

**USE OF BROWN COAL PROCESSING PRODUCTS AS MODIFIERS FOR ROAD BITUMENS**© Yu.V. Prisyazhny<sup>1</sup>, M.I. Donchenko<sup>2</sup>, T.A. Chipko<sup>3</sup>, M.V. Hryhorash<sup>4</sup>, S.V. Pyshyev<sup>5</sup>

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The study investigated the use of brown coal humic acids as modifiers of road petroleum bitumens. After establishing the optimal dosage of humic acids (2.0 % by mass of raw material) and the duration of the mixing process (1 hour) in the preliminary stages of the research, further experiments were aimed at studying the effect of temperature on the modification process. For this purpose, studies were conducted at the following mixing temperatures: 120, 150 and 180 °C.

During these studies, it was found that the addition of humic acids to bitumen significantly improves its properties, such as resistance to technological ageing, which was carried out using the RTFOT method, compared to the change in properties after heating for the initial sample. In addition, the most positive effect was observed at a modification temperature of 120 °C. Meanwhile, increasing the temperature to 150 and 180 °C leads to a deterioration in the initial properties of the modified samples and is not advisable.

The next stage of research involved preparing an asphalt concrete mixture and testing the final coating – asphalt concrete. For comparison, asphalt concrete samples were prepared using BND 70/100 petroleum bitumen and bitumen modified under optimal conditions – with the addition of 2.0 % by mass of humic acids, a process duration of 1 hour and a temperature of 120 °C.

The results showed that asphalt concrete of the ACG.Dr.Sh.A.NP.I grade, manufactured using modified bitumen, is characterized by improved physical and mechanical properties. In particular, its increased strength under prolonged exposure to water was established, which is especially important for ensuring the durability of road surfaces in real operating conditions. Thus, the data obtained confirm the feasibility of using humic acids as affordable and environmentally safe modifiers to improve the quality of road bitumens and asphalt concretes.

Keywords: brown coal, humic acids, modifier, optimal dosage, road bitumen, asphalt concrete.

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