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# **Obtaining a New Composition of Road Bitumen from Local Waste of Oil-Gas and Oil-Fat Production**

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**ABSTRACT:** The formulation of a new composition of road bitumen from local waste of oil-gas and fat-oil production has been developed. The analysis of sources that conducted experiments and studies on bitumen modification was carried out. A scheme has been developed for obtaining a new composition of road bitumen based on BOR-60/90 road bitumen with the addition of three components (oil sludge, gossypol resin and technical sulfur). Experiments were carried out to obtain 4 samples of experimental batches of a new composition of road bitumen.

**KEYWORDS.** Bitumen, oil sludge, gossypol resin (fat-oil plant), technical sulfur, asphalt concrete, road pavement.

## **I. INTRODUCTION**

In the laboratory of Petrochemistry of the Institute of General and Inorganic Chemistry of the Academy of Sciences of the Republic of Uzbekistan, a recipe for obtaining a finished product from local waste of oil and gas and fat-and-oil production was proposed with specialists and researchers. In the Petrochemistry laboratory, 4 experimental batches of a new composition of road bitumen from local waste from oil and gas and fat-and-oil production were obtained in small quantities for further research.

## **II. MATERIALS**

The formulation of the new composition of road bitumen consists of the following components: oil sludge, tar from the distillation of fatty acids of cotton soapstock and technical sulfur.

Analysis of known sources that conducted bitumen modification studies, as well as the origin and characteristics of local waste and components used.

1- Until now, there is no comprehensive solution to the issue of disposal of environmentally aggressive oil-containing waste generated at all stages of production processes of oil refining [1, 2].

Oil sludge is the most significant waste of the oil industry by weight. Analysis of the data presented in the literature [3, 4] indicates the existence of a large number of different estimates of the volumes of accumulated and newly generated waste.

Currently, a promising direction for the processing and disposal of oil sludge from the Bukhara Oil Refinery is their physical, physico-chemical treatment in order to extract water, oil parts and solid residues for further use as raw materials.

2- The object of the following raw materials is non-food oil and fat products - tar (gossypol resin) from the distillation of fatty acids of cotton soapstock produced and sold on the territory of the Republic of Uzbekistan. Gossypol resin is obtained in the form of a cubic residue (tar) when distilling fatty acids of cotton soapstock.

For the first time, highly effective bitumen compositions based on gossypol, lignin, urotropin and tar were obtained at low temperatures (70 °C) and for 60 minutes. The optimal composition of this composition (mass.%): gossypol - 35.5-38.5; urotropin - 0.33-0.40; lignin mixture - 26.5-30.0. It was found that the introduction of the above

components into the bitumen composition increases the softening temperature to 65 ° C, the needle immersion depth decreases to 25-30 mm-1 [5].

Gossypol resin (tar) obtained from the fatty acids of the cotton soapstock of the “Yangiyul Oil and Fat Combine” can be used as an additional component for the production of road bitumen without additional preparation.

4- The obtained technical sulfur (S) at the Mubarek gas processing plant can be used as a modifier for the production of road bitumen.

To date, studies have been conducted on the modification of road bitumen from elemental sulfur. In the experiment, the following were used: elemental sulfur produced by LLC Mubarekneftegaz, a by-product with a purity of 99.9%, pyrolysis distillate of the Ustyurt gas chemical complex, gossypol resin, cotton oil processing waste and asphalt road bitumen BND 40/60 from the Ferghana Oil Refinery [6].

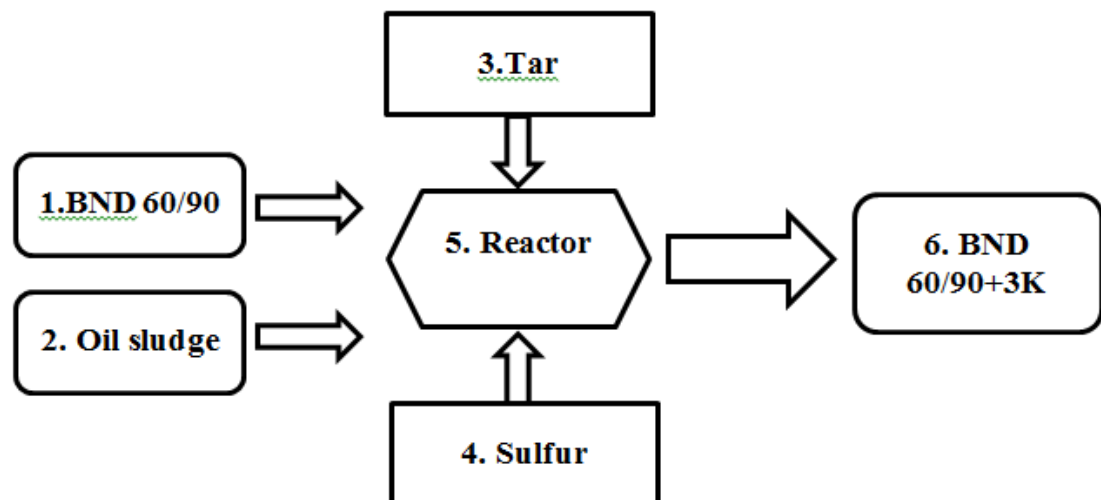
Based on the experiments of the study of sources [5, 6] that the modification of bitumen with gossypole resin and technical sulfur, that is, the reaction mechanism and IR spectra of the resulting modified bitumen with gossypole resin and sulfur can be seen reactions with sulfur binding from the heating temperature and reaction time.

The aim of the work is to obtain a finished product from local waste of oil and gas and fat-and-oil production, such as oil sludge, tar from the distillation of fatty acids of cotton soapstock and technical sulfur, while using auxiliary materials.

The scientific novelty is as follows: analyzing the study of experiments [5, 6] modification of bitumen with gossypol resin and technical sulfur, we have developed a recipe for a new composition of road bitumen of the BND-60/90 brand, while adding together three components (oil sludge, gossypol resin and technical sulfur) of local production for the preparation of a high-quality asphalt concrete mixture.

### III. RESEARCH AND RESULTS

In the Petrochemistry laboratory of the Institute of General and Inorganic Chemistry of the Academy of Sciences of the Republic of Uzbekistan, a scheme for obtaining a new composition of road bitumen for use in asphalt concrete mixture was developed with specialists and researchers (Fig. 1).



**Fig. 1. Scheme of obtaining new road bitumen for the purpose of road pavement:**

BND-60/90 - road petroleum bitumen; 2. Oil sludge - waste of the oil industry; 3. Tar from the distillation of fatty acids of cotton soapstock; 4. Sulfur - waste of the gas industry; 5. Reactor - oxidizing equipment with a stirrer; 6. BND-60/90+3K – road bitumen obtained by adding three components.

In the scheme 1-BND-60/90, petroleum bitumen in a certain amount is poured into the reactor and heated to 30 ° C, then 2-oil sludge, 3-tar and technical sulfur in a certain amount are added to the bitumen of the BND-60/90 brand



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that is in the reactor, then all components are mixed and heated to a certain temperature, after a certain time they receive a finished product, such as road bitumen for automobile pavement.

Experimental batches of road bitumen can be obtained in laboratory conditions.

Based on the scheme of obtaining a new composition of road bitumen for the use of automobile pavement in the laboratory "Petrochemistry", experiments were carried out to obtain experimental batches of road bitumen, which are presented in Table No. 1.

Table 1

| Bitumen Components            | Experimental batch №1 | Experimental batch №2 | Experimental batch №3 | Experimental batch №4 |
|-------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Bitumen BND-60/90             | 55                    | 55                    | 55                    | 55                    |
| Oil sludge, %                 | 20                    | 20                    | 15                    | 15                    |
| Tar (MJK)                     | 20                    | 15                    | 15                    | 10                    |
| Technical sulfur (S) ground,% | 5                     | 10                    | 15                    | 20                    |

The manufactured 4 samples of the experimental batch were sent to the central factory laboratory of shop No. 10 of the Fergana Oil Refinery to test the experimental batch of road bitumen according to physical and mechanical characteristics in accordance with the requirements of GOST 22245-90.

## IV. CONCLUSION

1. In the laboratory of Petrochemistry of the Institute of General and Inorganic Chemistry of the Academy of Sciences of the Republic of Uzbekistan, a recipe for obtaining a finished product from local waste of oil and gas and fat-and-oil production was developed with specialists and researchers.
2. The analysis of sources that conducted experiments and research on bitumen modification was carried out.
3. A scheme has been developed for obtaining a new composition of road bitumen based on BND-60/90 road bitumen with the addition of three components.
4. Experimental batches of obtaining a new composition of road bitumen were prepared in the laboratory for further study of IR and mass spectra.
5. The manufactured 4 samples of the experimental batch were sent to the central factory laboratory of shop No. 10 of the Fergana Oil Refinery to test the experimental batch of road bitumen according to physical and mechanical characteristics in accordance with the requirements of GOST 22245-90.

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