American Journal Of Biomedical Science & Pharmaceutical Innovation
(ISSN – 2771-2753)
VOLUME 03 ISSUE 04 Pages: 18-23
SJIF IMPACT FACTOR (2021: 5. 705) (2022: 5. 705) (2023: 6.534)
OCLC – 1121105677
Publisher: Oscar Publishing Services

Journal Website: https://theusajournals.com/index.php/ajbspi

Research Article

TECHNOLOGY OF PRODUCTION OF SULFUR POLYMER COMPOSITIONS FOR BITUMEN

Submission Date: April 20, 2023, Accepted Date: April 25, 2023,
Published Date: April 30, 2023
Crossref doi: https://doi.org/10.37547/ajbspi/Volume03Issue04-04

Raupov Bakhodirjon Kenja Ugli
Bukhara Institute Of Engineering And Technology Faculty Of Oil And Gas Technology, Department Of Chemical Gas Processing Technology, Doctoral Candidate, Uzbekistan

Mavlanov Bobokhon Arashovich
Bukhara Institute Of Engineering And Technology Docent Of The Department Of Chemical Gas Processing Technology, Uzbekistan

Fozilov Sadriddin Fayzullaevich
Bukhara Institute Of Engineering And Technology Head Of The Department Of Chemical Gas Processing Technology. Doctor Of Technical Sciences, Professor, Uzbekistan

ABSTRACT

Research in the field of technology for processing residual fractions is carried out mainly in search of optimal schemes for processing and upgrading raw materials, developing compositions of new effective catalysts, etc. Much less attention is paid by researchers and especially practitioners-petroleum refiners to other, non-traditional, but promising areas. to find new approaches to the processing of oil and oil residues, methods of their chemical modification and destruction, for example, using wave technologies (electrical, magnetic, ultrasonic, and other effects). Physical and chemical activation of residual raw materials at the stages of preparation or implementation of the technological process makes it possible to increase the efficiency of the process and improve the quality of the finished oil product.

KEYWORDS

Oil, bitumen, processing, chemical process, methodology, efficiency, technology.

INTRODUCTION

The peculiarity of high-molecular oil compounds - the residual components of oils, is significant molecular weights, non-hydrocarbon nature, polarity, manifestation of colloidal properties and a tendency to intermolecular interactions - association and macroorganization of molecules, which makes it difficult to deeply study the residual components.

The development of general colloid-chemical ideas about the structure of residual oil components began at the end of the last century with the study of the structure of bitumen, which made it possible to reveal the essence of the phenomena and processes occurring in the production of bitumen, their behavior in practical application.

MATERIALS AND METHODS

The scientific schools of P.A. Rebinder, A.C. Kolbanovskaya, D.A. Rosenthal, V.F. Kamyanova, B.G. Baked, F.G. Unger, also Z.I. Sunyaeva and A.A. Gureev, who connected colloid-chemical concepts of oil dispersed systems with the concepts of the theory of phase transitions and regulation of the dispersity of these systems by changing the energy of intermolecular interaction [1,2,3,4].

The introduction of modern instrumental methods of structural analysis (mass spectrometry, X-ray diffraction, optical and radio spectrometry, etc.) into analytical practice has made it possible to obtain reliable information about the structure and structure of bitumens.

RESULTS AND DISCUSSION

Improving the design of oxidizing apparatus and optimizing the oxidation process is not the only way to intensify the production of bitumen. The solution to the problem of bitumen deficiency is possible by expanding the resources of non-traditional raw materials and improving the quality of raw materials for bitumen plants, for example, by using the activating effect of energy fields (magnetic, electromagnetic, ultrasonic, etc.).

The components of the organic part of bituminous rocks, the most important alternative source of natural hydrocarbon raw materials, the resources of which significantly exceed the reserves of conventional oils and are estimated at 20-25 billion tons /3,4/, are very close in their composition and properties to oil high-molecular compounds.

In this regard, interest in the problem of development and use of bituminous rocks as an additional source of petroleum hydrocarbons is constantly growing. This is confirmed by the All-Union scientific and technical program "Development and implementation of effective methods and means of complex extraction and processing of bituminous rocks of Western Kazakhstan for their use in the national economy",

American Journal Of Biomedical Science & Pharmaceutical Innovation
(ISSN – 2771-2753)
VOLUME 03 ISSUE 04 Pages: 18-23
SJIF IMPACT FACTOR (2021: 5. 705) (2022: 5. 705) (2023: 6.534)
OCLC – 1121105677
Publisher: Oscar Publishing Services

which arose in 1980, within the framework of which part of this work was completed [5].

The deposits of bituminous rocks were practically not studied, therefore, for their qualified use, it was necessary to know not only the quantity, but also the quality of the organic and mineral constituents of the rocks, without which it is impossible to develop technologically simple and economical methods for extracting and processing natural bitumen.

Since, in terms of their composition and properties, natural bitumens are close to road grades of petroleum bitumen, the main standard indicators were used to characterize their properties, such as: needle penetration depth at 25 and 0 ° C, softening temperature, extensibility. Rature of fragility, content of water-soluble compounds. Determination of these indicators makes it possible to control the quality of oil and natural bitumen as a marketable product. To determine one of the most important characteristics of modified bitumen, which ensures good quality of road surfaces, adhesion, etc. were determined.

Penetration

Penetration indirectly characterizes the viscosity of bitumen, and it was determined using a penetrometer, the device of which and the test procedure are given in GOST 11501-78; the penetration depth of the needle by 0.1 mm was taken as a unit of penetration.

Softening temperature

The softening point of bitumen is the temperature at which bitumen changes from a relatively solid state into a liquid state. The softening temperature was determined by the "Ring and ball" method according to the method described in GOST 11506-78.

Extensibility

Extensibility (ductility) is the ability of bitumen to stretch into a thread; it is determined by the length of the thread, which is formed at the time of rupture. This indicator indirectly characterizes the cohesion of bitumen and is related to the nature of its components. Ductility is determined using a ductility meter, the device of which and the method of determination are given in GOST 11505-75 [5].

Brittleness temperature

The brittleness temperature is the temperature at which a material breaks down under the action of a short-term applied load. According to Fraas, this is the temperature at which the elastic modulus of bitumen with a loading time of 11 s is the same for all bitumens and is equal to 110 MPa. To assess the brittleness temperature, the method described in GOST 11507-65 was used. According to this method, the brittleness temperature is considered to be the temperature at which a through crack appears on a bitumen film with a thickness of 0.1 mm and a mass of 0.4 g, applied to a steel plate with a bend along a radius of 9 mm and cooled at a rate of 1 deg / min. The brittleness temperature was also determined using an instrument designed by Bash NII NP, the description of which device and the determination procedure are given in /314/.

American Journal Of Biomedical Science & Pharmaceutical Innovation
(ISSN – 2771-2753)
VOLUME 03 ISSUE 04 Pages: 18-23
SJIF IMPACT FACTOR (2021: 5. 705) (2022: 5. 705) (2023: 6.534)
OCLC – 1121105677
Publisher: Oscar Publishing Services

Rheological characteristics

The determination of the rheological characteristics of natural bitumen and polymer-bitumen compositions was carried out on a rotational viscometer "REOTEST-2" at varying shear rate gradients from 0.17 to 145 s"1 in the temperature range from 60 to 170°C.

Elemental composition

The content of carbon and hydrogen was determined by burning bitumen in excess of purified oxygen at 800°C in a quartz tube placed in a microelectric furnace. The determination of sulfur was carried out according to the accelerated method (GOST 1437-75) by burning a sample of bitumen in a quartz tube at a temperature of 900-950°C in an electric furnace. The method is based on the reaction of air oxidation of all sulfur-containing bitumen compounds into sulfur oxides, followed by their absorption and analysis.

The nitrogen content was determined by the Kjeldahl method, the essence of which is the decomposition of bitumen with concentrated sulfuric acid with a density of 1.84 and subsequent oxidation of the decomposition products with a solution of potassium permanganate. In this case, nitrogen-containing compounds are converted into ammonium sulfate, then ammonia is released under the action of alkali on it.

The oxygen content was determined by the difference between 100 and the total content of all other components in percent.

Thermal analysis

Thermal analysis was performed on a Q-1000 derivatograph manufactured by MOM, a Hungarian company, in air at a heating rate of 10 deg/min in the temperature range from 25 to 700°C.

Isolation of natural bitumen from rock

The bituminous rock was grouped according to the depth of occurrence, dried on baking sheets in the open air or in an oven, depending on its saturation with water, at a temperature of 85±5°C with constant stirring. Bitumens were extracted from the rock in a Soxhlet apparatus on the recommendation of the Central Design Bureau of the Minavtodor Kaz. SSR with a mixture of ethyl alcohol: toluene in a ratio of 1:4 at the boiling point of solvents until the extractant is completely decolorized. The bitumen solution was purified from clay and sand particles by filtration through a multilayer filter or centrifugation in an ultracentrifuge. The distillation of the solvent was carried out under vacuum. The residue was kept in an oven at a temperature of 70-80°C to a constant weight [6].

Group chemical composition

To separate bitumen into conditional group components, we used a technique developed at the Odessa Oil Refinery and improved

SoyuzdorNII, which provides for the extraction separation of asphaltenes with n-hexane or isooctane and the adsorption separation of maltenes on silica gel into fractions: paraffin-naphthenic compounds, mono-

American Journal Of Biomedical Science & Pharmaceutical Innovation
(ISSN – 2771-2753)
VOLUME 03 ISSUE 04 Pages: 18-23
SJIF IMPACT FACTOR (2021: 5. 705) (2022: 5. 705) (2023: 6.534)
OCLC – 1121105677
Publisher: Oscar Publishing Services

, bi-, polycycloaromatic compounds, toluene and alcohol-toluene resins.

To separate natural bitumen into conditional group components, the gradient-displacement method of liquid chromatography, developed at the Bash NII NP, was also used.

Fractional Composition The fractional composition of natural bitumen over the ranges of boiling points was determined by the following method. A sample of bituminous rock (25 g) taken in an even layer in a Petri dish was placed in an oven and kept at a given temperature. The sample was cooled every hour and the weight loss was determined. The sample was kept in a cabinet until an equilibrium curve close to horizontal was obtained. By weight loss, the amount of evaporated organic part of the bituminous rock was judged in a given temperature range.

The content of water and mineral impurities The content of free water and mineral impurities in natural bitumen isolated by water extraction was determined by the following method. A portion of bituminous foam was kept in an oven at a temperature of 90-100°C to constant weight. The amount of free water was determined from the weight loss of the sample. After drying, a sample of bitumen was dissolved in a 20-fold amount of solvent (alcohol-toluene mixture 1:4) in a water bath under reflux. The bitumen solution was filtered by washing with hot solvent until no traces of bitumen remained on the filter, and the filtrate was completely transparent and colorless.

CONCLUSION

Unstable condensate enters the condensate stabilization unit, from where it leaves as stable condensate to a combined unit for the production of petroleum products. The yield of stable condensate is 2.7 million tons/year. The output of the remainder of the stable condensate fraction > 320°C - fuel oil (after atmospheric distillation) is 220-250 thousand tons / year. With the plant reaching its design capacity, its output will be about 500.0-600.0 thousand tons / year, which is a significant value and, due to the difficulty of selling fuel oil today, it is necessary to search in advance for new technical solutions for its in-depth processing.

REFERENCES

1. Rudenskaya I.M., Rudensky A.V. Rheological properties of bitumens. M .: Higher School, 1967. - 118syu
2. Makk Ch. Physical chemistry of bitumen / Bituminous materials (asphalt, resins, pitches) Edited by A.Dos. Heuberg. M.: Chemistry, 1974. - S.7-88.
3. Traxler R.N. Rheology and rheological modifiers (with the exception of elastomers): Structure and time./Bitumen materials (asphalts, resins, pitches). Edited by A.Dos. Heuberg. M.: Chemistry, 1974. - S.7-88.
4. Andreeva JI.H., Kadychagov P.B., Turov Yu.P., Kukharenko O.A., Unger F.G. Instrumental methods for studying oil dispersed systems.

American Journal Of Biomedical Science & Pharmaceutical Innovation
(ISSN – 2771-2753)
VOLUME 03 ISSUE 04 Pages: 18-23
SJIF IMPACT FACTOR (2021: 5. 705) (2022: 5. 705) (2023: 6.534)
OCLC – 1121105677
Publisher: Oscar Publishing Services

Tomsk, 1990. - 37p. /Prepr. Sib. otd. Academy of Sciences of the USSR, Institute of Petroleum Chemistry, No. 15.

5. Dergalina T.A., Anufrienko V.F. Some aspects of physical chemistry of pitch mesophase structures. Novosibirsk, 1989. -36s. /Prepr. Sib. otd. Academy of Sciences of the USSR. In-t unreg. Chemistry, Institute of catalysis; No. 9.
6. Unger F.G., Krasnogorskaya N.N., Andreeva L.N. The role of paramagnetic molecules in intermolecular interactions of petroleum dispersed systems. - Tomsk, 1987. - 46s. / Prepr. Sib. otd. Academy of Sciences of the USSR. Institute of Petroleum Chemistry; No. 19.