DETERMINATION OF MECHANICAL STRENGTH OF ORGANOMINERAL SORBENT BASED ON GIPAN AND HOVDAK BENTONITE

A.Kh. Rakhimov, F.B. Eshkurbonov, M.Sh. Bobokulova, M.R. Uralova
Termiz Institute of Engineering and Technology

During the sorption process, sorbets are exposed to various external influences and lose their sorption capacity. In addition, sorbents with a polymer structure are affected by temperature, strongly acidic and alkaline environments, causing their disintegration and loss of functional groups. Compared to organic sorbents, inorganic mineral sorbents have relatively strong mechanical strength. These studies were analyzed by a number of scientists on the basis of special GOST requirements, and scientific research was carried out [1-3].

The main structural-mechanical property of sorbents is strength, which is characterized by grinding and friction properties. The strength of the organomineral sorbent was studied in accordance with the requirements of GOST R 51641-2000 granular granule materials. General specifications [4]. Accordingly, the level of grinding and friction should not exceed 4 and 0.5%, respectively. To determine these properties, several different samples of organomineral sorbents, differing in fraction sizes, were used. The results of the study are presented in Table 1.

Table 1.

Strength properties of organomineral sorbent particles of different sizes*

Sample	Grinding level	The degree of friction
GYPAN: Bentonite-1	1,2±0,1	1,2±0,1
GYPAN: Bentonite-2	1,2±0,1	1,2±0,1
GYPAN: Bentonite-3	1,2±0,1	1,2±0,1

*(Sample 1 - fractions of organomineral sorbents with a particle size of up to 1 mm; Sample 2 - fractions with mixed particles in the range of 1-3 nm; Sample 3 - with a size of more than 3 mm fractions (larger than sample 1)).

GIPAN:Bentonite-3 sample has the highest values of crushing index. It is known that particles up to 3 mm in size differ from larger ones in their resistance to crushing and abrasion.

Studies have shown that GIPAN:Bentonite-2 is characterized by the following optimal high parameters: the average crushing value is 1.4 ± 0.1% (not more than

4% according to GOST) and friction It was determined in the research results that the value is equal to 0.23 ± 0.1% (not more than 0.5% according to GOST).

Table 2.

The main physical properties of organomineral sorbents

Sample	Mass density, r, g/cm^3	Humidity, w, %	Actual density of dry sample, ρ_c, g/sm^3
GYPAN: Bentonite-1	1,21	13	2,31
GYPAN: Bentonite-2	1,18	15	2,29
GYPAN: Bentonite-3	1,03	15	2,29

The main physical properties that determine the quality characteristics are represented by porosity, plasticity and density. These features were also implemented in accordance with the requirements of GOST R 51641-2000. The obtained results are presented in Table 2. As indicated, the density of organomineral sorbents is 2.3 ± 0.1 g/cm^3.

The porosity of the organomineral sorbent as an adsorbent is of great practical importance. In the process of making granules from small adsorbent particles, the porosity index is one of the defining characteristics. It should also be noted that porosity is an important indicator for determining the antibacterial ability of an adsorbent in the process of wastewater treatment. According to laboratory studies, the average porosity of the organomineral sorbent used in the research is 43.6 ± 0.1% (Table 3).

Table 3.

Porosity of organomineral sorbent, %

Sample	Porosity, %
GYPAN: Bentonite-1	39
GYPAN: Bentonite-2	44
GYPAN: Bentonite-3	45

In conclusion, it can be said that the synthesized organomineral sorbent has the required strength during the sorption process and does not lose its sorption properties even in stable conditions. Organic sorbents have a low level of consistency. If inorganic minerals are added to it, the degree of consistency will be partially increased.

List of references

1. Эшкурбонов Ф.Б. Получение ионитов на основе реакции взаимодействия тиомочевины, эпихлоргидрина и различных аминов // Узб.хим. журн. Ташкент. – 2013. №5. С. 27-30.
2. Eshkurbonov F.B., Rakhmonkulov J.E., Ulugov B.D. Research of morphology and optical properties of complex-forming the ionit and their complex compounds of certain metals // EurAsian Journal of BioSciences. 2020/8/1. T14, №2. P.6045-6050.
3. Эшкурбонов Ф.Б., Джалилов А.Т. Исследование сорбционных свойств полученного ионита на основе гидролизованного полиакрилонитрила // Журнал Universum: химия и биология. 2014 г. № 3(4). С. 1-4.
4. ГОСТ Р 51641-2000 Материалы фильтрующие зернистые // ГОССТАНДАРТ России, Москва. 2000.