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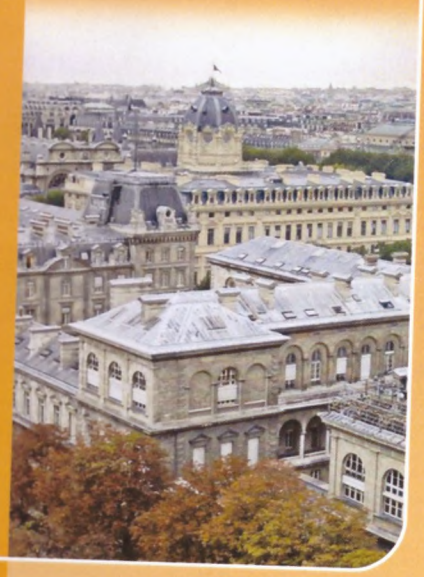

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ТЕХНИЧЕСКИ НАУКИ

Металургия

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EXPERIMENTAL RESEARCHING OF FUEL BRIQUETTES

In previous works [1-3].we determined sizes and geometrical shapes of empties, that are formed as a result of cubic and rhombohedra laying of spherical particles of components, according to the theory of filling voids with balls of equivalent diameter, recommended average granulometric values of briquette components are established, based on the concept of particle separation and the formation of an intergranular interlayer, the value of the minimum interlayer layer and the thickness of the enveloping film are established.

During experiment we used, following equipment, devices, instruments and materials: standard laboratory cylinder (Usman mechanical plant); separately laboratory cylinder; 6-tonn pneumatically model press 91271B; compressor type G-12; electric furnace SNOL-6,7/1300; dry furnace SNOL-6,7/350; press UEM WDW-200; microscope METAM LV-34; electronically scales with accuracy 0,01 gram; roller mixer; coal fine fraction 0,8 – 1,2 mm, rubber soot with constant fraction 60 – 100 Å, anode dust of electrolysis bath for aluminum production of fraction 0,2 – 0,4 mm.

In our experiments we prepared briquette mixes with different composition and granulometric grains of coal fine because sizes of anode dust and rubber technical soot are constant.

Briquette mass mixed in roller mixer with powdery state of three components, then weighted on scales 140 gr of mixed mass putted in laboratory cylinder with diameter 50 mm and height 120 mm with pallet and heated up to 200 – 250 ^{0}C in 5 minutes in furnace. After that, cylinder with putted mix under 6 tonn press and sealed with presuure 25,5 MPa. After, briquette sample pushed out from cylinder and determed density of produced briquette. Height of this briquettes fluctuates 50 ± 1 mm, from unstable working of pneuma-press unit, which is peculiar to this equipment

which works on pressured air. Therefore density of produced briquettes fluctuates in permissible limits from 1,38 to 1,46 g/sm^3. [4-6].

From each mix and determed composition we produced each batch was made of five samples and their average values were composition of samples. In this way we, present 6 samples. One of this batch was taken to the TOO «Technological institute of coal chemistry and technology» (Astana), as independent experts, for determination of carbon and enthalpy of coal briquettes burning. (Table 1).

Table 1- Characteristics of fuel briquettes samples

N	Components	Content, %	Mixing time, min.	Temperature, °C	Briquette density, g/sm^3	Specific press pressure, MPa
1	Coal Anode dust Petroleum pitch	45 30 25	8	200	1,41	25,5
2	Coal Rubber soot Petroleum pitch	53 27 20	5	250	1,44	25,5
3	Coal Anode dust Petroleum pitch	45 25 30	8	200	1,42	25,5
4	Coal Anode dust Petroleum pitch	53 27 20	5	250	1,46	25,5
5	Coal Anode dust Petroleum pitch	45 30 25	8	250	1,45	25,5
6	Coal Rubber soot Suspension	50 25 25	5	105	1,38	25,5

According to certificate values, that was given by TOO «Technological institute of coal chemistry and technology» (Astana) samples with the best values № 1, № 3, № 5, in a.w probes, where composition is analytically corresponding to calculated recipe of briquette mass and dry mixing duration (Table 2).

Table 2 – Results of chemical analysis on carbon (C) in coal briquettes and calculation of enthalpy of coal briquettes burning

№ of briquette	Carbon content, %	$-\Delta H^0_{burning}$, kJ/kg	$-\Delta H^0_{burning}$, kcal/kg
1	61,05	23834	5696,5
2	54,63	19523	4666,1
3	63,89	25741	6152,3
4	60,74	23626	5646,0
5	68,18	28622	6840,8
6	56,31	20651	493,7

Calculation $\Delta H^0_{burning}$ was made according to formula from experimental data on enthalpy of coal burning of «Northern» Ekibastuz field:

$$\Delta H_{burn.} = 17161 - 671,5\ (\%\ C),\ kJ/kg.$$

Comparison to heat of combustion of Ekibastuz's coal (17380 kJ/kg) shows better heat characteristics of coal briquettes on higher thermal characteristics of coal briquettes on both bio-binding and petroleum pitch.

Conclusions:

The quantitative ratio of the components in the briquette is determined. The density of the components and the necessary density of the briquette were determined, the weight ratios of the components and the mass of the charge loaded into the batch were calculated.

It is revealed that the calorific value of briquettes is higher than Ekibastuz's coal by 20-40%, and the heating value ($-\Delta H^0_{burning}$ = 6840,8 kcal/kg) is the highest for