INTERNATIONAL JOURNAL ON ORANGE TECHNOLOGY

https://journals.researchparks.org/index.php/IJOT e-ISSN: 2615-8140 | p-ISSN: 2615-7071

Volume: 03 Issue: 9 |Sep 2021

Modifying Additives to Bitumen

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Abstract: This article describes the testing of construction bitumen of the BN 90/10 brand with the addition of extract sludge, oil sludge and bleaching clay.

The oil refineries of the republic process sulfurous oils, the resinous residues of which are a fairly good raw material for obtaining bitumen. However, the analysis of the use of bitumen in the construction of these oils shows the need to adjust the properties of bitumen both in production and at the place of application. This is due to many factors, one of which is the poor low-temperature properties of bitumen used as a binder in construction [1].

On the other hand, insufficient resources of raw materials for road production due to the deepening of oil refining processes pose the task of increasing the amount of production of construction bitumen due to modifying additives. For this purpose, it is possible to use less valuable by-products or waste products of oil refining and petrochemical industries as additives, which is economically feasible.

The main purpose of modification is to obtain bitumen or materials based on them, which allow to expand the range of plasticity of bitumen, strengthen agdesia, increase resistance to aging, provide colloidal and mechanical strength, expand the operating temperature range, ensure environmental safety of obtaining and using modified bitumen, etc. [2].

It should be noted that the good compatibility of bitumen with various organic substances and polymers, which are able to give bitumen specific improved properties, speaks in favor of modification. Bitumen is a stable dispersed system. It is possible to regulate the properties of bitumen by changing its dispersed structure with additives. As a result of selecting the best bitumen – additive ratio, it is possible to achieve, if necessary, improvement of one or more properties of the finished bitumen material [3].

Modern composite building materials are complex systems, the properties and performance characteristics of which depend both on the properties of the raw materials used separately (fillers, fillers, binders, etc.), and on the nature of their combination, i.e. the characteristics of the contact zone between the components [1].

The technology of oxidation of raw materials when studying the process temperature mode is 250 °C, the air consumption for oxidation is 2.0 liters per 1 kg of raw materials per minute. The air supply for oxidation was started when the raw material temperature reached 200 °C. Then the heating is turned off, the volume of air consumption is reduced for a certain time, i.e. an induction period is created. After some time, a gas-oil fraction is added to the oxidized raw material as a "plasticizer" at a temperature of > 400 °C. As a result, a product with the following main technical characteristics was obtained: softening temperature-35.5 °C; penetration at 25 °C-105 °C; penetration at 0 °C-36 °C; ductility at 25 °C-126 °C; ductility at 0 °C-14 °C; brittleness temperature-minus 27.2 °C; flash temperature-225 °C [2]. The properties of bitumen are influenced by the characteristics of their components, and the structure and structure of asphaltenes play a crucial role and depend mainly on the technology of obtaining bitumen and slightly on the nature of the raw material. Since bitumen contains up to 40% of resins, their properties have a decisive influence on the extensibility, adhesion and cohesion of bitumen [1].

In order to increase the potential of bitumen production and solve the environmental issue of disposal of sludge residues, as additives to construction bitumen, by-products were tested in the laboratory conditions of the Ferghana Refinery. Extract of residual from the process of selective

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purification with phenol (ex), waste in the form of oil sludge (nsh) from the residual structures of the plant and spent bleaching clay (og) from the contact oil purification plant. The results are shown in table 1.

Results of testing of by-products

Table 1

Name of the indicator	The norm for the brand			Sample BN 90/10	with 3% ex	with 5% ex	with 5% shl	with 10% shl	with 5% og	with 10% og
	BN 50/50	BN 70/30	BN 90/10							
1. The depth of penetration of the needle at 25^{0}C, 0.1 mm.	41-60	21-40	5-20	10	16	20	20	28	10	5
2. Softening temperature for the ring and ball, ^{0}C	50-60	70-80	90-105	100	95	90	90	85	95	100
3. Extensibility at 25 ^{0}C, not less	4,0	3,0	1,0	1,0	2,0	3,0	3,0	3,0	2,0	2,0
4. Solubility, %, not less	99,5	99,5	99,5	99,5	99,5	99,5	99,5	99,5	99,5	99,5
5. Weight change after warming up, % no more	0,50	0,50	0,50	0.3	0,4	0,5	0,5	0,5	0,4	0,4
6. Flash point, ^{0}C not lower	230	240	240	250	240	240	240	235	245	245
7. Mass fraction of water	footprints	footprints	footprints	footprints	footprints	footprints	footprints	footprints	footprints	footprints

Analyzing the results of this table, it was found that the introduction of a residual extract from the process of selective purification with phenol and production waste in the form of oil sludge from the plant's treatment facilities allows changing the physical properties of construction bitumen within acceptable limits, which achieves the goals of increasing the production potential and utilization of sludge waste. When using this method at the place of application, when using slurry waste as an additive, special attention should be paid to the absence of water in the sludge, since the introduction of sludge into molten bitumen can lead to boiling of the mixture and the release of the mixture from the agitator. A good result was obtained due to the involvement of spent clay in bitumen, since the spent clay contains up to 20%

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resins and mineral oils, improving elasticity and slightly reducing heat resistance.

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