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THE POTENTIAL OF VACUUM RESIDUE OF OIL FROM THE MONASTYRYSHCHENSKO-SOFIIVSKYI OIL-BEARING AREA AS A FEEDSTOCK FOR ROAD BITUMEN PRODUCTION

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The article presents the results of studying the physicochemical characteristics of crude oil from the Monastyryshchensko-Sofiivskiy oil-bearing area and evaluating the potential of the obtained vacuum residue as feedstock for road-bitumen production. The research relevance arises from the necessity to improve the utilization efficiency of domestic paraffinic crudes, which traditionally show limited suitability for bitumen manufacturing due to their low resin-asphaltene content. The article emphasizes that vacuum distillation not only expands the feedstock base for bitumen production but also ensures the rational utilization of heavy petroleum residues.

The experimental work was performed using the HI-9168 Vacuum Distillation Apparatus in accordance with ASTM D 1160 at a pressure of 10 mm Hg. The physicochemical parameters were determined according to ASTM D 4052, ASTM D 86 and and DSTU EN 12591:2021. The investigated crude oil showed a density of 0.855 g/cm³, a water content of 0.5 %, and mechanical impurities of 0.03 %, and an elevated content of heavy fractions, indicating its potential suitability for vacuum residue production. The yield of vacuum residue reached 13–25 % m., depending on the equivalent final boiling temperature (500–520 °C at atmospheric pressure). The produced residue demonstrated a density of 0.965 g/cm³, a dark-brown color, and a homogeneous, stable colloidal structure without signs of coking.

Comparison with typical Ukrainian crude oils (Dolyna and Boryslav) indicates that the Monastyryshche-Sofiivka residue corresponds in density and viscosity to vacuum residues suitable for medium-grade bitumens. The obtained composition ensures an optimal resin-to-asphaltene ratio favorable for forming a stable colloidal network during oxidation. The results confirm the potential suitability of this vacuum residue for the production of road bitumens compliant with DSTU EN 12591:2021. Further research is recommended on oxidation and modification using coal tar in order to improve elasticity, thermal stability, and reduce the temperature sensitivity of the final binders.

Keywords: vacuum residue, vacuum distillation, bitumen, asphaltenes, coal tar, crude oil, road binder, heavy oil fractions.

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