

SYNTHESIS OF THE PRACTICALLY IMPORTANT ZEOLITE – PHILLIPSITE
ON A NATURAL BASISMamedova G. A.Nakhchivan Department of the Azerbaijan National Academy of Sciences
Institute of natural resources, Nakhchivan, Azerbaijan
gunelmamadova@mail.ru

For the first time, on the basis of the natural mineral of Nakhchivan, hydrothermal synthesis of a potential practical importance zeolite of phillipsite type was carried out.

The natural sample was taken from the zeolite horizon in the north-west of the Kyukyuchai river, where zeolite content varies in the range of 75–80 %. Zeolite tuffs of Nakhchivan were used as samples, 78.5 % of which is the main mineral – mordenite ($\text{Ca}_2\text{Na}_2\text{K}_{2.8}\text{Al}_{8.8}\text{Si}_{39.2}\text{O}_{96}\cdot 34\text{H}_2\text{O}$), 19.5 % quartz (SiO_2) and 2.00 % anorthite ($\text{Ca}_{0.86}\text{Na}_{0.14}\text{Al}_{1.94}\text{Si}_{2.06}\text{O}_{8.01}$). The sample has thoroughly been washed with distilled water and dried at a temperature of 100 °C for three days.

Hydrothermal synthesis was carried out in Morey autoclaves made of 45 MNFT stainless steel with a volume of 18 cm³, and the filling coefficient of $F = 0.8$.

Experiments on hydrothermal crystallization were carried out without creating a temperature gradient and without stirring of the reaction mass. The ratio of solid to liquid is 1:10. Experiments on the hydrothermal synthesis of phillipsite were carried out for 50–100 hours at a temperature of 100–200 °C. The concentration of the thermal solution $\text{Ca}(\text{OH})_2$ is 15–20 %. The above conditions are the region of existence of a phase-pure phillipsite zeolite with 100 % crystallinity. After crystallization was completed, the final material was separated from the initial solution, washed with distilled water from excess alkali, and dried at 80 °C. For each experiment, 2 g of natural zeolite was used.

The identification of the zeolite phase was carried out by X-ray phase and derivatographic analysis. In the experiments, we used the installation of an X-ray analyzer 2D PHASER "Bruker" ($\text{CuK}\alpha$ -radiation, $2\theta = 20\text{--}80^\circ$). Derivatographic studies were carried out in the "Derivatograph-Q 1500-D" of the Hungarian company MOM in a dynamic mode in the temperature range of 20–1000 °C.

According to the X-ray phase analysis established that phillipsite crystallizes in monoclinic crystal system with unit cell parameters $a = 9.87 \text{ \AA}$, $b = 14.30 \text{ \AA}$, $c = 8.67 \text{ \AA}$. The phillipsite diffractogram is shown in the figure.

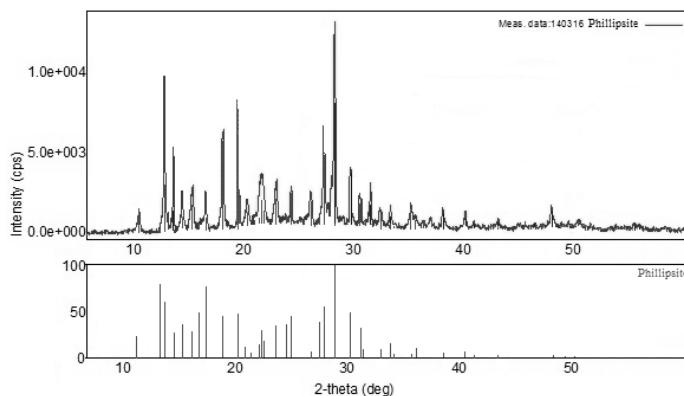


Fig. Diffractogram of phillipsite