

ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: N. E. Bednarczyk, J. Covey, J. G. Endres, J. Iavicoli, F. A. Kummerow, E. G. Perkins, T. H. Smouse, J. A. Thompson and R. W. Walker

• Fats and Oils

PRO-AND ANTIOXIDANTS IN THE FIELD OF FATS XXV. THEIR LOCALIZATION IN SEEDS, FRUITS AND POTATOES. H. P. Kaufmann, A. W. ElBaya and D. Meinsen (Inst. for Fat. Res., Munster (Westf.) Ger.). *Fette Seifen Anstrichmittel* 71, 537-42 (1969). Antioxidative action of various plant extracts on highly purified linseed oil and methyl linoleate was determined. Extracts from the peripheral zones of different fruits possess the maximum oxidation inhibiting action. The flavonol quercetin occurs in the flesh of onions as glycoside and not in the free state. In connection with the stability of potato products during storage, the lipid content and the distribution of lipids between starch and protein of the potatoes are determined. The scope of a possible utilization of the antioxidants present in the potato skins is discussed.

TLC SEPARATION OF MIXTURES OF ISOMERIC AND NATURAL TRIGLYCERIDES. H. Wessels and N. S. Rajagopal (Inst. for Fat. Res., Munster (Westf., Ger.). *Fette Seifen Anstrichmittel* 71, 543-52 (1969). Triglycerides can be separated by reverse phase, as well as by silver nitrate chromatography. In both of these methods critical pairs are formed which may be separated by a combination of the two methods. Isomeric triglycerides cannot be separated by the latter procedure. The isomeric triglycerides can be classified into positional isomers, geometric isomers, isomers having the same number of double bonds and C-atoms but containing different fatty acids, and glycerides containing the positional isomers of unsaturated fatty acids. The difficulties involved in the separation of these isomers are pointed out and examples for the TLC separation of triglycerides of each class are shown. In addition to the resolution of model substances, the TLC separations of cottonseed, sunflower, olive, peanut and palm kernel oils are given.

OXIDATION OF BRANCHED CHAIN FATTY ACIDS BY CHROMIC ACID. S. M. Khan, A. Aziz Khan and M. A. Beg (Dept. of Chem., Aligarh Muslim Univ., Aligarh, India). *Fette Seifen Anstrichmittel*, 71, 451-54 (1969). The kinetics of oxidation of isobutyric and isovaleric acids by chromic acid in a sulfuric acid medium have been studied. The end product, acetic acid, is supposed to be derived from the ketones which are the initial oxidation products of the corresponding branched chain fatty acids. The influence of acetic acid on the oxidation velocity has been examined and a marked effect on the rate constants with increasing acetic acid concentration has been observed. A mechanism involving the electrophilic attack of the oxidant on the tertiary carbon atom of the fatty acid to yield a carbenium ion has been postulated.

CONTINUOUS HYDROGENATION OF OILS AND FAT. G. Leuteritz (Res. Lab. Fa. BUSS, Basel, Switzerland). *Fette Seifen Anstrichmittel* 71, 441-45 (1969). Continuous processes for the hydrogenation of oils and fats are reviewed. The various systems are classified according to the type of reaction involved. The advantages and disadvantages are presented. As an example of a modern plant for continuous hydrogenation, the reactor of BUSS, AG, Basel, is described in detail, and its operational characteristics in the selective hydrogenation of fish oil are reported. The effect of pressure, temperature and catalyst concentration on the dilatation properties of the products at various temperatures and iodine values is given. Pressure was found to be the most important factor governing the selectivity.

PHYSICO-CHEMICAL CHARACTERISTICS AND FATTY ACID COMPOSITION OF SOME VIRGIN OLIVE OILS PRODUCED IN SOUTHERN ITALY. B. Dore and S. Remole (Prov. Chem. Lab., Trieste, Italy). *Riv. Ital. Sostanze Grasse* 46, 467-77 (1969). Physico-chemical constants, U.V. absorption coefficients and fatty acid composition are reported for a group of virgin olive oil samples produced in Southern Italy during the 1965-66 crop.

MODERN ASPECTS OF LIPID BIOCHEMISTRY. G. Moruzzi and R. Viviani (Univ. of Bologna, Bologna, Italy). *Riv. Ital. Sostanze Grasse* 46, 423-31 (1969). A review of recent developments in the area of lipid biochemistry.

ATOMIC ABSORPTION SPECTROPHOTOMETRY: PRINCIPLES AND APPLICATION TO FAT AND OIL ANALYSIS. R. Rastelli and A. Amati (Univ. of Bologna, Bologna, Italy). *Riv. Ital. Sostanze Grasse* 46, 62-5 (1969). The application of atomic absorption to the analysis of trace metals in fats and oils is discussed.

THE BLEACHING OF OLIVE OILS, I. VARIABILITY OF SOME PHYSICO-CHEMICAL CHARACTERISTICS AS A FUNCTION OF OPERATING CONDITIONS. A. Amati, A. Minguzzi and G. Losi (Univ. of Bologna, Bologna, Italy). *Riv. Ital. Sostanze Grasse* 46, 73-9 (1969). Experimental results on olive oil bleaching are reported and discussed.

REFINING OF OLIVE OIL AND OLIVE HUSK OIL, I. ALKALI DEGUMMING AND DEACIDIFICATION. C. Carola (Exper. Stat. Fats and Oil, Milan, Italy). *Riv. Ital. Sostanze Grasse* 46, 242-69 (1969). A detailed description is presented, with much operational data and theoretical principles, of the processes and installations involved in alkali degumming and deacidification of olive oil and olive husk oil, including the treatment of miscella.

ON THE STRUCTURE OF CONJUGATED AND ISOMERIZED OCTADENOIC ACIDS. E. Fedeli and F. Camurati (Center for Lipid-chemistry, Milan, Italy). *Riv. Ital. Sostanze Grasse* 46, 464-6 (1969). The products of alkaline conjugation of linoleic acid have been separated by thin layer chromatography, and their structure has been studied, with special regard to double bond position, by means of reductive ozonolysis. The same technique has been applied also to the study of the products obtained from the isomerization of conjugated acids with iodine.

SPECTROPHOTOMETRY IN THE VISIBLE SPECTRUM OF VIRGIN AND REFINED OLIVE OILS. A. Cucurachi (Agr. Exper. Inst., Bari, Italy). *Riv. Ital. Sostanze Grasse* 46, 449-60 (1969). A qualitative and quantitative study has been carried out on the visible wavelength absorption of 97 olive oil samples of the 1967-68 crop. The results confirmed the expected high degree of variability depending on olive variety, harvest period, production method, etc., all factors which affect the chlorophyll and carotenoid contents of the oil. The absence in refined oils of absorption maxima at several wavelengths, especially at 664 and 474 m μ , represents a useful circumstance for the identification of virgin olive oil.

RELATIONSHIP BETWEEN GLC BEHAVIOR AND CONFORMATIONAL STRUCTURE OF THE METHYL ESTERS OF UNSATURATED FATTY ACIDS. A. Strocchi, M. Piretti and P. Capella (Univ. of Bologna, Bologna, Italy). *Riv. Ital. Sostanze Grasse* 46, 80-8 (1969). ECL (equivalent chain length) values were determined for the methyl esters of some geometric isomers of mono-, di- and triunsaturated C₁₈ fatty acids with conjugated and isolated double bonds. Considerations about the configuration of the double bonds, their relative position and the modifications that they induce in the molecular conformation as compared with the corresponding saturated acids, allow a correlation to be drawn between molecular structure and gas chromatographic behavior of different isomers.

ISOLATION AND FRACTIONATION OF POLYUNSATURATED FATTY ACIDS. O. S. Privett (Univ. of Minnesota, Hormel Inst., Austin, Minn.). *Riv. Ital. Sostanze Grasse* 46, 433-42 (1969). Recent advances in techniques for fractionation and isolation of polyunsaturated fatty acids (PUFA) are described. General procedures are outlined for the preparation of PUFA that exist as minor or major components of complex natural fats. Generally, no single technique is able to provide pure PUFA, but the combination of techniques and the general scheme in which they are applied will depend on both the qualitative and quantitative composition of the fat. PUFA concentrates are generally first prepared by gross fractionation techniques. The major components are also purified by gross techniques, such as high capacity adsorption and low temperature crystallization. PUFA with up to six double bonds may be crystallized by a seeding technique and thus prepared in ultra-high purity. Fractional distillation is the key technique for isolating minor

(Continued on page 158A)

HAHN LABORATORIES

Consulting and Analytical
Chemists

1111 Flora St. P.O. Box 1177 Columbia, S.C. 29202

(Continued from page 156A)

component acids. A modified technique of amplified distillation with a spinning band column is described that virtually eliminates the problem of artifact formation in distilling higher polyunsaturates. Final purification of minor components in mg. amounts is also effected by multiple crystallization at low temperatures.

STUDIES ON MONOUNSATURATED FATTY ACIDS FROM VEGETABLE OILS BY MEANS OF GAS CHROMATOGRAPHY AND MASS SPECTROSCOPY. C. M. Zorzut and P. Capella (Univ. of Bologna, Bologna, Italy). *Riv. Ital. Sostanze Grasse* 46, 66-72 (1969). The isomers of monounsaturated fatty acids obtained from several vegetable oils have been studied by a combination of gas chromatographic and mass spectroscopic methods after conversion to the respective trimethylsilyloxy (TMSO) derivatives. The results show that, with the exception of parsley seed oil, the most widely represented isomers are the 9-cis-hexadecenoic, the 9-cis-octadecenoic, the 11-cis-eicosenoic and the 13-cis-docosanoic. Previously reported data have generally been confirmed, but the presence of isomers not yet reported has also been demonstrated, such as the 6-cis-hexadecenoic, the 8-cis- and 9-cis-eicosenoic in parsley seed oil and the 13-cis-octadecenoic in rapeseed and mustard seed oil. The results are discussed in relation to the current status of knowledge on unsaturated fatty acid biosynthesis.

LIPID PATTERNS IN SOME CRUCIFERAE. L. A. Appelqvist (Swedish Seed Assoc., Svalov, Sweden). *Riv. Ital. Sostanze Grasse* 46, 478-87 (1969). Most European cultivars of rape (*Brassica napus*), turnip rape (*B. campestris*) and white mustard (*Sinapis alba*) contain considerable amounts of erucic acid in their seed oils. The content of this acid is mainly under genetic control, with environmental conditions such as climate and mineral nutrition playing only limited roles in determining fatty acid composition. Some populations of partially or fully cross-fertilizing species of *Brassica* demonstrate an inter-seed variability in fatty acid spectrum that is considerably larger than that of self-fertilizing species. This variability is the basis of the plant breeding research that

has resulted in development of high-yielding strains of rape and turnip rape possessing only traces of erucic acid. The oleic, 11-eicosenoic and erucic acids in these oils are accompanied by considerable amounts of the less usual isomers, e.g., vaccenic, 13-eicosenoic and 15-docosanoic acids. Oils free of erucic acid have increased levels of palmitoleic and vaccenic acids. Erucic and eicosenoic acid are exclusively or almost exclusively located on the outer positions of the glycerol molecule. This explains why it has so far been impossible to develop strains of *Brassica* with more than 67 mole % of eicosenoic, erucic and saturated acids. There is considerable difference in fatty acid spectra both between different organs and lipid moieties of the *Brassicaceae*. Only small amounts of erucic are found in the phospholipids of seeds, the triglycerides of which have large amounts of this acid. Cotyledons, hypocotyl, seed coat, pods, stalks and leaves all differ in fatty acid spectra.

PROCESS OF PREPARING PUFFED CEREAL PRODUCT. T. Tsuchiya and H. V. Perttula (General Mills, Inc.). *U.S. 3,464,827*. Edible cereal products are prepared by coating cereal pellets with monoglycerides or alkali metal salts of saturated fatty acids of 14-22 C atoms and puffing the pellets by sudden release from a confined area to an area of larger volume and lower pressure.

LIPOLYZED MILK FAT PRODUCTS. D. J. Pangier (Miles Labs., Inc.). *U.S. 3,469,993*. Improved lipolyzed milk fat products can be obtained by treating a milk fat medium with a lactic acid producing bacterial culture and then contacting the milk fat medium with a lipase enzyme to effect lipolysis.

PROCEDURE FOR CONTINUOUSLY TEMPERING SHORTENING. J. G. Endres, R. J. Wrobel and R. B. Rendek (Armour and Co.). *U.S. 3,469,996*. A more uniform tempered shortening is produced by supercooling molten shortening triglycerides to crystallization and then quickly heating them with microwaves.

DETERMINATION OF CARBONYL COMPOUNDS BY 2-DIPHENYLACETYL-1,3-INDANDIONE-1-HYDRAZONE. D. J. Pietrzyk and E. P. Chan (Univ. Iowa, Dept. Chem., Iowa City, Ia. 52240). *Anal. Chem.* 42, 37-43 (1970). The use of 2-diphenylacetyl-1,3-indandione-1-hydrazone as an analytical reagent for carbonyl compounds is described. The variables studied in developing the quantitative procedure are reaction time, type of catalyst, heat, solvent and conditions for separation on thin layers. Carbonyl derivatives are highly colored and fluorescent and can be analyzed by spectrophotometry or fluorescence with the latter being more sensitive. Carbonyl compounds studied include a variety of aldehydes and ketones, several of which are steroids and biologically important compounds. Separation and analysis of mixtures of carbonyl compounds are also possible.

COUNTERCURRENT CHROMATOGRAPHY: LIQUID-LIQUID PARTITION CHROMATOGRAPHY WITHOUT SOLID SUPPORT. Y. Ito and R. L. Bowman (Lab. Tech. Dev., Nat. Heart Inst., Bethesda, Md. 20014). *Science* 167, 281-3 (1970). The liquid-liquid partition chromatographic system reported here involves a long helix of narrow-bore tubing. When the coiled tube is filled with one phase of a two-phase system and fed with the other phase, phase-interchange takes place in each turn of the coil, leaving a segment of the former phase as the stationary phase. Consequently, solutes present in either phase are subjected to a multistep partition process. The column efficiency, estimated on a separation of dinitrophenylamino acids, is comparable to that of gas chromatography.

EFFECT OF COMMERCIAL PROCESSING TECHNIQUES ON LINDANE- AND DDT-¹⁴C RESIDUES IN RAPESEED OIL. J. G. Saha, M. A. Nielsen and A. K. Sumner (Canada Agr. Res. Station, Univ. Campus, Saskatoon, Sask., Canada). *J. Agr. Food Chem.* 18, 43-4 (1970). The effects of simulated commercial vegetable oil processing techniques on the removal of lindane and DDT residues in rapeseed oil were studied. Alkali-refining and bleaching had little or no effect on lindane and DDT in the oil. Deodorization of the oil by heating it in the presence of water vapor at 230 to 260°C and 6 mm Hg for 4 hours removed 95 to 99% of the residue.

GRADIENT-THICKNESS, THIN-LAYER CHROMATOGRAPHY FOR THE ISOLATION AND ANALYSIS OF TRACE AMOUNTS OF FREE FATTY ACIDS IN LARGE LIPID SAMPLES. N. G. Bazan, Jr. and C. D. Joel (Depts. of Biolog. Chem. and Psychiatry, Harvard Med. School, Boston, Mass. 02115). *J. Lipid Res.* 11, 42-7 (1970). A thin-layer chromatographic method for quantitative isolation of free fatty acids is described. This method appears to be more satisfactory than existing methods in offering the com-

Topically Speaking— Why Not ROBANIZE Your Product?

ROBANE®



Purified Hexamethyltetracosane, Squalane
Liquid vehicle NATURAL to skin and sebum

A truly NATURAL adjunct to the
Cosmeto-Dermatological field.

And Emulsify it with—

CAROLATE®

CETYL PALMITIC ALKYLOLAMIDE
Self-Emulsifying Spermaceti-Amide

The satiny feel

Or with our New Emulsifier—

CETINATE®

FATTY ALCOHOL/ACID ESTER-AMIDE
Emulsifiable Sperm Oil/Spermaceti Wax
The elegant lubricant and surfactant

ROBECO CHEMICALS, INC.

212-683-7500

51 Madison Avenue
Reg. U.S. Pat. Off.

New York, N. Y. 10010
R Pat. Pend.