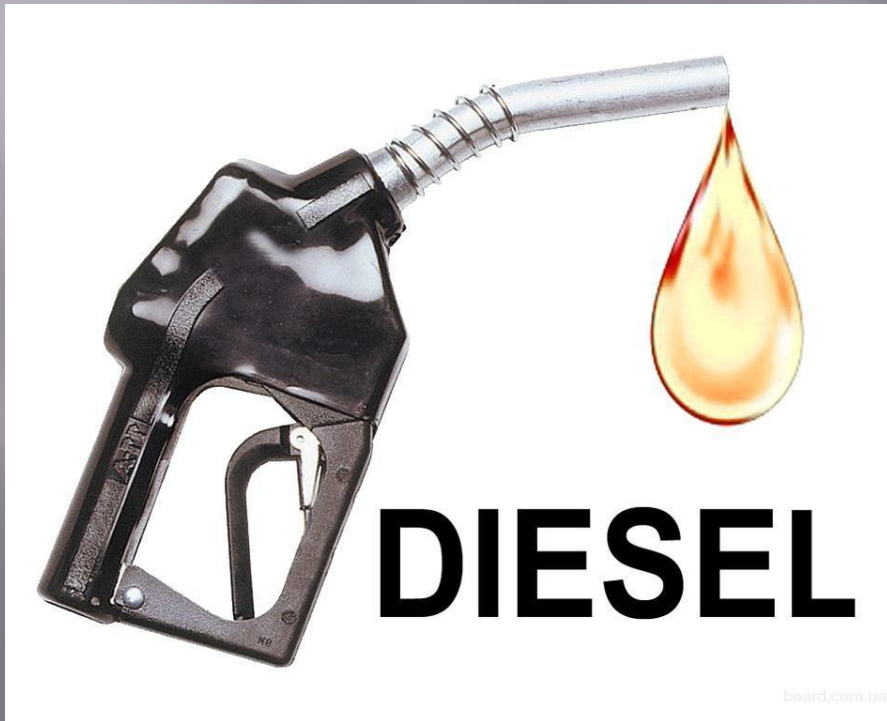


HYDROCLEARING DIESEL



Fulfilled
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Hydrotreating - the process of chemical conversion of substances under the influence of hydrogen under high pressure and temperature.

Hydrotreating petroleum cuts aimed at reducing the content of sulfur compounds in commercial petroleum products. Incidental saturate unsaturated hydrocarbons, reduction of resins, oxygen-containing compounds and hydrocracking of hydrocarbon molecules. The most common process of refining.



Basics hydrotreating

Motor fuels - gasoline, kerosene, diesel fuel - mostly obtained in the refining process. Depending on the composition of oils and the method of their processing, motor fuel quality may vary, do not always correspond to GOST requirements on commercial products

Purpose hydrotreating - improving the quality of the product or fraction by removing undesirable impurities such as sulfur, nitrogen, oxygen, resinous compounds, unsaturated hydrocarbons

Catalysts

The composition of the catalysts have a significant impact on the selectivity of the reaction, for this reason, appropriate selection of catalysts fails to manage the **process of** hydrotreating diesel fuels in a rather wide range.

In the industry for these processes are widely used alyumokobaltmolibdenovye (AKM) or alyumonikelmolibdenovye (ASM) catalysts.



Alyumokobaltmolibdenovyy industrial catalyst has very high selectivity. Reactions gap C-C bonds, or saturation of the aromatic rings in his presence hardly occur. It possesses high activity breaking the bonds in reactions C-S and high thermal resistance, whereby a long lifetime. An important advantage of the catalyst is resistant to catalyst poisons potential. In addition, this catalyst has suitable activity for the saturation reaction of unsaturated compounds, the breaking of carbon - nitrogen, carbon - oxygen, and is particularly suitable for hydrotreating of petroleum fractions. Alyumonikelmolibdenovyy less active catalyst reactions saturation of unsaturated compounds, it is more active against the aromatics saturation (10-50% compared with AKM) hydrogenation of nitrogen compounds (in 10- 18% higher than with AKM).

The use of hydrogen in hydrotreating processes

The hydrogen flow rate on the reaction. Consumption of hydrogen at hydrotreating reaction is variable depending on many factors: the content of saturated, unsaturated and aromatic hydrocarbon structure these hydrogenated feedstock components, hydrogen partial pressure, temperature and contact time with the catalyst materials, hydrocarbon raw material composition and degree of conversion.

The following are theoretical consumption data of hydrogen in the hydrogenation of various compounds in moles of hydrogen per 1 heteroatom

Sulfur-containing compounds

Mercaptans and elemental sulfur	1
Sulfides	2
Disulfides	15
Alkyl sulfoxides or thiophenes	4.0

Nitrogen-containing compounds

Saturated amines	1.0
Pyrrolidine, piperidine	2.0
Nitrites, pyrroline, etc.	3.0
Pyrrole, nitroparaffins	4.0
Aniline, pyridine, etc.	5.0
Indole	7.0

Requirements for the quality of raw materials and the final product. Process parameters

Hydrotreated diesel fuel is carried out to improve their quality by removing sulfur, resin, unsaturated compounds and other impurities worsening the operating characteristics of fuels. As a result of the hydrotreating increased thermal stability, reduced corrosiveness fuels decreased precipitation during storage, improves the color and smell of fuel.

Performance Features

The most important characteristics of diesel fuels are: flammability, fractional composition, carbon formation, viscosity, temperature, turbidity, and others.

Flammability - a tendency to self-ignition of diesel fuel, it is determined by the period of delay of ignition and is almost as important property, as well as anti-knock performance gasoline for gasoline engines. The period of delay is dependent on the cetane number.

Cetane number - Self-igniting fuel component is numerically equal to such content, in% (vol.) Of cetane in admixture with n-methylnaphthalene, in which self-ignition of the mixture, and compares it with the same test fuel. With a high cetane number of self-ignition delay period is short enough fuel when it is injected into the combustion chamber is ignited almost immediately, the pressure in the cylinder increases smoothly, and it works without knocking. With a low cetane number large period of delay, the fuel injected into the cylinder does not ignite immediately, and stored, and then the whole mass of the fuel is ignited. In this case, the cylinder pressure is growing in leaps and bounds, there is a detonation (knock). The cetane number of diesel fuels depend on their hydrocarbon composition.

Fractional composition is determined by the design features of the engine and operating conditions. Petroleum industry produces diesel fuel of two types: low-viscosity fuel for light-speed motors with shaft speed 800-1000 rev / min or more; high viscosity heavy fuel engines for slow speed shaft to 600-700 / min.

The fractional composition of fuel has an impact on the degree of its spray, combustion efficiency, exhaust smoke, soot and crankcase oil dilution. At a high content of light fractions increased combustion pressure. Weighted fuel sprayed worse due to increased surface tension of the fuel.

The content of light fractions in the diesel fuel is characterized flashpoint. Diesel fuel containing a significant amount of light fractions evaporate quickly, a fire hazard and are not suitable for indoor use.

Options hydrotreating

To obtain high-quality diesel fuels must original diesel fraction adequately free from sulfur and resinous compounds, unsaturated hydrocarbons, and in some cases, part of the aromatic hydrocarbons. This goal was successfully achieved with hydrotreating sulfur diesel fractions on the ACM or ASM catalyst with the following process parameters:

Pressure, MPa 3.0-4.0
Temperature, ° C
at the beginning of cycle 350-360
at the end of cycle 400-410
Feed space velocity, h⁻¹ 4-6
The hydrogen partial pressure, MPa 1.8 - 2.0

To ensure the requirements of hydrotreated diesel fuel flash point and the content of hydrogen sulphide is very important correctly chosen mode of stabilization of the column. For example, we recommend the following modes:

Number plates 20
Multiplicity of irrigation (mass) 2 1
The pressure in the column,..... , 0.16 MPa
Temperature, ° C
top of the column 130
bottom of the column is not below..... 260
inlet feed to column 220

Characteristics of the products

The target product is stable hydrotreating diesel. Yield stable diesel fuel averages 97% (wt.). Process byproducts are distilled off (gasoline), hydrocarbon gas (second stage separation and stabilization), hydrogen sulphide and hydrogen-containing gas purged

The following are the composition and properties of distillate:

Density, kg / m³ 750

Fractional composition: distilled at a temperature of RS

n. to..... 60

10% (vol.) 90

50% (vol.) 130

90% (vol.) 160

k. to 180

Sulphur content,% (wt.) 0.01-0.05

The octane number (motor method) 50

Vapour Pressure MPa not above 0.067

Yield of distillate depends on the content of light fractions in the feedstock constitutes 0.5-1.5% (wt.).

Installation and hydrotreating

On the domestic refineries hydrotreated middle distillate is preferably carried out at the L-24-5, A-24-6, 24-7-A, LP-24-2000 and LK-6U.

