

RESEARCH ON THE PRODUCTION OF COAL BRIQUETTES ON THE BASIS OF CRUSHING INDUSTRIAL WASTE

Alimov A. A.

PhD, Bukhara engineering-technological institute,
Uzbekistan, Bukhara city, +99897 445-19-00

Juraev J.M.

Trainee researcher, Bukhara engineering-technological institute, Uzbekistan, Bukhara city,
juraevjurabek0707@gmail.com, +998914169590

Abstract

Nowadays, the demand for solid fuel products in the country is growing day by day. However, in the production of solid fuel products, including the production of briquettes based on the fine fraction of coal and biocomposites, it is first necessary to address the issues of increasing its heat transfer efficiency. To do this, an in-depth analysis of the physical and mechanical properties of the selected raw materials, the degree of grinding, the laws of structural dependence, the basis for the introduction of targeted technologies. One of the main raw materials in briquette production is coal fraction.

Keywords. Coal fraction, grinding methods, grinding process, coal briquettes, humidity, dryers, briquetting device

Introduction

The efficiency of large and medium crushing process depends on the moisture content of the raw material, and this method is widely used in crushing raw materials, which usually have very low humidity. For processing dry and wet raw materials (in aqueous medium), the use of fine and ultra-fine grinding is considered effective. It is known that the mechanical strength of solid raw materials, the choice of crushing devices and methods depending on the structural structure allows obtaining goal-oriented results. The research work carried out by leading scientists describes the laws of use of grinders and mills according to the size of the raw material, its structural structure. Grinding is a very energy consuming process. In particular, in the formation of new surfaces, the energy expended to overcome the internal frictional forces generated by the deformation of body molecules and to overcome the external frictional forces between the surface of the substance and the working body of the grinder. The complete disintegration of the raw material occurs only when the cracks formed on the entire surface of the raw material under the influence of impact intersect in several directions. Also, the pressure acting on the entire volume of the deformed body is too high in some parts of the raw material, leading to fragmentation deformation and crushing [1].

Methods

One of the factors influencing the effective aggregation of the coal fraction with biobinders and the formation of an appropriate structure is the degree of fragmentation of the coal fraction. In this regard, the section entitled “Review of these literatures” studies the design, methods and laws of crushing devices for obtaining a fine fraction of coal. The process is based on volumetric and surface fragmentation, and according to surface theory, the work done in grinding is proportional to the surface fragments formed during grinding. The new surface formed during grinding is inversely proportional to the amount of surfaces of all the pieces dk. In this case, different levels of grinding are determined for the same size of starting material. The work consumed is proportional to the degree of grinding of the materials [2].

Table 1. Grinding methods

Type of grinding	The size of the solid particles before crushing, mm	Dimensions of solid particles after crushing, mm	Degree of fragmentation
Large (crushed)	1500-300	300-100	2-6
Medium (crushed)	300-100	50-10	5-10
Small (crushed)	50-10	10-2	10-50
Mild	10-2	$2-75 \cdot 10^{-3}$	~100
Fluffy	$10-75 \cdot 10^{-3}$	$75 \cdot 10^{-3}-1 \cdot 10^{-4}$	-

In the industrial sector, mills are used to create ultra-fine, fine-grained dispersed systems, and the methods of crushing, crushing and crushing of raw materials into several pieces are used. In the application of crushing methods, it is advisable to take into account the laws of interaction with liquids, including the physicochemical properties of solids. The crushing method of crushing is more effective in breaking down raw materials with high moisture content. According to the laws of mechanics, during the crushing process, deformation occurs in the structure of the raw material due to the influence of external forces, and cracks are formed at weak points. If the force action directed across the volume of the body is stopped, it is observed that the raw material undergoes elastic deformation due to the interaction of internal molecules. It can be converted into high quality coal briquettes by adding efficient waste fillers and binders, as well as used as fuel. Coal briquettes can be used effectively as a universal heating medium in industrial and social facilities [3].

Table 2. Methods of grinding on the mechanical properties of materials

Material structure	Grinding method
Hard and brittle	Tension, shock
Hard and elastic	Crushing
Brittle	Impact, fragmentation, friction
Sticky, medium hardness	Friction, shock

They can be used to meet the needs of small and medium-sized production facilities, social facilities (administrative buildings, schools, hospitals), the population. Any enterprise engaged in the sale or processing of any coal faces the problem of collecting coal ash and dust. About 20-30% of the total mass of coal is a powder fraction of up to 6 mm, and it is usually difficult to use this raw material as a fuel. One of the most effective ways to solve this problem is to use it in the production of coal briquettes from coal dust and fine particles [4].

The use of efficient coal briquetting technology allows to obtain high-quality and competitive coal briquettes from a small fraction of coal. One of the most promising methods is the production of coal briquettes using organic additives (cattle manure) and liquid binder (rice starch solution), which are effective and environmentally friendly binders. Coal fuel briquettes are a high-tech fuel compared to ordinary coal. Coal fuel briquettes with organic additives and binders are an environmentally friendly product that burns almost smokelessly, making it an ideal fuel for heating rooms of various sizes. Coal fuel briquettes are used as fuel for heating stoves, fireplaces, all types of stoves, tents, greenhouses and more [5].

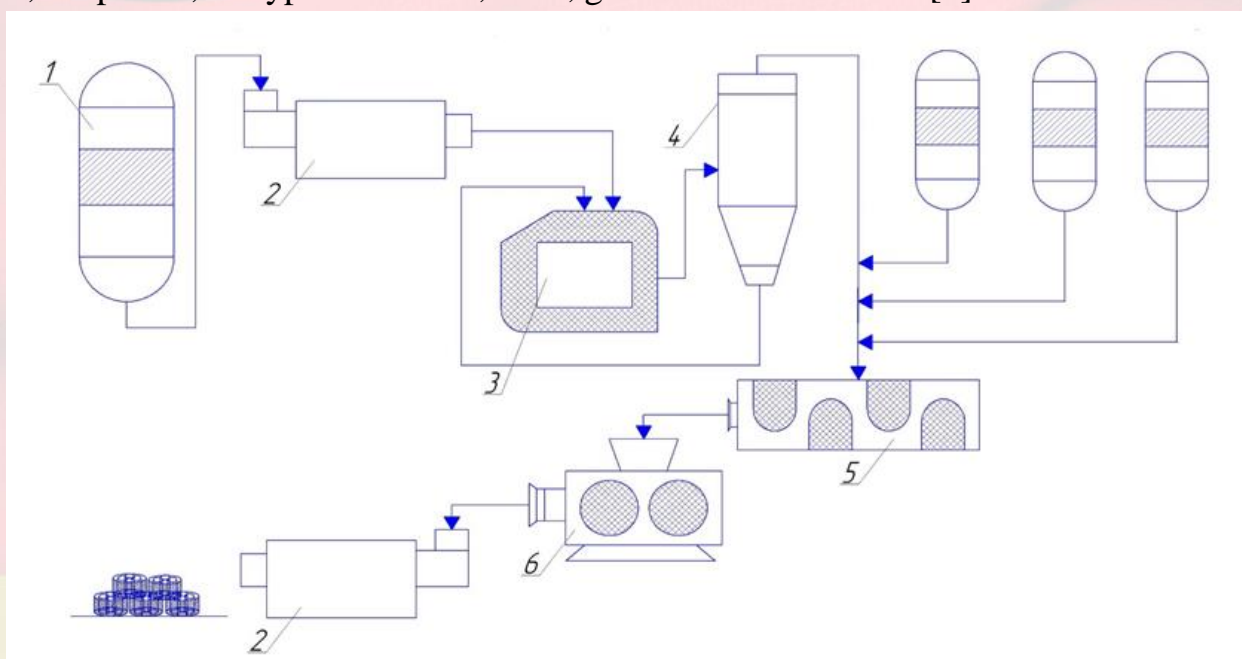


Figure 1 Technological scheme of production of coal briquettes

1 - Storage capacity of raw materials; 2 - dryers; 3 - grinder; 4 - sorting cyclone; 5 - mixer; 6 - briquetting device (press);

The main advantages of coal briquettes are their long combustion and stability of the combustion process, as well as ease of storage in narrow storage conditions.

The essence of the developed method of preparation of coal briquettes involves the crushing of coal fraction and biocomponent component (cattle manure). In the mixer, these dry components of the briquette are intensively mixed in a ratio of 80:20, followed by the addition of a liquid binder at the end of the mixing process. This liquid binder is an aqueous solution of rice starch and polyacrylamide in a ratio of 40: 1. The resulting mass is transferred to precipitation, which results in adhesion and structure formation in the mass, as well as

biochemical reactions. As a result, high mechanical parameters of the finished product are achieved [6].

Coal briquettes obtained by this method have high mechanical properties. The process is carried out in the following sequence: the pieces of coal delivered to the plant fall into the storage capacity of the raw material (1). From it the raw material is sent to the dryer (2). In the dryer, the pieces of coal are dehumidified, which makes it easier to use in subsequent processes. In the dryer, the dehumidified pieces of coal fall into the grinder (3). The grinder grinds the pieces of coal to a size of 1 mm and pulverizes them. The crushed coal particles are sorted in a sorting cyclone (4), and those that are sufficiently crushed are sent to the next stage for processing, and those that are not sorted are sent back to the grinder. The coal powder from the sorting cyclone is mixed with a mixture of bio binder (cattle manure), starch and water in a ratio of 40: 1 and sent to the mixer (5). Mixing is continued until a homogeneous paste mixture is formed. In turn, it helps to distribute the components evenly over the mass. The mixture is left in the open air for some time. Adhesion, structuring, and many chemical processes take place there. As a result, high mechanical parameters of the finished product are achieved. The mature mass is fed to the briquetting device (6). The briquette is dried in a dryer and sent to warehouses as a finished product.

Conclusion

One of the main raw materials in briquette production is coal fraction. One of the factors influencing the effective aggregation of the coal fraction with bio binders and the formation of an appropriate structure is the degree of fragmentation of the coal fraction. In this regard, the section entitled "Review of these literatures" studies the design, methods and laws of crushing devices for obtaining a fine fraction of coal.

References

1. M.S. Mirkomilova "Analytical Chemistry" Uzbekistan - 2003
2. K, Akhmedov, R. Sayfiddinov "General and inorganic chemistry" Uzbekistan - 2003
3. Sh.Nazarov and others "Analytical Chemistry" Teacher - 2000
4. N.L. Parpiev "Theoretical bases of inorganic chemistry" Uzbekistan -2000
5. Djuraev X.F., Rasulov Sh. X., Mizomov M.S. "Automation of oil remnant separation process" 24-226 p.
6. 22. Podchukaev, V.A. «Theory of information processes and systems»: uchebnoe posobie / V. A.Podchukaev. - M .: Gardarika-2007.