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DERIVATIVES OF VEGETABLE OILS AS COMPONENTS OF HYDRAULIC FLUIDS

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Though not total loss lubricants, hydraulic fluids have been classified as "high risk loss" lubricants - they are used in large volumes in equipment that is susceptible to spills. The hydraulic fluids currently used in Latvia in wood harvesting and other environmentally sensitive areas still are mainly based on mineral oils. Completely different is situation in other EU countries, e.g., in Sweden, where the Swedish standard SS 155434 for biodegradable hydraulic fluids is a legal requirement. There is an obvious need for elaboration of formulations of hydraulic fluids based on renewable natural resources in order to initiate and to promote production of such products in Latvia.

Hydraulic fluids of harvesters should operate at temperature C and under high pressure (180-200 atm) till°C up to 70-100°range -25 change-over after 800-1200 operating hours. The main problems of biodegradable hydraulic fluids based on vegetable oils are their low hydrolytic, thermal and oxidative stability, as well as bad low-temperature fluidity and shear stability.

The biodegradable hydraulic fluids of harvesters available nowadays on market are much more expensive than their mineral oil based analogues and often can not fulfill technical requirements set; due to this, new and cheaper technologies are developed using renewable base stocks. Investigations regarding new base fluids as well as new additives are very topical.

We used rapeseed oil, its methyl- and ethylesters (RME and REE, correspondingly), by-products of biodiesel production - mixture of free fatty acids, mono- and diglycerides - as raw materials for creation of biodegradable hydraulic fluids. Following basic components for hydraulic fluids were synthesized:

• Esters of fatty acids of rapeseed oil and polyols:
o NPE - esters of neopentyl alcohol,
o TMPE - esters of trimethylolpropane,
o PEE - esters of pentaerythritol.
• Estolides of rapeseed oil and their ethylhexylesters.

Several derivatives of glycerol and fatty acids were prepared as potential additives for improvement of technical parameters of new compositions:

• Ethers of glycerol, obtained from:
o glycerol and epoxydized rapeseed oil,
o glycerol and mixture of epoxydized rapeseed oil fatty acids and mono-, diglycerides (formed as a by-product in biodiesel production).
• Polyhydroxycompounds, obtained from epoxydized RME.

C, as well as°C and 100°We determined kinematic viscosity at 40 viscosity index, oxidative stability, cold-flow properties, acid value, foaming, air release, flash point of elaborated compositions. The most of tested parameters corresponded to requirements, but low temperature fluidity after 7 days were unsatisfactory – addition of temperature depressants (e.g., Lubrizol 7671A) improved this parameter. We used TBHQ as oxidation inhibitor, Lubrizol 7671A as pour point depressor and polymethylsiloxane as antifoam agent in rapeseed oil based formulations.