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STUDY METHODS OF OBTAINING COMPOSITES BY ADDING FILLERS TO LOCAL RAW MATERIALS

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Kholmurodova Dilafruz Kuvatovna
Professor, head of the department of medical chemistry, Samarkand state medical university Republic of Uzbekistan, Samarkand
Islomov Laziz Bekmurodovich
The leading lecturer of the academic lyceum of Samarkand state medical university. Republic of Uzbekistan, Samarkand
Mansurova Dilafruz Axmedjanovna
Assistant of the department of medical chemistry, Samarkand state medical university Republic of Uzbekistan, Samarkand

Annotation
This article is dedicated to obtaining charcoal briquettes by adding binders, using cotton stalks, an annual plant grown in Uzbekistan, as a filler..

Keywords
Coal, composition, coal briquettes, waste, filler, structure, strength, physical and mechanical properties.

Introduction. Coal industry is considered an integral part of fuel and energy not only in Uzbekistan, but also in the world.

Currently, coal reserves satisfy the needs of our republic for several hundred years.

The coal industry of Uzbekistan has a 72-year history. 85% of the coal mined in Uzbekistan comes from the Angren mine.

Three coal mining enterprises are engaged in coal mining. These are Angren lignite, Shargun and Boysun coal mines.

Lignite is a combustible mineral formed from lignite or peat [1].

Lignite differs from coal in appearance - it is always brown. It has lower carbon content and higher bituminous volatile matter and water content. Therefore, brown coal burns more easily, gives more smoke, smells, and also reacts with caustic potash and emits little heat. Coal reserves are abundant, and rational use of them is the need of the hour.

Objects and methods of research.

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One of the main ways of processing coal waste (screenings, spills, sludge, etc.) is their briquetting. The reserves of such waste annually increase to tens of percent of the total volume of coal mined. In terms of their quality characteristics, they are not inferior to coal mined and can be used to produce high-quality fuel. Of particular interest is the processing and utilization of carbon-containing materials of technogenic origin. An effective solution to this problem makes it possible to take into account the issues of environmental pollution and resource conservation [2].

The process of mechanical processing of coal fines into lump fuel - briquettes having a certain geometric shape, size and mass.

The object of the study was brown coals of the Angren coal mine of the Republic of Uzbekistan.

Waste from fat-and-oil production (gossypol resin) was used as a binder [2].

Cotton stems were used as a filler. It is well known that cotton is one of the main well-studied industrial plants by now [3-4].

Bentonite was used as target additives to modify gossypol resin.

Bentonite $Al_2[Si_4O_{10}](OH)_2 \bullet nH_2O$ – belongs to the group of montmorillonite clays, is confined to the upper glacial deposits [5], the pH of the aqueous suspension is 7-9, the chemical composition of bentonite has several characteristic features.

A set of experimental methods was used in the study: standard methods for determining the qualitative indicators of solid combustible minerals. Physico-chemical and technological, spectroscopic analyses. The technological characteristics of the fuel briquette filler (humidity, ash content, sulfur, nitrogen) are determined according to ГОСТ Р52911-2008, ГОСТ 11022-95, 8606-93, 28743-93, respectively. The sieve analysis was carried out according to ГОСТ 2093-82. Determination of the calorific value of solid fuel is carried out according to ГОСТ 147-95. The mechanical strength of briquettes is determined according to ГОСТ 21289-75. Determination of water absorption of briquettes is carried out according to ГОСТ 21290-75.

Humidity was determined according to ГОСТ Р52911-2008 "Solid mineral fuel. Methods for determining total moisture") [6].

The results obtained and their discussion. The table shows the qualitative test indicators of the developed coal briquette.

Table

Results of qualitative indicators of the developed fuel briquette

The composition of the ette	$W_{б}^{р}$, %,	$A_{б}^{р}$, %	$Q_{н.б.}^{р}$, kJ/kg	$П_{M_{brig,}}$ %	X_{brig}

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БУ %	CSh, %	CSh, %	TAd, %	Acc ıg to D	Fact	Acc ıg to RD	Fact	Acc ıg to D	Fact	Acc ıg to RD	Fact	A lin t D	Fact
80	10	9,5	0,5		7,0		19,5		3610		70,0		2,6
75	12	10,5	2,5	20	6,9	45	19,0	270	3645	46,1	70,5	4,	2,5
70	14	11	5		6,88		18,85		3655		76,0		2,2

-brown coal concentrate; GS-gossypol resin; CSh- cotton shavings; TAd-target additives (bentonite); Wbr - mass fraction of total moisture in the briquette, %; Arb - ash content of briquettes, %, no more; Qrn.b - the lowest heat of combustion of briquettes., kJ/kg, average; Pmbrig- mechanical strength, %, not less; Xbrig- briquette water absorption,%.

The figure shows the effect of the moisture content of Angren coal on the compressive strength of briquettes obtained at different pressing pressures.

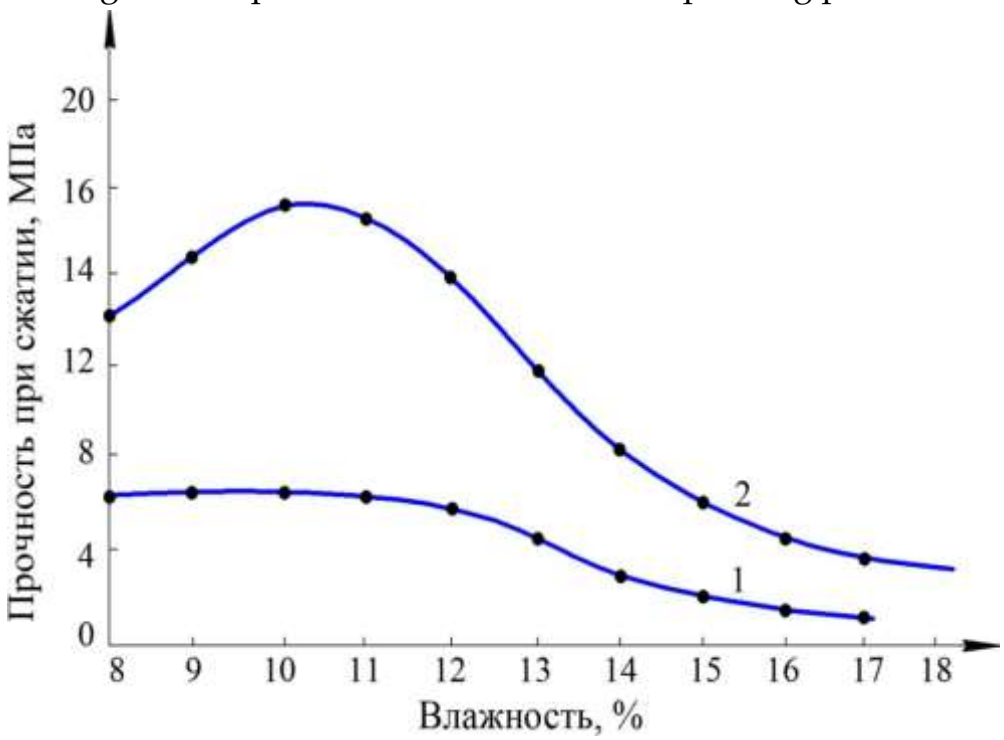

Fig. The effect of the moisture content of Angren coal on the compressive strength of briquettes obtained at a pressing pressure of 60 (1) and 160 MPa (2)

It can be seen from the figure that an increase in the moisture content in the coal from 11.5 to 18% weakens the adhesion between the coal and the binder. This is due to a sharp violation of the direct adsorption contacts in the interfacial zone, which leads to a decrease in strength. Therefore, we believe that the optimum for briquetting is the humidity of the air-dry state of coal in the range of 10-11%.

Conclusions. Thus, the technological characteristics of brown coals of the Angren deposit, which determine the possible directions of their further processing, are investigated. The unevenness of the quality indicators of coal is revealed, indicating the need for their averaging. As a result of experimental studies, it was found that gossypole resin meets the requirements: it has high adhesive properties, relative environmental safety, hardens quickly, has a high heat of combustion, is not deficient.

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