

## MOTOR OILS, PROPERTIES AND THEIR COMPOUNDS CHANGES

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The oils used in the lubrication systems of internal combustion engines are called motor oils. Their main function is to reduce the wear of engine parts due to the formation of a strong oil film on the surface of the working parts.[1,4]

Regardless of the use of different oils for machines and mechanisms operating in different conditions, the general requirements for all lubricants are:

- any oil should have viscosity that ensures reliable operation of the working surfaces in different modes, as well as good lubrication properties to slow down the wear of the working parts;[2,3]

- all lubricants must protect their surfaces from corrosion and rust. moylar oksidlanmasligi, yukori temperaturali utirindilar xosil bulishiga tuskinlik kilishi zarur;[5,6]

- it is necessary to ensure that the engine can be easily started at a negative temperature and that the oil reaches the working surfaces quickly;[7]

- it should ensure the formation of a thorough oil film at high temperature;

- it should ensure easy removal from cracks and joints in friction areas;

it must preserve its operational properties during transportation and long-term storage.[8]

Motor oils must meet the requirements specified in the standards and technical conditions in order to ensure reliable and long-term operation of the engines without losing the specified power and economy, quality indicators.[9]

Lubricants are divided into liquid oils and plastic oils. Both types of lubricants can be mineral and organic. The main part of mineral oils (more than 90%) is recycled oil. Oils obtained from plant and animal products are called organic oils. Organic oils are rarely used in pure form, they are used in the preparation of high-quality plastic oils.[10,13]

Oils based on ether and alcohol are considered the most promising. Organosilicon compounds have good properties: their molecules are similar to those of hydrocarbons, but the position of a carbon atom is occupied by a silicon atom. Lubricants are also being created based on fluorine and chlorine.[11,12]

In order to improve the quality of oils and increase their operational properties, additives are added to them in the amount of 15-18%.

1) For reliable and long-term operation of the engine, additives are added to the oils: 3% ambient viscosity additives to improve viscosity properties.[15,16]

2) Depressants (the so-called substance) are added in the amount of 1% to reduce the temperature of winter oils. They are used to lower the temperature of the oil, which is very important for transmission oils. They reduce the temperature by preventing the formation of crystals when paraffins are heated, and at this temperature the oil's mobility is preserved.[17,18]

3) In order to reduce the formation of varnish, soot, and sediments in the parts of the engine, washing additives are added up to 3-10% to prevent burning of the piston rings. The alkali contained in detergents neutralizes the acids produced by the combustion of fuel. They keep solids in the oil in a fine suspension and prevent them from sticking to the metal.[19,20]

4) Antioxidants are added to prevent oxidation of oils. Oxidation is considered the most harmful process. Oxidation products can contain acids and neutral substances that corrode parts - tars, asphaltenes, carbons, carbides. A sulphide compound or a phenol derivative is added. They prevent oxidation of the oil film on hot metal surfaces.[1]

5) Anti-corrosion additives - reduce their corrosion by forming a thick film on the rubbing surfaces of pairs of metal parts or reducing the coefficient of dry friction.

6) Anti-slip joints - parts made of the same metal prevent direct contact of homogeneous surfaces when the specific load is too large. When metal surfaces of the same type, which are not protected by an oxide film or other film, touch each other, under the influence of intermolecular forces, surface friction occurs. Free sulfur in transmission oils has this characteristic.[20]

7) Anti-rust compounds.

Antirust liquids added to motor oil protect metal surfaces from rust, not oil. They form a thick oil film on the surface of the metal parts, the acids and water contained in the oil do not touch the metal surface due to this film. AKOF-1 - selectively purified nitrate base is made on the basis of oil and 10% stearin is added to such liquids.

8).Anti-foaming liquid (silicone oil) oil does not cause foaming. These liquids do not dissolve in oils. The effect of anti-bubble fluid is that the silicone fluid particles break the air bubbles in the oil.[5]

In order to improve the properties of motor oil, various inorganic and organic substances containing zinc, chlorine, sulfur, calcium, barium, sodium, phosphorus, iodine, and cyclic hydrocarbons are added to it. Some substances cannot be used together at the same time, because when they are mixed together, they can disintegrate, rot, and produce corrosive substances. In addition, different oils containing additives that improve the quality of the kura cannot be mixed together.[10]

Prisadkas should be as effective as possible. They should dissolve completely in the oil and not be filtered in the engine's oil cleaning devices. The compounds added to the oil should be sufficiently stable, that is, they should not separate and rot when stored for a long time, when the temperature changes, and when exposed to water.[12]

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