DOI: 10.31081/1681-309X-2023-0-4-18-25 Specialty 161. U.D.C. 665.775.4

INVESTIGATION OF THE NATURE OF COUMARONE-INDENE-CARBAZOLE RESIN OBTAINED FROM LIQUID COAL COKING PRODUCTS

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The scientific achievements in the production of coumarone-indene resin (CIR) from the point of view of its use as a modifier of road bitumen are studied in detail. Its modifying disadvantages have been identified. An effective way of their elimination has been proved, in particular, by introducing carbazole into coumarone-indene resin at the stage of its synthesis. The method of ionic co-oligomerization was used to obtain coumarone-indene-carbazole resin (CICR), which, when added to road oil bitumen, has a rather neutral effect on its thermoplastic properties, but significantly improves the ability of bitumen to adhere to the surface of mineral material (adhesion characteristics). The raw materials for the production of coumarone-indene-carbazole resin were liquid non-target coal coking products, in particular, narrow coumarone-indene fractions (boiling point 140-190 °C) isolated from "heavy benzene" fractions; carbazole was the modifying agent of coumarone-indene fractions. The nature of the CICR was investigated. It is shown that indene, coumarone and styrene do not participate in co-oligomerization processes in the production of conventional coumarone-indene resin in full amount. It has been confirmed that carbazole is chemically involved in the formation of the structure of coumarone-indene-carbazole resin, which results in a decrease in the molecular weight of the resulting oligomers (compared to conventional coumarone-indene resins) and a decrease in their softening point. Under the same synthesis conditions (except for the addition of carbazole), the amount of CICR is significantly higher than that of CIR. The addition of carbazole to the feedstock "forces" not only the complete chemical conversion of indene, coumarone and styrene, but also involves other feedstock components, such as cycloalkene hydrocarbons and substances with triple bonds, in the oligomerization process. In contrast to CIR, coumarone-indene-carbazole resin contains a pyrrole ring and relatively fewer CH_2 groups, alkyl fragments, and cycloalkene rings.

Keywords: coumarone, indene, carbazole, resin, preparation.

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