«Use and development of technology for producing porous composite sorbents based on man-made raw materials»

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• Metallurgy provides ample opportunities for the production of man-made raw materials and products based on them.

• The use of dust waste as a basis for sorption porous composites is the most promising and economically profitable, since it allows solving such problems as water purification and disposal of industrial waste.

• The aim of this paper was to study the characteristics of porous composite materials based on man-made waste from aluminum and silicon industries.
Solution methods

- The objects of the study were composite porous materials based on man-made raw materials of silicon and aluminum production. The source of these man-made materials is the gas cleaning dust of Kremny JSC, which is divided into two fractions: light and heavy. Heavy (coarse) dust is deposited in pre-cleaners, light (fine) dust is deposited in Venturi tubes or electrostatic precipitators.

- As the first step, dry cleaning of gases is carried out in chambers or cyclones, where a more coarse fraction is deposited accounting for up to 20% of the total dust mass. At the second step, there are Venturi tubes installed, where the dust of a finer fraction is absorbed by the aqueous solution of soda ash.

Figure 1. Sorbent samples with a porous structure obtained by pelletizing.
Conclusions

The sorbent samples obtained by pelletizing have a porous structure, which can be clearly seen during their visual inspection. Also, these composite materials were tested for resistance to aggressive environments. A solution of 70% and 10% acetic acid was used as an aggressive medium, then the samples were immersed in this solution and kept in it for 24 hours. After removing the sorbents from the solution after the specified time, it was found that the material retained its strength characteristics and did not succumb to destruction, despite the significant content of an alkaline binder in it.

- It has been established that fine fraction waste of metallurgical production can be used as a sorption material. However, the use of this waste for the purification of wastewater and surface water in their original form has a number of disadvantages, so they need to be pelletized.

- It has been found that the studied sorbents are resistant to the effects of an aggressive environment and retain their strength characteristics.

- This material can be used for the purification of surface and wastewater in various conditions.
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