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Specialty 161 (05.17.07)

THE INTERBASIN RAW MATERIAL BASE OF COKE-CHEMICAL PRODUCTION OF UKRAINE: PROBLEMS OF CHARGE FORMATION, ITS PREPARATION AND COKING

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The evolution of the development of an inter-basin raw material base for coking plants of Ukraine has been traced. The share of participation of Ukrainian as well as imported coal in 2015-2018 in the base has been shown.

It has been shown that the imported component of the Ukrainian coal blends has expanded due to the use, except for the near (Russia, Kazakhstan), of coal from far abroad countries – USA, Canada, Australia. There is a substitution of Ukrainian coals with imported, mainly Russian and American origin. Currently, there are two large metallurgical companies operating in the Ukrainian controlled territory that have coke production – METINVEST HOLDING LLC and PJSC ArcelorMittal Kryvyi Rih. Each of these companies, first of all, tries to use its own foreign assets in the raw material base of coking. Those of METINVEST HOLDING LLC are an American coals (UCC) – Wellmore, Carter Roag (both of grade ZH) and Pocahontas (OS grade). PJSC ArcelorMittal Kryvyi Rih uses its own assets of the Karaganda basin of Kazakhstan (K, KZh, OS brands).

The information on the brand composition and charge quality of coke-chemical production facilities of the two main metallurgical companies of Ukraine – PJSC "ArcelorMittal Kryviy Rih" and LLC "METINVEST HOLDING" has been provided. The quality of the blast coke produced by them, including from the charge, which is coked in the classical bulk method and from the tamped mixture has been compared. The data presented show that tamping technology allows to obtain the blast-furnace coke of high mechanical and "hot" strength from the coal blends with an increased participation of thinning components of different stages of metamorphism.

The problems of formation between the basin coal charge, the features of its preparation and the heat engineering mode of coking are indicated. It is shown that the increase in the share of Petrographic heterogeneous coal in the charge should be taken into account in the technology of its preparation and coking.

Keywords: coal, coke, interbasin raw material base, loading of the charge in bulk, coking of the tamped mixture.

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THE STUDY OF THE INFLUENCE OF INDIVIDUAL TECHNOLOGICAL FACTORS ON THE RESULTS OF THE PROCESS OF THERMO-OXIDATIVE TREATMENT OF MEDIUM-TEMPERATURE PITCH

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The article presents the results of industrial experiments to assess the influence of the composition of the reaction melt and its processing conditions on the quality of the product obtained by the traditional technology of thermal oxidation of the medium-temperature pitch using atmospheric oxygen. Developed in the middle of the last century, this technology is designed to process the raw materials obtained from coal tars of an average degree of pyrolysis (the content of the solid dispersed phase is 4.0-6.0 %). In modern conditions, characterized by sharp and often unpredictable fluctuations in the properties of coal tar (CT), the limiting of thermal oxidative technology for the quality of raw materials in some cases does not allow for stable production of qualified electrode binders.

The theoretical aspects of the influence of the viscosity of the reaction melt on the diffusion rate of the gaseous oxidant in the liquid phase of the pitch and control of the depth of the reactions of compaction by varying the concentration of low molecular weight components in the processed pitch volume are considered. Along the way, it was proved that pitch distillates to a predominant degree are not the product of distillation of low-boiling components, which are initially part of the medium-temperature pitch, but the products of thermal degradation of its highmolecular

components during heat treatment.

The results obtained indicate that to some extent the introduction of low molecular weight substances into a pitch can slow down the formation of high molecular weight components of the group composition of the pitch, which is important in the production of electrode pitches based on highly pyrolyzed raw materials.

It is also shown that in the series of technological methods used for the pitch quality control, heat treatment of the medium-temperature pitch under the increased pressure is most suitable for producing high-temperature (with a softening point above 85 °C) electrode binders from tars of low degree of pyrolysis.

Keywords: coal tar, degree of pyrolysis, medium temperature pitch, electrode pitch, thermal oxidation, diffusion, pressure, diluent.

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THE STUDY OF THE CHEMICAL COAL COMPOSITION OF A NUMBER OF MINES AS WELL AS COAL-PREPARATION PLANTS OF UKRAINE AND THE PROSPECTS FOR THE DISPOSAL OF COAL DUMPS

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The article provides information on the presence and accumulation of toxic elements in coal, anthracites and related rocks of a number of mines and processing plants in Eastern Ukraine and their impact on the environment. The forms of finding toxic and related elements in coal and anthracites have been studied. To clarify their relationship with the organic and mineral matter of coal, a semi-quantitative spectral method was used. There has been defined the fractional composition of coal samples from coal seams of grade Zh on the mercury deposits of Nikitovsky ore field, coal of different classes of grade OS, at Uzlovskaya TSO, coal anthracite from coal seams of Dolzhansky Capital site Sverdlovsk coal industry region.

According to the values of the coefficients of kinship, 2 groups of toxic and related elements have been identified; they are associated with organic matter in coal and anthracite of Donbass. The first group is associated with organic; the second one is with the mineral part of coal. With organic matter in coal, a close relationship has been found for Ge, Ge, Nb, B, Sn, Bi, Yb, Tl, Y, Ga, La, Be, V, Mo.

The regularities of the distribution of mercury compounds and Hgmet in coal of various genetic types of coal basins have been established. It has been identified that the predominant share of As in coal seams in mercury deposits is associated with their mineral part.

The data obtained allow us to proceed to the development of methods for searching and predicting Hg- and As-containing coal and hidden ores containing these elements in coal-bearing sediments along their haloes. Solving the problems of the accompanying extraction of mercury, arsenic and other toxicants before the process of coking and burning coal, cleaning the air of hazardous substances at coke plants is very important, taking into account the volume of coal produced and processed.

Keywords: coal, enrichment, toxic elements, fractional composition, organic and mineral forms, environment, mercury content, arsenic, sulfur, compounds of rare-earth, scattered and rare metals.

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TECHNOLOGY PRODUCTION OF THE BASIC COMPONENT OF PLASTIC LUBRICANTS

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The possibility of obtaining a basic component for obtaining plastic lubricants from waste engine oils of different nature is considered. It is shown that from the considered technologies it becomes obvious that the existing approach to the processing of used lubricating oils does not allow obtaining base oils suitable for the production of high-quality commodity greases as a target product. This is due to the use of rapid heating of raw materials to a final temperature and the subsequent separation of the obtained products on distillation columns.

In this work, in order to obtain a dispersion medium for the production of greases, various samples of used oils were subjected to light thermal cracking at atmospheric pressure and a raw material heating rate of 4-5 °C per minute. The studied oils were previously operated in various devices and conditions. It is found that SAE 5W-40 synthetic motor oil of viscosity grade is the best raw material for producing a component with high viscosity-temperature properties (viscosity index, at level of 126 units). In addition to the target products, fuel fractions are formed in the

amount of 9.0-34.0% (by volume), which reduces the cost of the resulting target product. The resulting fuel fractions can be used in the production of furnace and boiler fuels or as additives to commercial fuel oil to reduce their viscosity and pour point.

The combined functional technological scheme of the process of production of base oils for the production of plastic oils has been proposed and given in this article.

The proposed technology for obtaining a base component by means of light thermal cracking allows to significantly expand the raw material base for the production of an analogue of industrial oils through the use of cheap raw materials, which is a harmful industrial waste.

Keywords: waste engine oil, industrial waste, plastic grease, thermal cracking, viscosity index, fuel fractions, base component.

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