

MÖSBAUER SPECTROSCOPY OF IRON COMPOUNDS IN THE IONIC CROSS-LINKED POLYMERS

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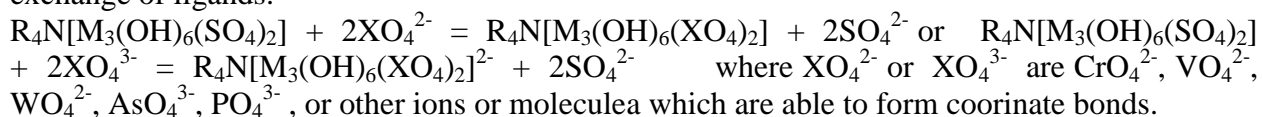
Cross-linked ionic polymers are widely used in various fields of science and technology. The largest amount of polymers is used to the water treatment at thermal, thermo-electrically and nuclear power stations as ion exchangers. Ion exchange is not a selective process, while new technologies require sorbents and catalysts with selective properties. Relatively recently there were made investigation of implementation of metal compounds in the phase of polymers, that radically changes their properties. Being amorphous and cross-linked, the investigation of processes with involving of these polymers is difficult due to the limited use of research methods. One of the most informative methods in the investigation of the processes, that take place in the phase of cross-linked polymers, is the Mossbauer spectroscopy, complemented by EPR, IR spectroscopies, magnetic susceptibility method.

This communication reports the results of investigation of interaction of iron ions with different classes of commercial ionic cross-linked polymers, using the Mossbauer spectroscopy. At first it was investigated the interaction of iron ions with strongly acid cation exchangers. But we, along with academician **Constantin Turta**, first started to investigate the complexation of iron ions with amines or carboxylic groups of the ion exchangers using Mossbauer spectroscopy.

It was demonstrated that the Fe^{2+} cations are oxidized easily in complexes with the carboxyl groups of the polymer. As a result of the reduction of Fe^{3+} ions with small molecular reducing agents, complexes in the phase of carboxylic polymer are destroyed.

With the use of Mossbauer spectroscopy it has been shown that the retention of Fe^{2+} and Fe^{3+} ions on weakly basic anion exchangers takes place not due to the ion exchange, but as a result of their coordination with polymers' amine groups.

The most recent and interesting works are devoted to the investigation of the formation of iron compounds in the phase strongly basic anion exchangers. As we know, strongly basic anion exchangers do not contain negatively charged or electron donors atoms in their matrix. Therefore, theoretically, they cannot interact with metal cations. But, surprisingly, we found that under certain conditions this type of polymers can interact with some metal cations. As a result of these interactions in the polymer phase are formed ultrafine particles of the jarosite mineral type compounds: $\text{R}_4\text{N}[\text{M}_3(\text{OH})_6(\text{SO}_4)_2]$, where R_4N^+ are functional groups of the polymer, M may be Fe^{3+} , Cr^{3+} , Al^{3+} and others cations. Synthesis of the metallic compounds in the polymer phase, change radically the physicochemical properties of the polymers. They become adsorbents and catalysts with selective properties. Selective adsorption properties are due to the exchange of ligands:



The polymers, containing iron compounds are good models for investigation using the Mossbauer Spectroscopy.