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Productivity of Brown Coal for Briquette Production

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ABSTRACT: This paper discusses such problems as the necessity of bricketîng coal, the efficiency of complex coal processing, and the basic consumer properties and evaluation criteria of briquettes. Also outlined are methods which enable the production of briquettes of high quality, results for tested briquettes made in laboratory conditions, and recommendations for manufacturers.

1 INTRODUCTION

During production, transportation and storage, brown coal is crushed by 20 to 80 % of its original volume and turns into coal dust or chaff Thus, during layer burning of raw coal in furnaces, and in small and average-size boilers, up to 40 % of this dust drops unbumed through grid-irons together with ashes, and up to 20 % of small pieces are lost through pipes together with smoke gases. Up to 30 % of the total coal is lost in diese ways. Thus, for every 3 tons of coal, 1 ton is not used, but instead pollutes the environment. In addition, pulverised coal frequently causes spontaneous combustion in storage. Therefore, bricketing of dust with particle sizes of 6-8 mm is an important issue.

It is more effective to make coal bricks together and in conjunction with other coal production: synthesis - gas, synthetic combustible, absorbents, restoring agents, etc. Complex production of coal products reduces the costs of the crushing of coal up to the required standard, and the heavy hydrocarbons obtained during coal gasification and hydrogénation are used in die production of briquettes as binding substances. It is also possible to respond actively to fluctuations of coal product sales in the market, by changing the volume of briquette production and, for example, liquid combustible from the same volume of coal with the purpose of stabilizing the volumes of production, transportation and crushing.

The production of briquettes is carried out with known techniques, but for each type of coal under optimum technological modes and parameters, which need to be determined by research and development.

The basic consumer properties and seams are made in laboratory conditions for the solution of these problems. Briquettes are tested for durability, heat-generation ability and water-resistance. For these purposes, the theoretical bases of coai bricketing with and without binding substances are developed. The technique of production and tests of experimental briquettes from coal dust are developed, and the laboratory equipment and devices are assembled.

The research conducted has shown that the best binding materials are bitumen and wastes of cellulose-paper production, but bricketing brown coal is possible without binding substances. The optimum humidity of briquettes is within the limits of 14-18 %. At a specific pressure of 70 to 130 MPa, the strongest briquettes are obtained. For production of briquettes at die indicated pressures, the design and creation of a special rolling type pressing İs necessary. On the basis of the results of the research, the technological principles for designing briquette factories are developed, in which technological, economic and ecological demands, and also the need for safe technology in briquette factory processing of coal dust to briquettes (small coat pieces) of Kıyaktinsk B3 grade brown coal are fulfilled.

The evaluation criteria for briquettes are its heat-generating ability (calorie content), durability during transportation, storage and burning, and also atmosphere-resistance (in particular water-resistance). These properties of briquettes depend on the material and granulometric structure of the bricketted coal, the properties of the binding substance and other components added for the improvement of separate qualities of briquettes. The properties and quality of briquettes also depend on the production

conditions and, in particular, the pressing of briquettes, i.e., on the "know-how" of briquettes.

Therefore the basic purpose of the research carried out in the D. A. Kunayev Institute of Mining is the development of the optimum "know-how" for briquettes for various grades of coal extracted in the Republic of Kazakhstan. For this purpose, the following problems are being tackled:

1) Determination of optimum granulometrics of coal structure for bricketing.

2) Establishment of optimum binding substance and other necessary components.

3) Establishment of optimum amount of water added for bricketing.

4) Determination of optimum pressure and temperature of pressing.

5) Determination of optimum size of the briquettes for their various applications.

6) Determination of optimum methods of coal drying and cooling of briquettes.

7) Development of technology for packing briquettes for loading, transportation and storage.

The experimental briquettes are made from various grades of coal from different deposits.

2 CONCLUSIONS

The suggested principles and the "know-how" of coal brick production İn conjunction with production of other coal products results in increased quality of briquettes, reduction in cost, increased profitability of production and combustible consumption, increased competitiveness of briquettes in consumers markets, and reduced anthropogenous load on the environment by prevention of self-burning and contamination of the bio-sphere with small coal pieces.

The technique of bricketing in conjunction with the production of other coal products is more effective in brown coal processing, as it is richer in organic materials, in humuses and pitch, and İs crushed more than other types of coal. The coal bricks are intended mainly for municipal-household use and for consumption in trains, schools, hospitals and military houses.