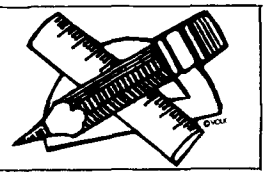
Abstracts



• Fats and Oils

THE LIPIDS OF STARCH—RESEARCH BETWEEN CARBOHYDRATES AND LIPIDS. L. Acker (Inst. f. Lebensmittelchem., Univ. Münster, D-4400 Münster, Germany). *Fette Seifen Anstrichm.* **79,** 1–9 (1977). The lipids of cereals are distinguished by a variety of polar lipids which have importance for the technological properties of cereal products. In this context the lipids of starch have a special role. They are present in the form of inclusion compounds of the amylose and they distinguish themselves from the usual lipids by the lysophosphatides which are rarely found in nature. The main compound, the lysolecithin, a lipid of strong hemolytic effect, is only to be found in form of the 1-acylisomer. Between amylose and lipids interaction exists; lipids as partners have to fullfil some conditions in constitution. Lipids as far as they are qualified for inclusion have already in low concentration a distinct influence on the viscosity of starch pastes and with it on the rheological properties of starch gels.

QUALITATIVE TLC-SEPARATION OF ACETOGLYCERIDES. R. Neissner (Edelfettwerke Werner Schlüter, D-2000 Hamburg 57, Germany). *Fette Seifen Anstrichm.* **79,** 24–8 (1977). A short review of the literature on preparation, application and chromatographic analysis of acetoglycerides is given. Technical acetoglycerides are separated by TLC into non-acetylated and acetylated monoglycerides as well as geometrical isomers of diglycerides (maximum eight fractions) and all the fractions with the exception of one are identified using reference substances. In an example, using TLC small amounts of acetylated glycerides are detected in hard fat (DAB 7) and identified as 3-aceto-1,2-diglyceride and 2-aceto-1,3-diglyceride.

COMPOSITION OF THE SEED OIL OF CLUSTERED ELDER (SAMBUCUS RACEMOSA L.). O. Moll, K. Stránský, L. Novotný and K. Ubik (Inst. f. Org. Chem u. Biochem., Tschechoslowakische Akad. d. Wiss., Flemingovo nám. 2, 166 10 Prag 6, Czechoslovakia). *Fette Seifen Anstrichm.* **79,** 28–32 (1977). The seeds of clustered elder (Sambucus racemosa L.) contain 28% of an oil. Its separation to groups of components was carried out by adsorption chromatography. Single groups of substances were further analysed by TLC and GLC in combination with physico-chemical methods (IR and MS). Thus the following substances were found and identified: n-alkanes (C_{17}–C_{33}), 2-methyl- and 3-methylalkanes, squalene, a mixture of esters, triglycerides, β-sitosterol, campesterol and a mixture of diglycerides. The conditions for the separation of esters by silica gel column chromatography were also found. The mixture of esters was thus separated into a group of aliphatic wax esters (C_{34}–C_{44}) and four groups of esters of steroidal alcohols (mainly β-sitosterol and campesterol) with aliphatic unsaturated acids (predominantly $C_{18:1}$, $C_{18:2}$ and $C_{18:3}$). In the triglycerides representing the main fraction of the oil (93%), the acids $C_{16:0}$, $C_{18:1}$, $C_{18:2}$ and $C_{18:3}$ are present. The same acids were also found in diglycerides.

MOLECULAR ARRANGEMENTS IN FATS WITH TRICLINIC CRYSTAL STRUCTURE. E. Frede and D. Precht (Inst. f. Physik, Bundesanstalt f. Milchforschung, D-2300 Kiel, Germany). *Fette Seifen Anstrichm.* **79,** 69–75 (1977). Apart from their stable β-form the saturated mono-acid triglycerides are found to occur in four other modifications with triclinic crystal structure which differ from each other by the angle of chain tilt of the molecules. This fact, of little consideration in literature so far, could be confirmed and evidence could be given of it, partially for the first time, by means of X-ray diffraction of the even-numbered triglycerides trilaurin till tristearin. Based on several hypotheses, e.g. a nearly constant triclinic subcell, a theoretic structure model could be elaborated in which all experimental results of the five triclinic crystal forms may be classified. In addition, mathematic relations were found which allow a complete build-up of the β-unit cell from the subcell. It was found from electron and X-ray diffraction studies that an homologous isomorphium of the triglycerides studied does not exist in the strict sense. The cause may be seen in a slight but characteristic shrinkage of the subcell with increasing molecular length.

DETERMINATION OF POLYETHYLENE IN FATS. A. Seher, M. Arens and Gisela Werner (Bundesanstalt f. Fettforschung, D-4400 Münster, Germany). *Fette Seifen Anstrichm.* **79,** 75–7 (1977). Numerous procedures, based on the same principle have been suggested for the determination of polyethylene in crude animal fats for technical uses. Investigation of these procedures led to the development of a gravimetric method of determination, which is based on the latest suggestion of the British Standards Institution. This method enables, apart from determination, the identification of the synthetic polymer by infrared spectrometry. Out of known amounts of added polyethylene, 90 or 295 mg/kg of pure beef tallow, 96–97% were recovered. The incidental errors were at the most 10 mg/kg at the lower level of contamination and 6 mg/kg at the higher level. The values are mainly influenced by the limitation in attainable weight constancy of the filtering device.

COMPOSITION AND CHARACTERIZATION OF CLEOME ICOSANDRA L. SEED OIL. Y. Uma Devi and H.R. Zaidi (College of Technology, Osmania University, Hyderabad 7, India). *Fette Seifen Anstrichm.* **79,** 91–2 (1977). Cleome icosandra grows wild in abundance all over India. The seeds contain 26% of oil. The iodine value of the fresh and the stored oils was found to be 125–126 and saponification value as 205. The oil contains only a small amount of saturated acids (21–22%), viz. myristic (1–1.2%), palmitic (13–14%) and stearic (6–7%) and high amounts of unsaturated acids, viz. oleic (12–14%), linoleic (65–66%). Due to the high linoleic content the oil polymerises during storage. The degree of polymerisation is higher with the oil extracted from stored seeds which was kept over a period of three months than the oil obtained from fresh seeds under identical conditions. The short crop period, ease of collection of seeds from forest areas and the desirable tendency of polymerisation suggest the exploitation of this oil for industrial use.

DETERMINATION OF XANTHOPHYLL CONTENT OF VEGETABLE OILS. P. Vogel (Union Deutsche Lebensmittelwerke GmbH, D-4190 Kleve 1, Germany). *Fette Seifen Anstrichm.* **79,** 97–103 (1977). The DGF official method F-II 2 enables the separation of carotenoid hydrocarbons from the unsaponifiables using a Al_2O_3 column. This method can be extended by the successive use of polar solvents. Thus, polar carotenoids can also be separated. Spectrum of each fraction from the Al_2O_3 column is obtained and the fractions are further separated in a MgO-celite column. Identification of individual carotenoids is done on the basis of absorption spectra as well as the nature and number of polar groups determined by thin-layer chromatography on silica gel plates. Content and composition of carotenoids in several vegetable oils, such as soybean sesame, sunflower, corn germ and low-erucic rapeseed oil were determined by this technique. All these oils contain mainly dihydroxy carotenoids.

QUALITATIVE TLC-SEPARATION OF ACETYLATED PENTAERYTHRITOL FATTY ACID ESTERS. R. Neissner (Edelfettwerke Werner Schlüter, D-2000 Hamburg 57, Germany). *Fette Seifen Anstrichm.* **79,** 103–7 (1977). Partially acetylated pentaerythritol fatty esters, suitable as emulsifiers, were separated by TLC into non-acetylated pentaerythritol mono-, di-, tri- and tetraesters, partially acetylated pentaerythritol mono- and diesters, and fully acetylated pentaerythritol mono-, di- and triesters (maximum 10 fractions) and all the fractions were identified.

METHOD FOR THE DETERMINATION OF THE DISPERSION OF WATER DROPLETS IN WATER-IN-OIL-EMULSION (W/O-EMULSION). R. Zschaler (Unilever Forschungsgesellschaft mbH, D-2000-Hamburg 50, Germany). *Fette Seifen Anstrichm.* **79,** 107–9 (1977). We find emulsions of the w/o type for instance in

margarine and butter. Besides other facts the fine dispersion of the water in microscopical small droplets, which are coated by fat, are of importance. Therefore, it is of interest for the manufacturer that he has an exact idea of the dispersion of the water droplets in his product. We describe the method for the determination of the water dispersion and the preparation of the test material.

TURKISH TEASEED OIL AND TEA SAPONIN. T. Yazicioğlu, A. Karaali and J. Gökcen (Sci. Tech. Res. Council Turkey, Marmara Sci. Ind. Res. Inst., Gebze-Kocaeli, Turkey). *Fette Seifen Anstrichm.* 79, 115–20 (1977). The annual production of black tea in Turkey is about 50,000 t. It is estimated, that Turkey can produce annually 14,000 t tea seed and 3,000 t teaseed oil. The seed consists of 70% kernel and 30% hull. The oil content of the kernel is 33%. The Turkish teaseed oil has following characteristics: Specific weight at 250° C: 0.9180; refractive index at 25° C: 1.4692; saponification value: 192.8; iodine value (Hanus): 90.9; RM-value: 1.0; hydroxyl value: 5.25; unsaponifiable: 1.05%. Gas chromatographic determination of fatty acids gave following average values: myristic acid traces, palmitic acid 16.0%, stearic acid 1.67%, oleic acid 59.4%, linoleic acid 21.8% and arachidic acid 1.23%. The oil-cake contains 14% saponin, therefore, has a bitter taste. Tea saponin is a triterpenic saponin of the type of amyrin. The aglycone consists of five different sapogenins. The carbohydrate part of the tea saponin contains following sugars: xylose, galactose, glucose and galacturonic acid.

SIGNIFICANCE OF FATTY ACIDS IN THEIR FUNGISTATIC ACTION. H. Rieth (Mykologisches Labor, Univ.-Hautklinik Hamburg-Eppendorf, D-2000 Hamburg 20, Germany). *Fette Seifen Anstrichm.* 79, 120–1 (1977). The fungistatic action of saturated and unsaturated fatty acids, halogenated fatty acids and esters as well as sulfur-containing derivatives is reviewed. Fungistatic agents, known since a long time, are propionic acid, caprylic acid and its salts as well as undecylenic acid and its salts. The recently known fatty acid derivatives having fungistatic action are morpholine and piperidine compounds of long chain fatty acids and the new class of aminimides of fatty acids with 14–16 C atoms.

FATTY ACID PATTERN AND TOCOPHEROL CONTENTS OF OILS FROM DIFFERENT VARIETIES OF SUNFLOWER IN THE WORLDWIDE CULTIVATION. R. Marquard, W. Schuster and K.-H. Seibel (Inst. f. Pflanzenbau u. Pflanzenzüchtung, Justus Liebig-Univ. GieBen, D-6300 GieBen, Germany). *Fette Seifen Anstrichm.* 79, 137–42 (1977). The material available for investigation comprised 9 varieties from two harvests from 6 locations having greatly differing climate. Furthermore, the material from freely flowering plants and that from isolated plants, which were pollinated within the varieties, were investigated. The fatty acid composition is distinctly dependent on the location; linoleic acid content is negatively correlated with oleic acid content, being high in cold regions and low in warm regions. The tocopherol content of the oil varies both with location and variety in isolated plants, whereas in freely flowering plants the differences in tocopherol content between the varieties disappear. Correlations are found between tocopherol content of the oil and oil content of the seed, yet differentiation should be made whether the variations in oil content are due to genetic differences or due to regional factors. Varietal differences in oil content are positively correlated in both years and regional differences are negatively correlated with the tocopherol content of the oil.

ISOMERIZATION OF LINOLEIC ACID METHYL ESTER WITH RHODIUM COMPLEXES. H. Singer, R. Seibel and U. Mees (Univ. Mainz, Fachber. Chem., Abt. f. Lehramtskandidaten d. Chem., D-6500 Mainz, Germany). *Fette Seifen Anstrichm.* 79, 147–50 (1977). The isolated double bonds of the linoleic acid methyl ester were conjugated with rhodium complexes plus $SnCl_2 \cdot 2H_2O$ as catalysts. The dependence of the reaction on phosphorous and nitrogen ligands was studied. The most active catalyst resulted with tri-p-tolyl-phosphin as ligand; it isomerises the linoleic acid ester in a good yield at temperatures as low as 25° C.

HARMFUL SUBSTANCES IN FATTY FISH PREPARATIONS. J. Wurziger and G. Dickhaut (Chem.-u. Lebensmitteluntersuchungsanstalt im Hygien. Inst., D-2000 Hamburg 36, Germany). *Fette Seifen Anstrichm.* 79, 165–70 (1977). The occurrence of harmful substances in fish and fish preparations is outlined. These discussions include mercury, DDT and PCB. Harmful substances can be removed from fish oils by intensive processing. It is also shown that oxidative changes in fish oils might indicate the occurrence of harmful substances. Relationships between the age as well as length of the fishes and their mercury content are discussed. Examples are given which show that it is unnecessary to examine younger fishes and preparations obtained therefrom for harmful substances. Large and heavy old fishes should be sorted out immediately after hauling and processed separately to yield oils that can be freed from harmful substances after refining and hardening. Mechanical separation of fish oil from fatty fish preparations generally leads to alteration in the distribution of harmful substances. The use of strongly contaminated fatty fish parts can be improved by mechanical separation of fish oil and conversion to corresponding products. Conversion factors correlating processed fish to fresh fish are given for different varieties of fish treated in different manner.

DETERMINATION OF SILICONES IN VEGETABLE OILS BY NONFLAME ATOMIC ABSORPTION SPECTROPHOTOMETRY. M.K. Kundu (Kusum Products Ltd., Brabourne Rd., Calcutta-1, India). *Fette Seifen Anstrichm.* 79, 170–3 (1977). The determination of silicone in oil was based upon conversion of the oil into water-soluble form (Na/K-Soap) in a teflon tube, extraction of the water-insoluble, solvent-soluble silicones with petroleum ether, and determination of the silicones in some suitable organic solvent by nonflame atomic absorption spectrometry (AAS). (An aliquot of this extract might be used to chromatographically detect silicones originally present in the oil in a very low concentration). The standard deviation and the per cent relative standard deviation data for silicone in oil at ca. 2 ppm level were 0.41 and 25.20 respectively. The contamination of silica from the reagents employed can be virtually eliminated. The success of the method lies principally in the purity of the alkali employed. Direct determination of the silicones by flame- or nonflame AAS was not satisfactory at low concentrations. Apart from the volatility of the silicones, the presence of oil appeared to seriously suppress the sensitivity level of determination. Digestion of the silicone containing oil with HNO_3-$HClO_4$-H_2SO_4 apparently improved the sensitivity level but the advantages gained were mostly offset by the contamination of silicates from the acid reagents employed.

SOY PROTEIN PREPARATIONS AS ANTISPATTERING AGENTS FOR MARGARINE. H. Pardun (Anna-von-Cleve-Str., D-4190 Kleve, Germany). *Fette Seifen Anstrichm.* 79, 195–203 (1977). It was found that soy protein concentrates obtained by successive extraction of ground soybeans with hexane and ethanol or with hexane alone, grinding to a particle size less than 100 μ and subsequent leaching with diluted acids at pH 4.5, are good antispattering agents. If the process is preceded by a debittering treatment of the beans with steam, products having very neutral taste are obtained. Addition of 0.2% of these concentrates to fully deaerated margarine containing 5% milk and 0.15% each of mono- plus diglycerides and lecithin, prevents spattering completely. Half-fat margarine does not spatter inspite of its high water content, if 0.1% of the concentrate is added. A disadvantage is the infection of soy protein concentrates with resistent fungus, which necessitates sterilization of the proteins at 85° C in acidic medium.

COMPOSITION OF SOME KOREAN SEED OILS. A. Seher, M. Krohn and Y. Su Ko (Bundesanstalt f. Fettforschung, D-4400 Münster, Germany). *Fette Seifen Anstrichm.* 79, 203–6 (1977). Seeds of some Korean plants, used in popular medicine, were investigated for oil content, fatty acid composition and sterol composition. Two seed oils of conifers contained unusual polyenoic acids having 18 and 20 C-atoms. cis-5,cis-9,cis-12-Octadecatrienoic acid was identified as one of the major component fatty acids in the seed oil of Pinus koraiensis. Apart from their medicinal use, some of the investigated seeds of angiosperms, such as perilla, sesame or rape, are used mainly for oil extraction. The oils in the varieties cultivated in Korea do not differ in their fatty acid composition from the figures considered as average composition in Europe.

INTERACTIONS BETWEEN AROMA SUBSTANCES AND LIPIDS 1. SORPTION OF SOME VOLATILE SUBSTANCES IN PURE LIPIDS. H.G. Maier and K. Kessler (Inst. f. Lebensmittelchem., TU Braunschweig, D-3300 Braunschweig, Germany). *Fette Seifen Anstrichm.* 79, 241–4 (1977). Ethyl acetate, n-hexane, ethanol, and acetone are sorbed much better by liquid lipids than by solid ones. The sorption capacity of liquid lipids increases in the order triglyceride, free fatty acid, fatty acid methyl ester, and also with decreasing chain length of the fatty acid residues. Oleic acid derivatives sorb more than stearic acid ones. The sorbed amounts decrease in the order ethyl acetate, ethanol or hexane, acetone. This holds for the sorption of