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MÖSSBAUER SPECTRA OF THE IRON COMPOUNDS IN THE PHASE OF STRONGLY BASIC EXCHANGERS

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Strongly basic anion exchangers (containing R_4N^+ groups) are able to retain metallic cations from solutions. The sorption of metallic cations on strongly basic anion exchangers takes place through formation in the polymer phase of ultrafine particles of jarosite mineral type compounds [1] $R_4N[M_3(OH)_6(SO_4)_2]$, where M is Fe(III), Cr(III) or Al(III).

The modified polymers become selective sorbents for various anions; also, the use of exchangers can be expanded in catalysis. The main objective of these investigations was to study the stability and the possible transformation of jarosite mineral type compounds in the phase of the polymer. In order to achieve that, it was investigated the state of iron ions (III) compound in the phase of strongly basic anion exchangers of AV-17 and Purolyte (A-400) using Mössbauer spectroscopy (at 80 and 300 K) and magnetic susceptibility at 300 K.

After the polymer contact with $Fe_2(SO_4)_3$ solution, simultaneous with the formation of jarosite mineral type compounds, took place a parallel process of destruction. The result of this destruction process of jarosite mineral type compounds in the phase of the exchanger was accompanied with the formation of Fe^{2+} cations found in solution and in the phase of the polymer.

Major changes of the state of iron ions investigated with magnetic susceptibility were not found. Through these studies we concluded that after the drying of the modified polymer at 50°C-60°C, the compounds of jarosite mineral type remained stable. The effective moment of iron ions in the phase of the polymer is 5, 25 μB.

Mössbauer spectra obtained at 80 and 300 K for polymer samples modified with iron (III) compounds at 50°C showed that the state of iron ions (III) in polymer AV-17 and Purolyte was almost similar. After boiling of the modified polymer in water, the jarosite type compounds suffered a transformation; they were converted in FeOOH particles. The obtained samples were also studied with Mössbauer spectroscopy. The spectra of the first sorption-boiling cycle demonstrated that the formed FeOOH particles were in the superparamagnetic state. The spectra of the second sorption-boiling cycle showed that in phase of the polymer exist magnetically ordered β-FeOOH particles, a part of these particles remain in superparamagnetic state.

References

[1] Gutsanu, V. L. J. *App. Polym. Science,* **2006,** 99, 59-64.