Intensification processes of refining petroleum, petroleum distillates and residual petroleum products with additives of polar solvents

Evgeniya I Grushova – D.Sc, Professor, BSTU, Belarus

Abstract

The purpose of this study was to develop efficient and low-cost ways of intensifying the processes of treating crude oil based on the use of activating additives.

Under the influence of additives of polar organic solvents (ethylene glycol, tetramethylene sulfone, N-methylpyrrolidone, tetrahydrofurfuryl alcohol, isopropyl alcohol, etc.), the structure of oil dispersed systems undergoes changes. This positively affects the efficiency of a number of technological processes: atmospheric vacuum distillation of oil, selective purification of oil oil fractions with polar solvents, extraction of aliphatic hydrocarbons from oil raffinates by low-temperature dewaxing, and the production of oxidized bitumens. Additions of solvents containing hydroxyl group have the greatest influence on treating processes.

It is established that, according to the nature of the effect of the activating additive on oil, it can be conditionally attributed to the additives of the "prolonging action". In the presence of the addition of a solvent in an amount of not more than 2% by weight, not only the distillate fractions are increased to 6-11% by weight in the distillation of oil, but the subsequent process, the oxidation of the hydron, also proceeds more efficiently. This is due to the increase in the degree of dispersion of hydrons, the enrichment of the composition of asphaltenes, separated hydronically, aromatically and branched aliphatic structures.

Purification of oil fractions of Petroleum from undesirable components by phenol or N-methylpyrrolidone containing no more than 5-7% by weight of the activating additive allows to control the selectivity of the process or provides efficient purification of oil fractions of any viscosity.

When the activating additive (up to 3% by weight) is added to methyl ethyl ketone-toluene or acetone-toluene systems, oil losses with a hook are reduced, and accordingly, the content of alkanes as well as the ratio of n-alkanes: i-alkanes are increased.

Of particular interest the oxidation of (hydron) in the presence of solvents containing groups -OH. Allow the oxidation process to be accelerated during the "combined oxidation" process. In this case, the solvent exhibits two functions during the oxidation of the hydron: the function of the initiator reagent and the function of the reagent acting on the structural group composition of the oil dispersed system.

All the developed options of intensification of processes of treating oil raw materials can be realized on the corresponding operating industrial installations.

Recent Publications

1. Grushova E I, Shariph A S (2013) Regulation of the colloidal structure of petroleum feedstock with activating additives. Questions of chemistry and chemical technology 6:82-85.

2. Shariph A S, Grushova Ye I (2013) Influence of polar solvents on direct distillation of oil. Proceedings of BSTU. Chemistry, technology of organic substances and biotechnology 4:25-28.

3. Grushova E I, Yusevich A I (2007) Extraction properties of blends of tetrahydrofurfuryl alcohol with acetone, ethanol, and ethylene glycol. Petroleum Chemistry 47: 421.

4. Shrubok A O, Grushova Ye I (2012) Effect of a modifying additive on the blown-asphalt manufacture process 52: 346.

5. Grushova E I, Karpenko O V, Labkovich O V, Al'-Razoqi A A (2015) Improving the technology of obtaining base mineral oils and paraffins. Proceedings of BSTU. Chemistry, technology of organic substances and biotechnology 4:126-129.

Biography

•Grushova Evgeniya Ivanovna - D.Sc (Engineering), Professor, Department of Technology of Petrochemical Synthesis and Polymer Materials Processing. Belarusian State Technological University (13a, Sverdlova str., 220006, Minsk, Republic of Belarus). E-mail: Grushova.e@mail.ru

Email:
Grushova.e@mail.ru;