

THE SYNTHESIS OF VARIOUS VALUABLE PRODUCTS FROM PLANT OILS DAŽĀDU VĒRTĪGU PRODUKTU SINTĒZE NO AUGU EĻĻĀM

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Summary: The epoxy and polyhydroxy triglycerides have been synthesized from oils of plants commonly grown in Latvia - rape, hemp and flax. These compounds are suitable as additives for biodiesel and lubricants, e.g., chain saw oils, as they improve kinematic viscosity and oxidative stability. These derivatives of triglycerides have been obtained from renewable resources and are environmentally friendly.

Last years a considerable attention has been devoted to biodegradable lubricants obtained from renewable resources, which do not pollute the environment. Vegetable oils turned out to have multifarious applications.

Our investigations have been devoted to the epoxidation of seed oils and synthesis of polyhydroxy triglycerides. These compounds are valuable as additives for biodiesel and lubricants, e.g., chain saw oils, and for other applications as well.

During epoxidation oxiranes (epoxides) are formed from double bonds of unsaturated fatty acids by the reaction with peroxyacids. Epoxidized oils and esters are being used as plasticizers; their addition to polyvinyl chloride increases the thermal stability, flexibility, elasticity and endurance against UV radiation [1]. Epoxy triglycerides have high stability and viscosity, but polyhydroxy triglycerides demonstrate excellent emulsifying properties for oil in water emulsions [2].

The epoxides of rapeseed, hempseed and linseed oils as well as polyhydroxy triglycerides of rapeseed oil have been obtained; their properties have been evaluated. We obtained epoxides of seed oils by reaction with performic acid (generated *in situ* from formic acid and H₂O₂ water solution (30%)), while heating the reaction mixture at 56°C for 7-15 hours. The iodine value and kinematic viscosity (at 40°C) of raw oils and products were detected.

The viscosity of epoxy and polyhydroxy triglycerides has risen from 27-34,5 mm²/s up to 145–267 mm²/s, but iodine value has decreased from 116–200 to 1,2–1,4 mg I₂/100 g in comparison with corresponding oils. Due to the high viscosity and low iodine value, the obtained epoxy and polyhydroxy triglycerides of rapeseed, hempseed and linseed oils may serve as additives improving viscosity and oxidative stability, favourably in compositions of lubricants and chain saw oils.

The chain saw oil based on hempseed oil with 2% (wt) additive of epoxy triglycerides obtained from linseed oil has been prepared and approbated in forest exploitation. This additive serves as emulsifier and improver of viscosity and oxidative stability.

Our experiments demonstrate application of renewable resources – oils of plants grown in Latvia – for production of environmentally benign, biodegradable products.

Literature:

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