

STUDY OF THE OXIDABILITY OF SOME VEGETABLE OILS

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Lipid oxidation is one of the most important processes in the deterioration of lipid-containing foods. Lipid oxidation is a multi-stage process, with a multifactorial determinism, being influenced in foods by chemical structure (richness in unsaturated fatty acids), physical condition (liquid or solid), the presence in one form or another of inorganic oxidants (ions of some metals: Fe²⁺, Cu²⁺, Co²⁺, Mn²⁺) or organic (hemoglobin, myoglobin), the pre-existence of free radicals, the existence of lipases, the quantity and quality (selectivity) of substances with antioxidant role in food, the way of food processing, the way of packaging and food storage conditions.

A study on the process of forced oxidation of grape seed oils, walnuts and corn in the presence of hydrogen peroxide and Cu (II) ions was realized. The thermo-oxidation of the oil caused a significant decrease in the saponification index, which indicates a significant degree of polymerization and leads to an increase in the viscosity of the studied sunflower oil. To highlight the impact of heat treatments, the analysis was performed by IR spectroscopy and the possible mechanisms of forced oxidation of unsaturated fatty acids under the influence of heat factor were analyzed. It was established that the applied treatment favored both the formation of carbonyl secondary compounds and the simultaneous formation of hydroperoxides and triglycerides containing hydroxylated groups. The accumulation of hydroperoxides and triacylglycerides that have hydroxyl functions have facilitated the course of polymerization reactions, which are to increase the viscosity of the studied thermo-oxidized sunflower oil. Analogous to the forced oxidation of sunflower oil [1], the formation during oxidation of trans-isomers of polyunsaturated acids was attested. The study investigated and identified the minimum concentrations of antioxidants needed to reduce the oxidation of the analysed oils.

Keywords: vegetable oil, thermal oxidation, IR spectroscopy, peroxide index, acidity index

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Reference

1. Rodica Sturza, Druță Raisa, Covaci Ecaterina, Duca Gheorghe, Subotin Iurie (2020). Mechanisms of sunflower oil transforming into forced thermal oxidation processes. *Journal of Engineering Science*, no.3, Vol. XXVII, p. 239–251. DOI [10.5281/zenodo.3949716](https://doi.org/10.5281/zenodo.3949716)