

# Influence of aggressive environment and temperature on the mordenite of the Nakhchivan Autonomous Republic

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Open more than two hundred years ago natural minerals zeolites in recent years have aroused increased interest of scientists around the world. To assess the quality of the zeolite materials and to identify possible areas of their use it is necessary to know their physical-chemical properties. Thermal stability, resistance to aggressive substances are most important properties. This shows the relevance of Nakhchivan zeolites research. These zeolites consist mainly of mordenite which is of great practical importance.

The purpose of this work was the creation of physical-chemical foundation of Nakhchivan zeolites study and investigation of the influence of the aggressive media and temperature on the structure of the zeolite.

The composition of Nakhchivan zeolites and the influence of aggressive environments and temperature were investigated by methods of differential thermal analysis (NETZSCH STA 449F3), X-ray diffraction (2DPHASER «Bruker»  $\text{CuK}\alpha$ , 20, 20–80 degrees) and microstructural (Hitachi-3000) analysis.

Effect of the aggressive environment on the Nakhchivan mordenite zeolite was investigated in concentrated sulfuric, hydrochloric and nitric acids. Zeolite was placed into three flasks with concentrated sulfuric, nitric and hydrochloric acids and treated for 10 days. After ten days it was filtered, washed with distilled water and dried for analysis. According to X-ray diffraction and microstructural analysis (Fig.) no changes in the structure of the zeolite occur, that demonstrates the resistance of zeolite to aggressive (acidic environment).

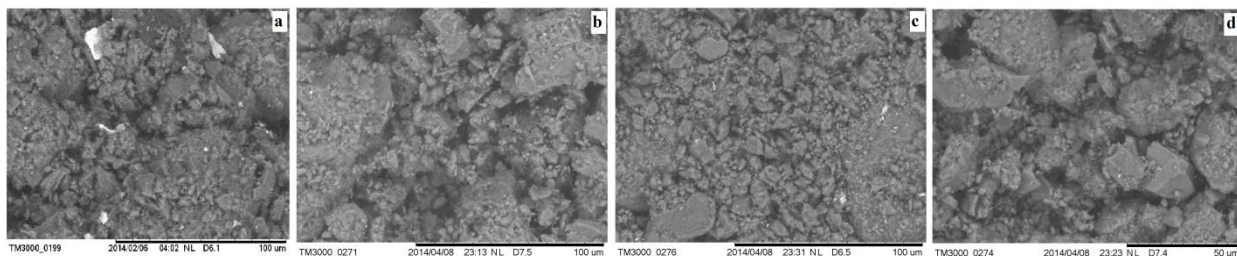


Fig. SEM photographs of zeolite surface: *a* – initial mordenite, *b* – mordenite treated with hydrochloric, *c* – nitric, *d* –sulfuric acid

The thermal stability of mordenite was studied by thermographic analysis. At 1000 °C mordenite structure does not change as shown by X-ray diffraction analysis, that shows Nakhchivan mordenite is resistant up to this temperatures. At the raising the temperature up to 1300 °C according to X-ray diffraction analysis, the structure of mordenite is destroyed.

The above confirms that Nakhchivan zeolite is resistant to aggressive environments and high temperatures (up to 1000 °C and more).