Comprehensive Scheme for Processing Used Oils and Lubricants

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Abstract

In the following article the comprehensive details of the processing used oils and lubricants are explained taking into account the industrial-level equipment. Viscosity, colloidal stability,drop-off temperature and range strength are implemented through the deep chain methods.

Keywords. Petroleum oils, contact loads, hetero-composites,Hydrotreating with catalysts, viscosity index, opticaldensity

Introduction

Petroleum oils are the main type of lubricants designed to reduce friction and wear on rubbing surfaces and prevent them from being bullied. They have long been widely used in various fields of technology, and the correct application of oils largely depends on the reliability and durability of machines, mechanisms and various equipment. The increasing speed of machines, increased operating temperatures, contact loads and the duration of equipment operation have significantly changed the role and increased requirements for lubricants. The increasing importance of petroleum oils for reliable operation of equipment has caused the need for a deeper study of their nature and properties, identifying the optimal conditions for their production and use.

Main Part

The raw material for the production of lubricating oils are oil fractions that boil off above 350^o C. These fractions concentrate high-molecular compounds of oil, which are complex multicomponent mixtures of hydrocarbons of different groups and their hetero-composites, the molecules of which contain atoms of oxygen, sulfur, nitrogen and some metals (nickel, vanadium, etc.). the Components of oil fractions have different properties, and their content in finished oils may be useful and necessary, or harmful and undesirable. Therefore, the most common way of processing oil fractions to obtain oils is to remove "undesirable" components from them while preserving “desirable” components as much as possible, which can provide the finished products with the necessary physical, chemical and operational properties.

Production of oils includes the following operations: A) Production of several distillate oil fractions: 300-400^0 C, 400-450^{0}C, tar fractions above 5000^{0}C; B) purification of fractions from undesirable components will be checked using selective cleaning processes, de-waxing, de-asphalting of tar with the use of selective solvents with subsequent results. C) Hydrotreating of components; D) commercial Oils are prepared by mixing pre-refined components in various ratios with the addition of additives depending on the oil grades. Distillate fractions are cleaned with selective solvents (phenol), dewaxing (with a solution of methyl ethyl ketone, benzene - toluene), and Hydrotreating with catalysts. Residual base components are obtained in two ways: by deasphalting the tar with propane followed by selective cleaning with phenol (option-1) or by cleaning the tar with paired solvents (option-2). The remaining raffinate is then subjected to dewaxing and Stripping.

The viscosity and viscosity-temperature properties of oils depend on their fractional and chemical composition. As the temperature increases, the viscosity of the oils decreases. The hydrocarbons contained in the oil have a different effect on the viscosity and its change with temperature. Paraffinic hydrocarbons are characterized by the lowest viscosity. With branching, hydrocarbons are characterized by the lowest viscosity. With the branching of the chain, their viscosity increases, and their viscosity-temperature properties deteriorate. Cyclic hydrocarbons (naphthenic and aromatic) are significantly more viscous than paraffin. With the same structure, the viscosity of naphthenic hydrocarbons is higher than that of aromatic

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ones. In general, the more rings in the structure of the molecule, and the more branched side chains, the higher the viscosity. Resinous-asphaltene substances have the highest viscosity.

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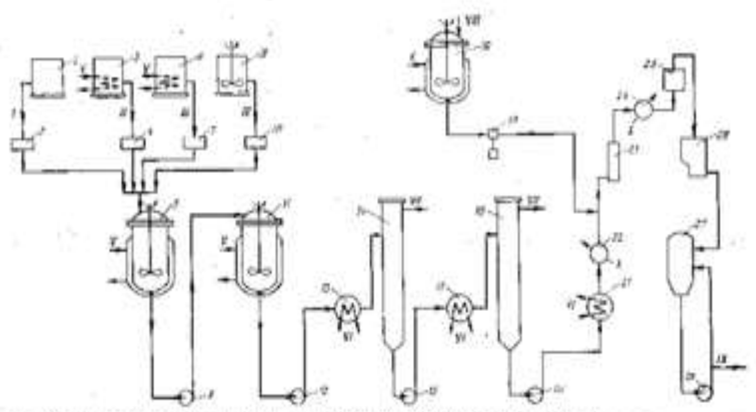
The most important characteristic of oils is the dependence of their viscosity on temperature-the viscosity index (VI) or the viscosity-temperature characteristic, an indicator that is characterized by the viscosity coefficient (V_{50}/V_{100} ratio). The more canopy temperature curve viscosity (less viscosity), the higher the value of VI and higher quality oil (modern oils should have a viscosity index of at least 120). The viscosity-temperature characteristic of the oil depends on the type and structure of the hydrocarbons included in its composition. Paraffin hydrocarbons have the most gentle viscosity-temperature curve and, consequently, the highest EV. VIES of ISO-paraffin hydrocarbons are less than normal. Cyclic hydrocarbons are characterized by an improvement in their viscosity-temperature properties with a decrease in the cycling of molecules and an increase in the length of side chains.

Classification and characteristics of oils are determined depending on their purpose. The operation of the lubricating oil in the friction unit largely depends on the operating conditions (temperature, load, speed of movement, composition of the environment, etc.) and the nature of the mechanism or machine (constant or variable external influences, stops, etc.). of Great importance are: the design features of the friction unit (type, size, nature of movement of the rubbing surfaces, etc.); the lubrication system and materials with which the oil contacts during operation: operating conditions of the friction unit, timing of oil change.

There are three generally accepted classifications of petroleum oils: in composition, the production method (or method of purification) and by appointment.

By their origin, lubricants are divided into vegetable, animal and mineral. In the process of production, operation, cleaning of used commercial oils for the purpose of environmental protection, issues of separation and cleaning of technically important products, improving the quality of products produced by industry, increasing the purity of individual chemicals, and many others are associated with the use of adsorbents. With the help of adsorption technology, deep and fine cleaning of gases and liquids, recovery of volatile solvents, cleaning of environmental pollution of emissions, isolation of trace amounts of useful substances from mixtures, regulation of the composition of the gas environment in the storage of agricultural products, etc.A comprehensive scheme for processingused petroleum oils, sodium and sodium-calcium greases has been developed figure-1)



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The scheme provides for the use of technology for cleaning mixtures of waste industrial oils, including the stages of coagulation, distillation of fuel fractions and water, and adsorption treatment. The scheme allows you to improve the technology, in particular by more qualified use of sorbents (chemical and thermal activation, the use of partially spent sorbent). The possibility of using the waste of hydrochloric acid activation of bentonites – the master batch – as a coagulant for waste oils is shown.

Recycling of used greases (RUG) is based on the destruction of their structure by water to produce oil and soap-oil emulsion (SOE). The latter is a raw material in the production of water STS, and is also suitable as a coagulant for waste oils.The advantage of the integrated scheme is the possibility of joint processing of waste oils and lubricants, since the scheme allows you to use the products and waste of one process as raw materials or reagents of another. In principle, any more modern and efficient processing technology can be included in the scheme. The quality of the products obtained is shown in tables 1 and 2.

Table 1: Quality of oils-processed products according to a complex scheme

Indices	Adsorption cleaning oils[1], pre-coagulation			Oil from RUG LZ – SNII[1]	Oil I-20AP[2]
	Sodiummethasilicatome	SOE	otherliquor		
Viscosity at 50^0C, мм^2/s	23,1	23,2	3,5	14,1	19,1
Acidic number, mgKOH/g	0,05	0,03	,14	0,09	0,05
Opticaldensity 540 nm	0,23	0,27	,46	0,13	1,08

1 – Cleaning with acid-activated Navbaharbenthonite.

2 – Oil produced at present at oil-generating stations according to the scheme: coagulation with sodium metasilicate-removal of fuel fractions and water - adsorption treatment with clay inactivated.

Figure 2

Quality of spent lithium grease *

Indices	Grease from the waste materials	Lithoil – 24 (GOST 21150-75)
Range strength at 20^0C, Pa	520	450
Dynamic viscosity at -30^0C, Pa.c	1150	800-1500
Colloidalstability, %	11	12
Drop-offtemperature, ^{0}C	185	180
Properties of lubricating, H:		
critical load	670	630
Weldingload	1600	1410

*Medium of dispersion– oil fromRUGLZ-SNII(see. table. 1), thickener – 12 lithium oxystearate.

Results.The wastes of the complex scheme are coagulation sludge, spent sorbents, and fuel fractions. For their disposal, it is most appropriate to incinerate with heat recovery and cleaning of atmospheric emissions. The resulting ash residue can be buried in the soil. In this case, it is possible to achieve low-waste technology.

Conclusion

Practical implementation of the complex scheme is possible in certain industrial areas with a fairly high concentration of various industries that consume a significant amount of lubricants. Implementation of the scheme allows solving a number of economic and environmental problems.

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References

1. Chernojukov N.I. Texnologiyapererabotkinefti I gaza. Moscow,IzdatelstvoKhimiya., 2008, 424 p.
2. Uilyam L Lefer. Pererabotkanefti. M. ZAO Olimp – biznes, Moscow, 2003, 224 p.
3. Glazov G.I., Fuks I.T. Proizvodstvoneftyanixmasel. Moscow, Khimiya, 2010, 192 p.
4. Bagirov I.T., Sovremennieustanovkipervichnoypererabotki. Moscow, Khimiya, 2014, 240 p.
5. Korotov P.I. Isaev B.N., Teteruk V.G. Pervichnayapererabotkaneftinavisokoproizvoditelnixatmosferno – vakuumnixustanovkax. Moscow, Khimiya, 1975, 120 p.
6. NeftiYujnogoUzbekistana. Tashkent, FAN, 2012, 262 p.
7. Nesterov I.D. Razrabotkatexnologi I fraksionirovaniyamazutadlyapolucheniyavakuumnixdistillyatovglubokogootbora. Avtoreferatkand. Texn. Nauk, Ufa, 1990, p.
8. Reay D. W. Vacuum distillation of heavy residues meeting changing refinery requirements. T.Chem. E. JubilleSumposium, 2013. P. 51 – 60.
9. Erix V.N. Khimiyanefti I gaza. L., Khimiya, 1969, 282 p.
10. Safieva R.Z. Fiziko–khimiyanefti. Pererabotkanefti. Moscow, Khimiya, 1998, 428 p.
11. Turdiyev Bexruz Sobirovich. Ma'naviy yangilanishlar strategiyasining hayotbaxsh islohotlari: nazariya va amaliyot. //O'zbekiston Milliy axborot agentligi – O'zA Ilm-fan bo'limi (elektron jurnal). –Tashkent, UzA, 2020, April. P.1-12.
12. TurdiyevBexruzSobirovich. Strategy of development of pilgrimage tourism in Uzbekistan. //"Modernization of islamic culture in bukhara and prospects for the development of sustainable tourism" International Scientific and Practical Conference. February 24, 2020 Bukhara. -P.468-471.
13. TurdiyevBexruzSobirovich. Spiritual renewal and interethnic relations in the Strategy of Actions. //"Teoriyaipraktikasovremennoynauki" (Vipusk № 3(33) (MART, 2018)), P.85-90.
14. TurdiyevBexruzSobirovich. Strategy of spiritual renewal in Uzbekistan. International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 06, 2020.
15. Shirinov A.Q. The implications of globalization in Central Asia: Centrifugal vs. Centripetal trends.https://eesa-journal.com/2020/04/03/implications-of-intensified-globalization-in-central-asia-centrifugal-vs-centripetal-trends-4-11/
16. TurdiyevBexruzSobirovich. Fitratningjamiyatnima'naviyyangilanishito'g'risidagiqarashlari. //"Buxoroningjahonmadaniyatidagio'rni" mavzusidagiRespublikamiqyosidagionlaynilmiy-amaliyanjumanmateriallari. –Bukhara, 2020. P.415-418.

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