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HIGH-TEMPERATURE TESTS OF THE GABBRO-BASALT GROUP OF KAZAKHSTAN FOR PRODUCTION OF MINERAL WOOL

Abstract. The results of studying the rocks of the gabbro-basalt group in the territory of Kazakhstan are described: 1) their material composition and thermal behavior in the temperature range 20–1000 °C; 2) high-temperature tests were performed on the LNT 04/16 installation in heating modes from 40 to 1500 °C. For this, rocks from different regions of Kazakhstan were selected, differing in chemical content and the degree of perfection of their mineral inclusions in accordance with existing standards. As a potential raw material, rock samples were used near major economic centers in Northern, Central and Southern Kazakhstan. Calculations of the viscosity of rocks of the gabbro-basaltic series were carried out by the method of E. S. Persikov. For the production of basalt fibers with specified characteristics for strength, chemical and thermal resistance and certain electrical insulating properties, it is proposed to use basalt rocks with characteristics in terms of chemical composition and properties of raw materials. Analysis of the available data showed that in many regions of Kazakhstan there are deposits of rocks of the gabbro-basalt group, suitable for the production of mineral wool, whose reserves amount to many tens of millions of tons. Technologies for the production of basalt fibers, especially continuous fibers, are quite new, they have a number of principal features related to the raw material. For each type of basalt requires its own special technological regimes and parameters of fiber production. The processes of melting, homogenization and preparation of the melt pass at high temperatures of 1400 °C and are associated with certain energy inputs. Technologies for processing basalt fibers in materials and products are not associated with high-temperature processes and are produced using "cold technologies". Thus, the production of basalt wool is essentially energy-saving and environmentally friendly.
Key words: mineral wool and fibers, basalt, diabase, gabbro, amphibolite, geological and petrological characteristics, chemical, thermal, X-ray diffractometric and microprobe analyzes.

The magmatic rocks of the gabbro-basalt group are the raw feedstock for the production of basalt fibers. They have high natural chemical and thermal resistance. The main energy functions of primary melting of rocks of the gabbro-basaltic series were fulfilled by nature. The rocks of the gabbro-basalt group are a ready-made natural raw material for the production of fibers. At the same time, the cost of extracting basalt raw materials is meager.

The results of studying the material composition and thermal behavior in the temperature range 20–1000 °C of the rocks of the gabbro-basalt group from some regions of Kazakhstan are described in the works [1-4]. The article gives the results of high-temperature tests at the LNT 04/16 installation in heating modes up to 1500 °C. For this purpose authors used the rock samples from different regions of Kazakhstan, different in chemical content and the degree of sophistication of their mineral spots according to existing standards and earlier studies [5-8].

As raw materials, authors selected rock samples near the economic centers in the Northern region (Schuchinsk District), Central region (Pribalkhash) and South region (south-east of the Chu-Ili Mountains) of Kazakhstan (Table 1). Figures 1–8 contain sample photos of the firing of selected samples and the high-temperature heating schemes.