

## Contents

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### THE INFLUENCE OF THE STORAGE TIME OF COALS ON THE QUALITY OF COKE

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In the open-air coal warehouse of PJSC "ZAPOROZHKOCS", the influence has been studied of storage periods in stacks with a capacity of ~ 200 tons of coal of various grades on their technological properties and the quality of blast furnace coke obtained from coal blends with their participation. The need for research is due to the transition of domestic enterprises to an inter-basin coking raw material base, which caused an increase in the duration of the transportation and storage of coking coal.

It has been shown that long-term storage of coals led to a noticeable decrease in the thickness of their plastic layer, the burst pressure developed by the blend during coking, as well as the content of carbon and hydrogen in the coals. This is due to oxidative processes that occur during storage of coal in the open air. This is confirmed by a significant increase of the oxidation index of the studied coals.

To study the influence of the degree of oxidation of coal on the indicators of their coking ability, laboratory coking of coal blends has been carried out. Tested blends included the coal concentrates selected at different periods of their storage. Compiled and prepared coal blends were subjected to coking in a laboratory 5-kg oven designed by SE "UKHIN". For the cokes obtained from the experimental blends, in addition to the strength and abrasion indicators, technical analysis indicators, structural strength according to Gryaznov, abrasive hardness according to Ginzburg, as well as CRI reactivity and CSR post-reaction strength according to DSTU 4703: 2006 has been determined.

The studies revealed that the use of oxidized coal in coal blends leads to a deterioration in the "mechanical" ( $M_{25}$ ,  $M_{10}$ ) and "hot" (CSR) strengths of blast furnace coke obtained from them. As a result of oxidation of the components of the coal blend, the mechanical strength of the obtained coke worsened from 93.9 to 91.2 and from 5.5 to 6.8 %, respectively; indicators of abrasive hardness and structural strength decreased from 63.7 to 57.7 mg and from 89.7 to 82.0 %, respectively.

Based on the results obtained, the previously developed ultimate storage standards for coals of certain grades in the fields of open coal warehouses has been confirmed.

Keywords: coking coal, storage, oxidation, coke quality, technical analysis, strength, ultimate storage standards for coal storage.

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### CHANGE OF THE ACTUAL MASS OF COAL WHILE DEFROSTING

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The article is devoted to the further development of the theory of freezing of coal. To this aim, the study of the dependence of the freezing temperature of coal on its particle size distribution and the level of working moisture content has been performed. This is an urgent task, the solution of which will allow to optimize the work of the coal preparation workshop, as well as to reduce the energy costs for heating the frozen coal.

Wellmore's coal sample has been used as a model sample in laboratory studies. Data on the maximum moisture capacity of six fractions of its particle size distribution were obtained. It is concluded that the maximum moisture capacity decreases with increasing size of the studied coal classes. Therefore, it can be expected that the highest content of working moisture and freezing will be characterized by coal particles with a size < 3 mm and especially < 0.5 mm.

The influence of the level of humidity (6, 10 and 12 %) on the freezing of different classes of the studied coal sample, as well as on the loss of mass of coal in the process of defrosting, were determined.

Particles begin to freeze when the moisture content in them exceeds the value of the maximum capacity. In turn, the magnitude of the maximum capacity depends on the degree of metamorphism and in the range of coking coal has the maximum values for the low-metamorphosed coal. Taking into account this fact, these coals may be found less time in

the defrosting garage compared to other coking coals.

With decreasing temperature, the degree of coal freezing increases with increasing humidity.

Using mathematical statistics, an equation has been obtained describing the change in the mass of coal when it is thawed, depending on the moisture content, average particle diameter of the coal, and time spent in the defrosting garage. This equation makes it possible to estimate the reduction in the mass of coal in the process of defrosting, depending on its quality indicators and the conditions in the defrosting garage.

Keywords: coal, maximum water holding capacity, freezing, garage defrosting, weight loss.

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## USING TREATED PHENOLIC EFFLUENTS IN WATER SUPPLY OF COKE OVEN AND BY-PRODUCT PLANTS

© I.V. Haponova (SE «GIPROKOKS»)

The article provides an analysis of the current situation with the use of purified phenolic wastewater, especially in the conditions of the implementation of dry coke quenching facilities at the enterprise.

The data on the balance and methods of wastewater treatment at the coke production plants has been described, which are presented, in addition to phenolic and rainwater, by the waters of reverse cycles, household and sludge spillways, as well as drainage waters.

During the construction of dry coke quenching plants, not only the possibility of utilizing purified phenolic water for wet quenching of coke is reduced, but also purge water from boiler rooms is added. As a result, a need arises to dispose of excess wastewater in the territory of the coke production.

The reasons for a long time hindering the commercial implementation of the use of purified phenolic water in the circulating water supply systems of the coke production has been summarized. The existing domestic and foreign practice of using phenolic wastewater by specific enterprises is shown. For example, at Alchevskkoks PJSC, purified phenolic waters are using for wet quenching of coke, and purge and rainwater are sending to the sludge storage of a metallurgical plant.

The requirements for the quality composition of recycled water for cooling systems according to various enterprises, as well as the degree of purification of phenolic wastewater in accordance with industry standards for replenishment of wet quenching cycles and other evidence has been presented.

It is shown that for the implementation of the use of purified phenolic wastewater at the territory of the coke production plants it is necessary to strive not only to increase the depth of treatment, but also to minimize the amount of their formation. The rationale has been given for the accommodation of the purification of water of boiler blowdown as well as water of chemical treatment directly at the place of their formation and the need to clean from bound ammonia that wastewater, which is transferred to reverse cycles to reduce corrosion and the amount of suspended substances.

Keywords: phenolic wastewater, treatment facilities, wet coke quenching, dry coke quenching unit, excess wastewater.

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## UNIFIED EVALUATION OF THE INFLUENCE OF OBJECTS OF ECONOMIC ACTIVITY ON ENVIRONMENT

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The article analyzes the state of solving the problem of integrated assessment of the environmental impact of an economic activity. It is proved that in the normative documents, and even in the scientific and technical literature, there is no single clear criteria according to which it would be possible to comprehensively assess the level of environmental hazard. The main shortcomings of the existing approaches to environmental hazard assessment are formulated. When assessing the level of danger, it is important not only to know the situation at the moment, but also in the dynamics:

trends of its change, previous and predicted situation. We must also take into account the features of complex natural systems.

An integrated approach to assessing the environmental risk of industrial and other environmental impacts is proposed. The environmental safety assessment of the facilities is carried out on a component-by-component basis, followed by the calculation of summaries and based on the analysis of a set of diversified indicators. These figures are given in a single relative units of measure. There are three complexes of factors, indicators and standards of environmental impact in different aspects of action: ecological, hygienic, environmental and ecological and economic. The options for aggregation of indicators are selected: by type of environmental impact.

The environmental safety assessment of the facilities is carried out on a component-by-component basis, followed by the calculation of summaries. An integral measure of the environmental hazard of all impact factors is the criterion for selecting the element to which the object has a major impact (or priority element).

The proposed approach to the assessment of environmental safety of objects has the following advantages: takes into account the specific impact of enterprises in different industries, comprehensively assesses the impact of objects of negative impact on the environment, allows to rank the objects of negative impact on the degree of environmental safety, allows to take into account the requirements of different restrictions the impact of businesses on the environment, and does not exclude the use of previously developed techniques, but complements them.

Keywords: object of economic activity, environment, influence, integral estimation, degree of ecological danger, complex approach.

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