

Table 5. Composition of new bitumen

Component	Content, %	Refractive index
Bitumen sample, wt %	100	—
Elemental composition, wt %:		
C	56.25	—
H	9.76	—
S	32.10	—
N	2.76	—
Hydrocarbons, wt %:	20.94	
paraffins and naphthenes	4.00	<1.49
monocyclic aromatic	5.32	1.49–1.53
condensed bicyclic aromatic	4.22	1.53–1.59
condensed polycyclic aromatic	7.40	>1.59
Tars, wt %:	40.66	—
petroleum–phenol	10.26	—
phenol	10.24	—
alcohol–phenol	20.16	—
Asphaltene	26.55	—
Carbene, carboid, mechanical impurities	11.85	—
Total	100	

The physicochemical properties of the new product are in complete compliance with the corresponding standard. Therefore, it is comparable with BND 60/90 bitumen. With a penetration index of -1.1 , it may be classified as type II bitumen. It has a sol–gel rheological state. Table 5 presents the group composition of the new bitumen. The results are obtained by the Marcusson chromatographic method.

We see in Table 5 that the bitumen contains 40.66% tar, 20.94% hydrocarbons, 26.55% asphaltene, and 11.85% carbene and carboid. The decreased content of monocyclic, bicyclic, and condensed aromatic hydrocarbons (20.94%) and the increased content of asphaltenes (26.55%) and tar (40.66%) may be explained in that elemental sulfur reacts with the benzene rings of the aromatic compounds.

Thus, viscous bitumen for highway use, which matches all the physicochemical properties of BND 60/90 bitumen, may be produced by modifying the organic component of hydrogenated coal with sulfur.

We have determined the group composition of the new bitumen: 20.94 wt % hydrocarbons, 40.66 wt % tar, and 26.55 wt % asphaltene.

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