentration, close to 2.3 M.

Fig. 2. Dependence of K_p of ferric chloride on the concentration of ferric chloride during its extraction from a solution in 1.5 M HCl (section AA, Fig. 1)

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Note: Figure translations are in progress. See original paper for figures.

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