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Fuel Based on Food and Agricultural Organic Waste Development of Safe Technology of Briquettes

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Abstract: Wood waste is generated at all stages of its processing, from cutting wood (twigs, chips) to the production of carpentry. Wood waste can be classified according to the range of raw materials (waste wood, plywood and fiberboard); by type of wood (hardwood waste, solid wood waste); by humidity (dry - up to 15%, semi-dry -16 - 30%, wet -31% and above, ultra-wet 100% and above); by structure (piece large, piece medium, piece small, empty); by recycling stages (primary waste, secondary waste.

Keywords: kaolin, rice, cotton stalks, flood, secondary raw materials, waste, mixing process.

In our country, a consistent policy is implemented in the field of ensuring environmental protection, rational use of natural resources, as well as improving the sanitary and ecological conditions of the regions. In particular, in the short term, large-scale work was carried out on the improvement of the infrastructure of the system for the implementation of works related to solid household waste, the establishment of clusters for the complex implementation of work related to household waste with a total capacity of more than a million tons of household waste per year. The measures taken made it possible to increase the coverage of the population with sanitary cleaning services by more than ten times [1].

More than 100 million tons of industrial waste is produced in Uzbekistan every year, about 14% of which is toxic. The largest amount of waste is located in Navoi, Tashkent, and Fergana regions and is produced in mining and processing industries. Only 0.2% of the generated solid industrial waste is used as secondary raw materials, and the rest is stored in storage tanks. In the Republic about 10,000 hectares of land are occupied by industrial waste collectors [2;3].

In accordance with the Law "On Waste", state control over waste-producing enterprises is carried out by the State Committee for Nature Protection of the Republic of Uzbekistan, which is responsible for burying waste and maintains the state cadastre of burial places, maintains the state cadastre. environmental expertise of research and technological developments and project-estimate documents. According to the information collected in the database of ecological indicators, the tendency of the annual volume of solid industrial waste to decrease in the following years is being observed in the republic [4;5;6].

According to the information of the State Committee for Nature Protection and relevant ministries and agencies, about 30 million m3 of household waste is generated in the republic per year [7;8]. At the same time, with every million tons of household waste, 360,000 tons of food waste, 160,000 tons of paper and cardboard, up to 55,000 tons of textiles, up to 45,000 tons of plastic and many other recyclable components are lost.

Methods of research work. Preparation of fuel briquettes in the laboratory. The first step in the preparation of fuel briquettes in the laboratory is to collect all the components, remove impurities and dry them.

Components used in the laboratory:

1) rice stalk.
2) rice husk.
3) stems and stalks of cotton.
4) water.

Before starting the process of mixing the components, all the components are dried because. excessive moisture of the components interferes with grinding. The following components are dried:

1. rice stalk;
2. Stems and pods of cotton.

In the process of drying, the internal moisture of the components is removed. The drying process is carried out in an oven at a temperature of 50-700C for 4 hours.

The next step is the preparation of fuel briquettes in the laboratory - grinding all the components to fine particles. Grinding is done in a grinder. Grinding coal fines (dust), rice stalk; the stems and bolls of the cotton go through without difficulty due to their soft structure. Unenriched kaolin (clay) is ground in a mortar. Difficulty in grinding occurs only with cotton stalks, because cotton stalks have a fibrous sheath that interferes with the grinding process. Also, cotton stalks have a more rigid structure compared to other components. In laboratory conditions, the husk of the cotton stalk is cleaned by hand and crushed using two types of grinders.

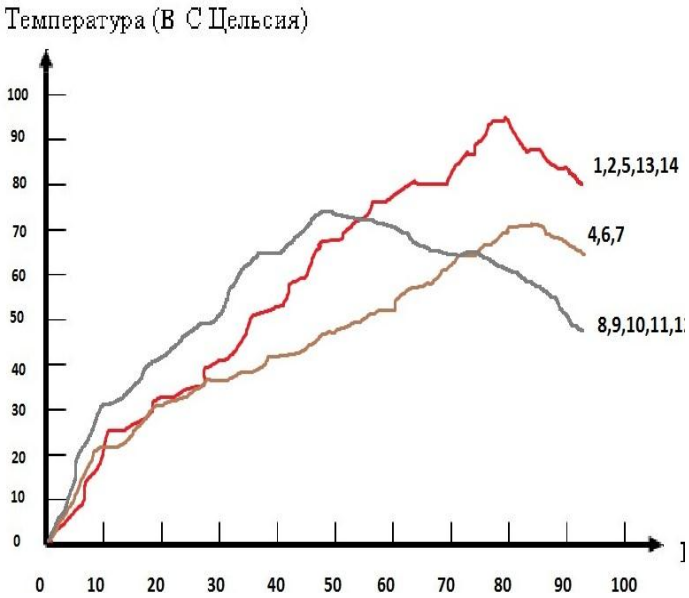
After drying and grinding, all components are mixed in different proportions. Mixing is done in special laboratory glassware with slow addition of water and binder -unenriched kaolin -with constant stirring. The binder - non-enriched kaolin - dissolves well in water. The mixture is mixed until it has a homogeneous porridge-like mass [3].

The fourth step in the preparation of fuel briquettes in the laboratory is to create a briquette shape. The shape of the briquette can be different. A pre-engineered block of rectangular wooden blocks with a hole size of 3 cm x 4 cm x 3 cm in the laboratory. The mixed components are carefully placed in the opening of the space.

The fifth stage of making fuel briquettes in the laboratory is pressing the briquettes into blanks. The specific pressure during pressing is from 50 to 90 kg/cm. The pressing process takes 1-3 minutes. After pressing, the briquettes are squeezed out of the space.

Results of scientific research. Tests of fuel briquettes were carried out in a laboratory device. Water is poured into a heat-resistant flat-bottom flask with a capacity of 100 ml fixed on a tripod. A test sample of briquettes was placed under the flask and ignited. The ignition temperature was measured using a thermometer at the water heating temperature. 14 ignition temperatures of the sample were measured. The ignition temperature measurement of sample No. 3 was not performed because the sample did not ignite due to the high content of the binder component.

Graph 1. Time dependence of the burning temperature of briquettes.



Only 3 graphs were constructed because the ignition temperatures of some samples were almost the same.

Sample 4 contains a large amount of binder, raw kaolin, and contains a large amount of ash from the wood processing industry, which deteriorates the combustion process of the briquette. Sample -7 contains a large amount of cotton seeds, which also worsen the burning process of briquettes.

Samples 8,9,10,11,12 are samples with average burning temperature. The samples contain rice stalk waste. All samples contain waste in different proportions: coal fines, firewood, cottonseed, kaolin. It was found that these samples have the property of retaining heat for a long time during combustion, samples 1;2;5;13;14 are the samples with high combustion temperature.

Sample 1 contains equal proportions of coal particles, rice stalks, cotton bolls, and topon. It has a high ignition temperature, but very low mechanical strength. Sample 2 contains a large amount of coal fines, l but is also not strong. Sample 5 contains a large amount of coal fines, has a high ignition temperature, and due to the binder, the mechanical strength of the raw kaolin coal deposit is considered high. In sample 13, they are replaced by crushed cotton husks, which have a high burning temperature. In sample 14, there is no cotton stalk and topon, they are replaced by ground rice stalk, which has a high burning temperature.

Conclusions and suggestions. In the development of safe technology of fuel briquettes based on organic waste of food and agriculture, it was proposed to obtain fuel briquettes by studying and analyzing the physico-chemical properties of waste, especially of organic origin. It was found that the obtained fuel briquettes can be used as a source of thermal energy. Such briquettes can be widely used in the rural and sub-mountain areas of the Republic of Uzbekistan, where thermal energy is always in short supply, especially in the autumn-winter season [9; 10; 11]. As a result of the introduction of this technology for the production of fuel briquettes, many issues related to the disposal of industrial and agricultural waste, which are accumulated on the ground and are not used in practice, are harmful to the environment, are solved. is being done. It is also possible to contribute to the development of small businesses in the area by providing new jobs in the production of fuel briquettes from solid organic waste generated as a result of the use of the proposed technology. Due to the unique production technology and the use of only natural materials in the production process (for example, hemp stalks, rice stalks, kaolin, hemp, hemp husks), fuel briquettes are not harmful to human health during combustion. It is explained by the fact that it does not release toxic substances.

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