TOPOTOXIC TRANSFORMATIONS IN THE SERIES NaA-NaP-ANALCITE-HYDROSODALITE AND MORDENITE-NaP-ANALCITE-HYDROSODALITE

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For several years we studied the processes of synthesis of zeolites under hydrothermal conditions on base of natural aluminosilicates. In particular, the process of transformation into zeolite in the system of kaolinite-NaOH.

As a result of the works carried out we succeeded in synthesizing number of zeolites NaA, α NaP, analcime and hydrosodalite. From these zeolites there was obtained pure NaA which with increase of exposition turns into zeolites mentioned above. Further, structural mechanism of these transfers is referred.

We have established that all the above mentioned topo-transformations taken place on division border zeolite-liquid phase can be explained proceeding from single principle, namely, from mechanism of «drop» transfer of atoms (Si(Al)) from occupied tetrahedron into hollow one and back. The hollow tetrahedron, in its turn, can be formed in the conditions when to three neighboring oxygens of frame, oxygen molecule of water or, presumably, oxygen of hydroxyl approach. The change of chemical composition at transfer of frame NaA(Si/Al=1)→NaP(Si/Al=1,8)→analcime (Si/Al=(1,8-2)→hydroxyl (Si(Al=1) 1) indicates that phase transformations are also accompanied by «drop» transfer of atom Si(Al) into solution with subsequent substitution of generated tetrahedral emptiness of atom Al(Si). There have been developed topo schemes of the indicated transformations. Thus, it is easy to show existent in NaA, parallel to the fourth axis, the chains of 4,4,8,4,4,8 type transformed into the chains of 4,4,4 type, i.e. the chains typical for zeolite NaP. In addition, projection of frame along quarter axis remains unchangeable, i.e. the net formed by combination of one from 8-membered and connected with it 4-membered rings are preserved in NaP. While transforming NaP into analcime (chain) at the expense of re-orientation of tetrahedral vertices the chains are converted into tapes formed by combination of alternating four and six-membered ones, characteristic to analcite. Similar chains, i.e. 4,6,4,6 are preserved in hydrosodalite and transformation goes on at the expense of reorientation of these chains. Besides, it is outstanding the fact, that in both phases the cubic symmetry of frame is preserved.

Topo-transformations in the series mordenite-NaP-hydrosodalite analcite goes on.