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Shungite rocks silicate component processing

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Nature clay minerals are widely used as sorbents, catalysts and catalyst supports in different technological processes. However structure and surface properties of the same industrial wastes similar to that of the nature silicate materials. Development work of preparation silicate sorbents, catalysts and catalyst supports from industrial wastes are interested so mineral resources surface mining and industrial wastes storage are main reasons of lands pollution and irrational using and loss of valuable materials too.

This work deals with processing of mineral part of shungite rocks which are in dumps after complex ore mining and concentration for preparation abovementioned materials.

It was determined by X-ray diffraction that shungite rocks mineral part mainly consists of quartzite and different alumosilicates. We investigated an influence of various treatment ways on its composition, structure, sorptive and catalytic properties. There were thermal (from 400 to 1000˚C) and acidic (with 10÷30 % H_2SO_4) treatments, thermal treatment with following leaching with HNO_3 and acidic treatment with 10÷30 % H_2SO_4 with following heating at 650 ˚C in 15 min. Study of the chemical and mineral compositions, adsorptive and catalytic properties of the obtained materials shown that they depended on following conditions of the original material activation: a temperature, a concentration of acid and a ratio of liquid and solid phases.

The thermal activation and thermal treatment with following leaching with HNO_3 didn't vary of the investigation samples compositions but acidic leaching of the shungite rock silicate component with 10÷30 % H_2SO_4 varied of them very much: Ca^{2+},

Mg^{2+}, Fe^{3+} and other metals were eluted to solution and as a result silica content increased but dealuminizing of silicate matrix did not occur.

Study of the obtained samples catalytic properties was completed in cyclohexanol dehydration reaction. Original mineral part, burnt materials and burnt samples treated with HNO_3 were inert in this reaction. But materials treated with H_2SO_4 catalyzed cyclohexanol dehydration; at 280 ˚C 100 % conversion of cyclohexanol was achieved.

All obtained materials were used as sorbents for purification of air from ammonia gas. It was appeared that silicate materials burnt at 400, 500 and 600 ˚C were fairly effective, 100 % purification degree was achieved. Acid sorbents were less active in the process of the model gas mixture purification.

So investigations and received results demonstrated a perspective of industrial preparation of the new silicate sorbents and catalysts from shungite rocks mineral part.