INVESTIGATION OF THE STRUCTURAL CHANGES OF GEORGIAN NATURAL LAUMONTITE

V.G. Tsitsishvili, G.P. Tsintskaladze, S.L. Urotadze, N.A. Osipova, T.K. Kvernadze, N.O.Burkiashvili

Petre Melikishvili Institute of Physical and Organic ChemistryJikia 5, 0186, Tbilisi, Georgia, e-mail: physorgchem@pochta.ru

The objects of our study were some Georgian deposits. The analysis of literature data of IR spectra of laumontites shows that they are less studied. Structural changes of laumontite, both its original samples and samples treated with acids of different concentrations, have been investigated.

It should be marked that the studied IR spectra of Georgian laumontites coincide well with the data of those ones studied earlier from the deposits which testify high content of zeolite phase in our samples. The observed absorption bands can be referred to two types of oscillations: oscillations inside tetrahedron being structural unites (these oscillations don't reflect peculiarities of zeolite structure) and oscillations on external bonds of tetrahedron. The second type depends on the structure of zeolite.

The results of the experiment show that the content of zeolite phase is high in the studied laumontites. It is pointed by clearly expressed and rather high intensity of inter-tetrahedral bands of both valent and deformational oscillations.

It should be noted that the band of crested form of anti-symmetric valent oscillations unlike the spectra of other zeolites is characteristic only for laumontites.

From the literature sources it is known that some natural laumontites in aggressive medium and especially at hydrothermal treatment are unstable. In our case while treating laumontite sample with 1N solution of ammonium chloride the crystal lattice is practically unchanged which is testified by invariability of inter-tetrahedron oscillations in IR spectra.

As a result of treatment of the laumontite sample with hydrochloric acid even of low concentration a slight change of the structure is noted which is expressed in IR spectra by weakening or disappearance of the bands of inter-tetrahedron assymetric valent oscillations. In this respect the bands of inter-tetrahedron anti-symmetric valent oscillations at 960, 930, 1040, 1080, and 1165 cm^{-1} appeared sensitive.

Investigation of water vapor adsorption on these samples showed that in case of treatment of the samples with low concentration hydrochloric acid or with the solution of ammonium chloride, water vapor adsorption almost hasn't changed. Increase of the solution concentration significantly worsens adsorption properties that points to the structural decomposition.

Thus, investigation of the samples showed that IR spectra data completely coincide with the water vapor adsorption results.