SAPONITE IN THE TECHNOLOGY OF POROUS MATERIALS

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Modern technologies require to manufacture competitive products wit the use of high quality materials. Implementation of this requirement is impossible without the use in the process of porous permeable materials (PPM). Operating conditions of porous materials and the variety of options of filter designs determine the range of materials and methods of manufacture of (PPM). Widespread methods of manufacturing of PPM – are powder metallurgy techniques.

However, currently existing methods for obtaining of PPM by powder metallurgy method are far from perfect. They are characterized by high energy and material costs and also by low productivity. The main cost method is an expensive operation process of sintering of a product. Great potential in this respect has a method of self-continues high-temperature synthesis (SHS), founders of which are Academician Merzhanov A.G. and Borovinskaya I.P. [1, 2]. A feature of SHS process as physic-chemicals reaction that determine the structure of the resulting products is the ability to produce a number of products with unique performance characteristics. So, SHS as a method of producing porous materials, combines low energy consumption, waste-free and the possibility of dynamic variation and other structural properties of products.

Great importance for the implementation of the SHS process in order to obtain high-quality products is the selection of charge materials. In our work batch basis to produce porous materials comprise natural minerals (saponite clay) and metal powders (titanium powder).

Saponite - natural sorbent which has a high adsorption, ion exchange, catalytic and filtration properties. Creation of SHS-materials based on saponite-titanium in addition to the scientific novelty and relevance also has economic significance. We used powders of titanium PTS-1 GOST 9722-79 with a particle size of -0.1 +0.063 mm, natural saponite powder with a particle size of -0.1 + 0.063 mm.

Compaction of a charge at a ratio of 50% of saponite and 50% of titanium powder produced by the dry radially isostatic pressing of the blank. Synthesis of a system was carried out in a laboratory reactor. After the sintering process occurs a slow cooling of the sample with the reactor. Combustion process consists of two stages: 1) reduction of oxides (metal-thermal stage), 2) the stage of SHS - direct synthesis of elements.

Metallographic studies were made on microscope MMP-4. Samples for metallographic examination were prepared by standard methods. In order to obtain a clear image of the grain boundaries etched thin sections of 4% H_2SO_4. Fig. 1. shows the structure of the samples sintered by SHS.

Fig. 1. A structure of porous material based on titanium and saponite

Determination of the component composition of obtained materials was carried out by X-ray structural analysis. X-ray diffraction studies were carried out on a diffractometer DRON 4-13 using CuKα rays.

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2.Borovinskaya I.P., Bunin V.A., Merzhanov A.G. Self-propagating high-temperature synthesis of high porous Boron nitride // Mendeleev Communications. – 1997. V.7. №2. – P. 47-15.