abstracts

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• Fats and Oils

NICKEL/SILVER CATALYSTS AND THEIR APPLICATION IN SELECTIVE HYDROGENATION OF FATS. J. Lefèbvre and J. Baltes (Harburger Oelwerke Brinckmann & Mergell, Hamburg-Harburg, Germany) Fette, Seifen, Anstri Chm. 77, 125–31 (1975). Catalysts used for the hardening of fats are critically evaluated from the view-point of reaction mechanisms and kinetics. Carrier catalysts composed of nickel and silver exhibit high selectivities, low rates of isomerization and unusual longevity. They can be removed completely from the hydrogenated fat by the usual operations. These catalysts, which do not have the drawbacks of copper-containing catalysts, can be used instead of the latter. Hydrogenation characteristics of the new catalysts depend upon their composistion and mode of preparation. Two types of nickel/silver catalysts have been found suitable; Ni/Ag-carrier catalyst TR containing at least 10 parts of silver per 100 parts of nickel, which is reduced at 220°–290° C, and Ni/Ag-carrier catalyst HS containing 7 to 8 parts of silver per 100 parts of nickel, which is reduced at 350°–450° C. Both catalysts TR and HS are suitable for the production of stable edible fats, for example, from soybean oil or rapeseed oils derived from the new varieties of rape. Using the type TR catalyst, the linolenic acid content of an oil can be reduced to a level of less than 2% without an appreciable reduction in the content of linoleic acid. Thus, from soybean oil, after removing small amounts of solid glycerides, a cold-stable salad oil can be obtained which does not tend to flavour reversion. The second type of catalysts, HS, reduces also the content of linoleic acid thus yielding heat-stable products that are suitable as frying oils and liquid shortenings. Experimental conditions and results of commercial testing are described. Methods for the preparation and handling of the new catalysts as well as the composition and the properties of hydrogenated products are presented.

STUDIES ON CHEMICAL PROPERTIES OF MCT AND ACETOGLYCERIDES. J. Brückner, G. Mieth, J. Pohl and J. Kroll (Akademie der Wissenschaften der DDR Forschungszentrum für Molekularbiologie und Medizin, Potsdam). Medium chain triglycerides (MCT) were synthesized by esterification of glycerol with medium chain fatty acids. The authors have investigated the influence of temperature and various catalysts on the speed of esterification. Acetoglycerides were formed by transesterification of sunflower oil with triacetin, using sodium methylate as catalyst. The chemical stability of MCT and acetoglycerides was determined by storage trials and by estimation of the peroxide number, the acid number, and the carbonyl content. The tests concerned the pure fats, the fats as part of margarine blends, and formula diets. The chemical stability of MCT was mainly limited by hydrolitic reactions; the influence of water binding agents on the stability has been investigated. The storage behavior of acetoglycerides is compared with that of sunflower oil. The results indicate that the acetic acid content of triglycerides has only little influence on the stability. (Chemurgy of Fats, International Symposium. Gdansk, Poland. 1975)

THE ALTERATIONS IN GLYCERIDE COMPOSITION DURING INTERESTERIFICATION OF MIXTURES OF SUNFLOWER-SEED OIL WITH LARD AND TALLOW. D. Chobanov and R. Chobanova (Institute of Organic Chemistry Bulgarian Academy of Sciences, Sofia, Bulgaria). The one-phase interesterification of mixtures of sunflower-seed oil with fully-hydrogenated lard, lard, and tallow is followed by argentation thin-layer chromatography. The curves of the changes of each of the triglyceride groups, differing in unsaturation, are present. These are used to establish the conversion of the initial composition to the random limits in the mixtures cited. (Chemurgy of Fats, International Symposium. Gdansk, Poland. 1975)

MODIFICATION OF THE PROPERTIES OF ESTERS BY THE SELECTION OF THE ACID RADICAL. J. Cyganska, H. Szczepanska and W. Siemaszko (Institute of Industrial Chemistry, Warsaw, Poland). Effect of acid radicals on the properties of ester waxes was studied. Experiments were carried out with liquid and solid, individual and mixed fatty acids of molecular weight which ranged from 200 up to 340. Tallow alcohol of molecular weight 256 was used as the alcohol component of esters. Based on the melting point and freezing point data and on DTA and penetration curves, effect of the acid radical characteristics on these physicochemical properties which are important for the performance of product was found. Further modification of ester properties has been demonstrated by the example of multicomponent mixtures containing hydrocarbons. (Chemurgy of Fats, International Symposium, Gdansk, Poland. 1975)

EFFECT OF SOME ADSORBENTS ON THE OIL HYDROGENATION PROGRESS. B. Drozdowski, I. E. Goraj and H. Niewiadomski (Institute of Organic and Food Chemistry and Technology, Gdansk Technical University, Poland). The changes in kinetics and mechanism of rapeseed and soybean oil hydrogenation in the presence of adsorbents introduced in to the reaction system have been studied. The process has been carried out in a laboratory "dead-end" type reactor with automatic recording of hydrogen absorption. It has been stated, that the increase of hydrogenation rate, due to the presence of an adsorbent, depends on the kind of catalyst and oil. Especially positive influence has been observed during rapeseed oil hydrogenation. The presence of an adsorbent in the reaction system, does not change the selectivity and the degree of cis-trans isomerization of unsaturated fatty acids. (Chemurgy of Fats, International Symposium. Gdansk, Poland. 1975)

PROGRESS OF THE SOYBEAN OIL HYDROGENATION WITH PARTLY POISONED NICKEL CATALYST. B. Drozdowski and M. Zajac (Institute of Organic and Food Chemistry and Technology, Gdansk Technical University, Poland). Supported and unsupported nickel catalysts have been partly poisoned with sulphur and phosphorus compounds. It has been observed that the supported nickel catalyst is more resistant to the poisoning effect of the studied inhibitors. The sulphur compounds bring about longer induction periods at the same level of sulphur and phosphorus in the reaction system. The changes in oil hydrogenation rates, as a result of partial poisoning of both catalysts have been shown on the corresponding kinetic curves. No remarkable changes have been observed as regards the hydrogenation mechanism. (Chemurgy of Fats, International Symposium. Gdansk, Poland. 1975)

HYDROGENATION OF DIGLYCERIDE, TRIGLYCERIDE AND FREE FATTY ACID MIXTURES. B. Drozdowski, Z. Hazuka and H. Niewiadomski (Institute of Organic and Food Chemistry and Technology, Gdansk Technical University, Poland). Mixtures of di- and triglycerides were subjected to hydrogenation in a laboratory reactor of "dead end" type with an automatic recording of hydrogen absorption. The process was repeated for the same mixture with addition of free fatty acids and for the mixture of TG and FFA. The overall fatty acid composition of all components was identical. The reaction progress of each component was identical. The reaction progress of each component was determined. The preferential hydrogenation of FFA and DG to TG and the inhibitory effect of the former two components on the triglyceride hydrogenation rate have been confirmed. (Chemurgy of Fats, International Symposium, Gdansk, Poland. 1975)

INFLUENCE OF THE REFINING PROCESS ON THE DISSOLVED OXYGEN CONTENT OF VEGETABLE OILS. J. Holló. (Department of Agricultural Chemical Technology Technical University, Budapest, Hungary), I. Buzás and E. Kurucz (Research Institute for Vegetable Oil and Detergent Industry, Budapest) and J. Pólya (Vegetable Oil and Detergent Production Company, Budapest). The technological steps of the refining process of sunflower and rapeseed oils were studied by measuring the oxygen physically dissolved in different intermediate and final products. Samples were drawn during neutralization, bleaching, deodorization, winterization and from the bottled oils. The measurements were carried out by means of a Radelkis polarographic oxygen sensor consisting of a silver cathode and a zinc anode covered with a Teflon membrane to separate the electrolyte and the sample. Thus the sensor provides a rapid and direct determination of the partial pressure of the oxygen and it proved to be suitable for industrial quality control. The results showed that the amount of dissolved oxygen was different in intermediate products, it was negligible after deodorization but it increased considerably during handling and storage, therefore it was high in the bottled oils. The oxygen consumption of bottled oils was also investigated. (Chemurgy of Fats, International Symposium, Gdansk, Poland. 1975)