

Environmentally friendly lubricants

A.F. Khuzhakulov, K.Sh. Khotamov

Bukhara Institute of Engineering and Technology, Bukhara

Annotation

This paper presents the results of a study of environmentally safe lubricating oils. To solve the problems of preventing environmental pollution and import-substituting environmentally safe lubricating oils based on local raw materials with the involvement of additives of vegetable origin.

Keys words: mineral oils, waste oils, raw materials, additive, impurities, vegetable oils, chemical analysis, temperature biofuel, biodegradability.

The concept of ecological safety is to a certain extent conditional and relative, since any technological product, as well as the process of its production, to one degree or another poses a danger to the biosphere.

The most important ecological and economic problem of the use of all lubricants are leaks and evaporation during operation. This leads to a shorter service life and contamination of the workplace.

An insignificant part of the lubricants used (10-20%), during operation, is irretrievably lost to carbon monoxide, evaporation, entrainment, spills and leaks. The main part of them (80-90%) under operating conditions undergoes complex physico-chemical (thermal, oxidative, etc.) changes in composition and properties: from simple contamination with external impurities and internal wear products to deep chemical transformations that ultimately lead to deterioration of the operational properties of oils [1].

In Russia, 150 thousand tons are potentially formed annually from the initial industrial, energy oils produced by industry in the amount of 1 million 170 thousand tons [3].

Lubricants unsuitable for further use are removed from the lubrication system after the end of their service life or according to their condition and replaced with fresh conditioned petroleum products. Used mineral oils are characterized by a dark color, increased viscosity, acid numbers, content of asphaltenes and resins. Spent petroleum products are toxic, have a low degree of biodegradability (10-30%). They are able to accumulate in the natural environment and sooner or later can cause a shift in the ecological balance. Therefore, by the relevant decisions of the world community, spent petroleum products are classified as hazardous waste [2].

Used oils, being hazardous waste, are subject to mandatory collection and disposal, and in some cases - destruction. However, there is still no legislation on this

issue in Uzbekistan. 26-77% of all waste oils in Russia and Uzbekistan are illegally dumped on the soil, into reservoirs; 40-48% are collected, but only 14-15% of all collected waste oils are used for cleaning, and the remaining 26-33% are used as fuel or burned [1,3].

The degree of impact of used lubricating oils on hydraulic resources is as follows: only one liter of used oil can pollute 7 million liters of soil water [1].

The increasing demands to reduce environmental pollution put vegetable oils on one of the first places, which makes it possible to consider the use of vegetable oils a very promising direction in the production of fuel and lubricants and from the point of view of ecology.

Let's consider separate directions in solving these problems, given that when creating environmentally friendly lubricants, two main ways can be distinguished: the first (main) is the production of base oils, the chemical nature of which mainly determines the nature of the environmental impact, and the second is the synthesis of new additives: environmentally safe, biodegradable and effective in new base fluids.

The solution of this problem will allow us to come very close to the possibility of creating so-called "energy autonomous farms". When using vegetable oils as lubricants, industrial fluids, not only their renewability and high biodegradability are important, but also the characteristics that determine the possibility of their use in engineering. At the same time, it should be taken into account that the requirements developed for petroleum and synthetic oils can only be limited to products of vegetable origin [1].

It is very important that the use of vegetable oils is possible not only in the production of almost all types of lubricants, but also fuels [2].

In addition, the production of plant-based fuels and industrial fluids will entail the creation of new jobs, the resumption of the use of abandoned land and some other positive phenomena.

In principle, any lubricant with a high culture of operation can be considered to a certain extent environmentally safe: reducing friction leads to energy savings and increases the service life of equipment, a high-quality product has a long working life and generates less waste.

The use of biofuels and biomass reduces the emission of almost all harmful substances compared to the use of fuels derived from oil [3].

Their structure practically does not differ from the structure of lubricants based on petroleum oils.

The main goal in the development of environmentally friendly lubricants is to create products with high biodegradability and low eco-toxicity.

It is believed that the negative impact on the environment reduces the degree of biodegradability of the basic components 70% (additives should be potentially biodegradable) [3].

Therefore, it is relevant to obtain alternative types of oils obtained on the basis of raw materials of vegetable origin or with their involvement in the composition of base oils. Below is information on the biodegradability (in% for 21 days) of vegetable, petroleum, and synthetic base oils.

Vegetable oils:

Table №1

Rapeseed	100
Soy	70-100
base oil oils of selective purification	17-45

Synthetic oils:

Table № 2

poly – α – olefins	0-30
simple polyesters	11-25
esters	5-94

Research and pilot testing of such lubricants continues.

List of literature

1. Tonkonogov B.P. The state of production and consumption of lubricants in the Russian Federation and CIS countries, II International Scientific and Technical Conference / Innovative developments in the field of chemistry and technology of fuels and lubricants. Bukhara 2007, p. 15.
2. Matviyevsky R.M., Lakhshi V.L., Buyanovsky I.A. et al. Lubricants. Handbook. M. mashinostroenie, 1989. p. 224.
3. Fuks I.G., Evdokimov A.Yu., Lakhshi V.L., Saidmamedov Sh.M. Ecological problems of rational use of lubricants, Moscow 1993, p. 142.