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## STUDY OF THE QUALITATIVE CHARACTERISTICS OF THE DEVELOPED COAL BRIQUETT FROM LOCAL RAW MATERIALS AND PRODUCTION WASTE

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### **Annotation**

*The article shows the development of coal fines briquetting using composite materials from local raw materials and production waste. Based on a deep study of the structure and physico-chemical properties of selected organic and inorganic ingredients from local and secondary raw materials, the patterns of formation of the physico-chemical and strength properties of coal briquettes based on them, depending on the nature, type, content and ratio of organo-mineral ingredients, have been established.*

### **Keywords**

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

**Introduction.** Today, the coal industry is the leading basic industry, which is an integral part of the fuel and energy complex of the Republic of Uzbekistan.

The reserves of natural gas and oil in the Republic of Uzbekistan are limited, and the reserves of coal meet the needs of the republic for several hundred years.

The coal industry of Uzbekistan has a 72-year history. The basis of the resource base of the coal industry of the republic is the brown coal "Angren" and two smaller coal deposits - "Shargunskoye" and "Baysunskoye". It should be noted that 85% of the coal mined in Uzbekistan comes from the Angrensky open pit.

Three coal-mining enterprises carry out coal mining. These are the Angren brown coal deposit, the Shargun and Baysun coal deposits.

Brown coal is a combustible mineral that is formed from lignite or from peat [1].

Brown coal differs from coal in appearance - it is always brown. It has a lower carbon content, and a higher content of bituminous volatile substances and water.

Therefore, brown coal burns more easily, gives more smoke, smell, and also, when reacting with caustic potash, it releases little heat. It contains a lot of water, so for burning it is used in powder.

**Objects and methods of research.** Currently, one of the main ways of processing coal waste (screenings, spills, sludge, etc.) is their briquetting. The stocks of such waste annually increase by tens of percent of the total volume of coal produced. In terms of their quality characteristics, they are not inferior to mined coal and can be used to produce high-quality fuel. Of particular interest is the processing and disposal 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 saving [2].

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

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

Waste oil and fat production (gossypol resin) was used as a binder [3].

Cotton stalks were used as filler. It is well known that cotton is one of the main well-studied industrial plants to date [4-5].

To modify the gossypol resin, bentonite was used as target additives.

Bentonite  $Al_2[Si_4O_{10}](OH)_2 \cdot nH_2O$  - belongs to the group of montmorillonite clays, confined to upper glossy deposits [6], the pH of the aqueous suspension is 7-9, the chemical composition of bentonite has several characteristic features.

The study used a set of experimental methods: standard methods for determining the quality indicators of solid fossil fuels. Physico-chemical and technological, spectroscopic analyses. The technological characteristic of the fuel briquette filler (humidity, ash content, sulfur, nitrogen) is determined according to GOST R52911-2008, GOST 11022-95, 8606-93, 28743-93, respectively.

Sieve analysis was carried out according to GOST 2093-82. Determination of the calorific value of solid fuel is made in accordance with GOST 147-95. The mechanical strength of briquettes is determined according to GOST 21289-75. Determination of water absorption of briquettes is carried out according to GOST 21290-75.

Humidity was determined according to GOST R52911-2008 "Solid mineral fuel. Methods for determining total moisture" [7].

The results obtained and their discussion. The table shows the quality indicators of tests of the developed coal briquette.

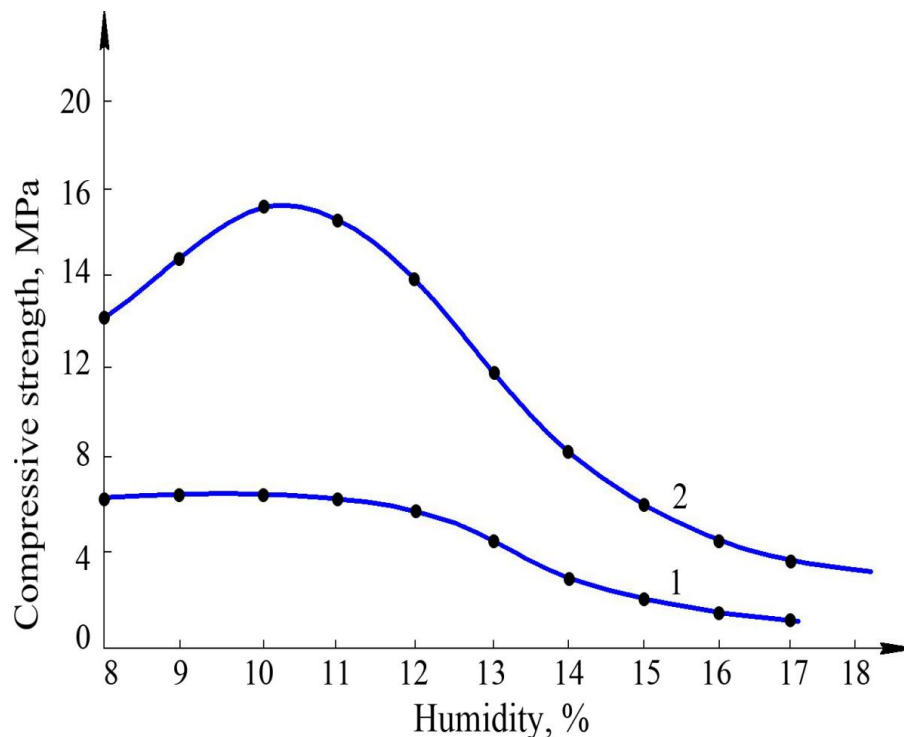
### Table

**The results of the qualitative indicators of the developed fuel briquette**

Briquette composition				W <sub>δP</sub> , %		A <sub>Pδ</sub> , %		Q <sub>P<sub>H.δ</sub></sub> , kJ/kg		Π <sub>M<sub>brig</sub></sub> , %		X <sub>brig</sub>	
BU %	GS, %	CX, %	CD, %	By N	actual	By ND	actual	By ND	actual	By ND	actual	By ND	actu
80	10	9,5	0,5	20	7,0	45	19,5	270	3610	46,0	70,0	4,0	2,6
75	12	10,5	2,5		6,9		19,0		3645		70,5		2,5
70	14	11	5		6,88		18,85		3655		76,0		2,2

BUK-brown coal concentrate; GS-gossypol resin; CX - cotton shavings; CD-target additives (bentonite); W<sub>br</sub>,% - mass fraction of total moisture in the briquette,%; A<sub>Pδ</sub>,-% - ash content of briquettes, %, no more; Q<sub>P<sub>H.δ</sub></sub>, kJ/kg - lower calorific value of briquettes, kJ/kg, average; Π<sub>M<sub>brig</sub></sub>,% - mechanical strength, %, not less; X<sub>brig</sub> - water absorption of the briquette,%.

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



Picture. Effect of 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 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%.

**Findings.** Thus, the technological characteristics of brown coal from the Angren deposit, which determine the possible directions for their further processing, have been studied. The non-uniformity of quality indicators of coal is revealed, indicating the need for their averaging. As a result of experimental studies, it was found that gossypol resin meets the requirements: it has high adhesive properties, relative environmental safety, quickly hardens, has a high calorific value, and is not in short supply.

## LITERATURE

1. Brown coal // Encyclopedic Dictionary of Brockhaus and Efron: in 86 volumes (82 volumes and 4 additional - St. Petersburg, 1890-1907.

2. Rasskazova A.V. Carbon-containing waste as a source of innovative commercial products [Text] / A.V. Rasskazova, K.V. Prokhorov // integrated development of georesources: materials of the IV All-Russian Scientific Conference with the participation of foreign scientists (Khabarovsk, September 27-29, 2011). In 2 vols. - Khabarovsk: IGD FEB RAS. - 2011. - V.1. - S. 389 - 395.

3. Askarov K.A., Kiyamova D.Sh., Kholmuradova D.K. Study of the process of obtaining fuel briquettes from industrial waste // Composite materials, 2021, No. 3, - P. 148-150.

4. The structure and development of cotton //Cotton v.3.- Publishing House of the Academy of Sciences of the Uzbek SSR.- Tashkent: 1960,-S. 9-12, 102-108, 212-218.

5. Мауэр Ф.М. Хлопчатник.- Изд-во АН УзССР.- Ташкент:1954. - С.4-12, 205-206.

6. Ibodullaev A., Yusupbekov A.Kh., Akhundzhanov B.D., Abdurshidov T.R. And the teaching of the technological properties of rubber mixtures filled with bentonite // Zh. 27-29.

7. GOST R52911-2008. Solid mineral fuel. Methods for determining total moisture [Electronic resource] - Access mode: <http://gosexpert.ru/gost/gost-52911-2008>.

8. Yusupova, S. S., D. K. Holmurodova, and Kiyamova D. Sh. "A New Source Of Biologically Active Substances Used In The National Economy And Medicine." *The American Journal of Medical Sciences and Pharmaceutical Research* 2.09 (2020): 35-40.

9. Kholmurodova D. K., Kiyamova D. S., M. STUDY OF THE STRUCTURE, PHYSICO-CHEMICAL PROPERTIES OF THE SELECTED ORGANIC AND NON-ORGANIC INGREDIENTS ON THE BASIS OF LOCAL AND SECONDARY RAW MATERIALS, AS RELATED TO THE DEVELOPMENT OF COAL BRIQUETTES //Thematics Journal of Chemistry. – 2022. – Т. 6. – №. 10. Холмуродова Д. К., Киямова Д. Ш. ИССЛЕДОВАНИЕ КАЧЕСТВЕННЫХ ХАРАКТЕРИСТИК РАЗРАБОТАННОГО УГОЛЬНОГО БРИКЕТА ИЗ МЕСТНОГО СЫРЬЯ И ОТХОДОВ ПРОИЗВОДСТВ //Горизонты биофармацевтики. – 2023. – С. 28-31.

11. Kumar P., Kholmurodova D. K. Digitalization of laboratory diagnostics. – 2022.

12. Аскарлов К. А., Киямова Д. Ш., Холмурадова Д. К. Исследование процесса получения топливных брикетов из отходов производств //Композиционные материалы. – 2021. – №. 3. – С. 148-150.

13. Негматов С. С., Киямова Д. Ш., Холмурадова Д. К. ИССЛЕДОВАНИЕ ВЛИЯНИЯ СВЯЗУЮЩЕГО НА ЭКСПЛУАТАЦИОННЫЕ ХАРАКТЕРИСТИКИ УГОЛЬНЫХ БРИКЕТОВ //Universum: технические науки. – 2022. – №. 1-3 (94). – С. 15-17

Раимкулова Ч. А., Холмуродова Д. К. РАЗРАБОТКА МЕТОДОВ И УСТРОЙСТВ ДЛЯ НЕИНВАЗИВНОГО КОНТРОЛЯ НЕКОТОРЫХ КЛИНИЧЕСКИ ЗНАЧИМЫХ БИОМАРКЕРОВ //ЖУРНАЛ ГЕПАТО-ГАСТРОЭНТЕРОЛОГИЧЕСКИХ ИССЛЕДОВАНИЙ. – 2022. – №. SI-2.