

# ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: N. E. Bednarczyk, J. E. Covey, J. G. Endres, J. Iavicoli, S. Kawamura, D. A. Leo, F. A. Kummerow, E. G. Perkins, and R. W. Walker

## • Fats and Oils

FAT CONTENT AND SOYA LEVEL EFFECT ON TENDERNESS OF GROUND BEEF PATTIES. D.L. Huffman and W.E. Powell (Dept. of Animal Sci., Auburn Univ., Auburn, Ala. 36830). *Food Technol.* 24, 1418-19 (1970). Cooking from the frozen or thawed state did not affect tenderness. No significant interactions were found among cooking state, fat and soya level. Significantly less force was required to shear patties containing approximately 35% fat than those containing approximately 15 or 25% fat. Patties containing 2% soya had significantly higher tenderness scores than those containing no soya.

INFRARED SPECTROSCOPIC DETERMINATION OF DEGREE OF UNSATURATION OF FATS AND OILS. R.G. Arnold and T.E. Hartung (Dept. of Food Sci. and Technol., Univ. of Neb., Lincoln, Neb. 68503). *J. Food Sci.* 36, 166-8 (1971). Infrared spectra of various fats and oils were determined. Ratios of absorbance at 3.3 microns (olefinic C-H stretching band) to absorbance of other characteristic triglyceride absorption bands were calculated. Relationships between these ratios and unsaturation, as estimated by iodine value, were determined. Analysis of 25 fats and oils showed that the ratio of absorbance at 3.3 microns to absorbance at 3.5 microns (aliphatic C-H stretching band) and iodine value were linearly related and exhibited a correlation coefficient of 0.98. Estimation of degree of unsaturation of 19 additional fats and oils revealed an average deviation of  $\pm 0.97$  iodine value units or  $\pm 1.12\%$  between measured values and values calculated from infrared absorption patterns.

OXIDATION OF CAPSANTHIN. T. Philip and F.J. Francis (Dept. of Food Sci. and Technol., Univ. of Mass., Amherst, Mass. 01002). *J. Food Sci.* 36, 96-7 (1971). Oxidation of capsanthin (a carotenoid) by molecular oxygen at 40C in the solid state is discussed. The absence of an induction period in the oxygen absorption curve indicated that oxidation does not in-

volve the typical autoxidation pattern. A number of keto-carotenoids such as capsanthone, 3-keto-kryptocapsone and 3-keto- $\beta$ -apo-8'-carotenal were isolated in the oxidation products. Oxidation of capsanthin involves primarily the oxidation of hydroxyl groups, followed by scission of the chain at the carbon-carbon bond  $\alpha$  to the in-chain carbonyl group.

THE NATURE OF FATTY ACIDS AND CAPSANTHIN ESTERS IN PAPERIKA. T. Philip, W.W. Nawar, and F.J. Francis (Dept. of Food Sci. and Technol., Univ. of Mass., Amherst, Mass. 01002). *J. Food Sci.* 36, 98-100 (1971). The triglycerides present in whole ground paprika and paprika pods were extracted and hydrolyzed. The fatty acids were methylated, separated by gas chromatography and identified by mass spectrometry. The whole paprika and pods, respectively, contained approximately 66 and 45% linoleic acid, 14 and 19% palmitic acid, 12 and 14% oleic acid and 5 and 17% linolenic acid. Small quantities of myristic and lauric acids and traces of capric, stearic and palmitoleic acids also were present. Capsanthin, which amounted to 35% of the total carotenoids, occurred as the dilaurate ester. It was isolated from paprika by thin-layer chromatography after interesterification of the triglycerides. Capsanthin dilaurate, synthesized in the laboratory, gave identical R<sub>f</sub> value and infrared and visible spectra to those of the naturally occurring compounds.

FACTORS AFFECTING MACADAMIA NUT STABILITY. 3. EFFECTS OF ROASTING OIL QUALITY AND ANTIOXIDANTS. C.G. Cavaletto and H.Y. Yamamoto (Dept. of Food Sci. and Technol., Univ. of Hawaii, Honolulu, Hawaii 96822). *J. Food Sci.* 36, 81-3 (1971). Chemical and physical changes which occurred in the oil used for roasting macadamia kernels during 13 weeks of continuous use did not appreciably affect kernel shelf-life. Changes in iodine number and fatty acid composition indicated there was considerable oil exchange between the coconut roasting oil and macadamia kernels. The effects of direct antioxidant application (butylated hydroxyanisole and butylated hydroxytoluene) and vacuum packing on roasted macadamia kernel stability also were studied.

## Fatty Acid Production Statistics

Production of animal, vegetable, and marine fatty acids totalled 48.6 million pounds in May 1971, up 6.9 million pounds from April. Inclusion of tall oil types raised the overall May production level to 88.0 million pounds, the same as overall production for April.

Disposition of fatty acids amounted to 55.4 million pounds in May, up 7.2 million pounds from April. Including tall oil fatty acids, May disposition totalled 97.9 million pounds, compared with 75.4 million pounds in April.

Stocks of fatty acids other than the tall oil types, amounted to 35.7 million pounds on May 31st, down 0.6 million pounds from the end of April.

Source: Fatty Acid Producers' Council, 475 Park Ave. So. at 32nd St., New York, N.Y.

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EVALUATION OF OLEIC SAFFLOWER OIL IN FRYING OF POTATO CHIPS. F. Fuller, D.G. Guadagni, M.L. Weaver, G. Notter and R.J. Horvat (USDA Western Reg. Res. Lab., ARS, Albany, Calif. 94710). *J. Food Sci.* 36, 43-4 (1971). Oil with iodine value of about 90 is now available from a new variety of safflower. The low iodine value results from a reversal of oleic:linoleic acid ratio from that of ordinary safflower (iodine value of about 145). Lower linoleic acid content causes the oil to be more stable toward oxidation at both ambient and frying temperatures. Potato chips fried in the new safflower oil were as stable toward rancidity during accelerated storage as chips fried in hydrogenated vegetable oil.

CATALYSTS OF LIPID PEROXIDATION IN MEATS. 1. LINOLEATE PEROXIDATION CATALYZED BY METMB OR Fe(II)-EDTA. H. Liu (Dept. of Food and Nutr., Florida St. Univ., Tallahassee, Fla.). *J. Food Sci.* 35, 590-92 (1970). The hemoprotein MetMb accelerated linoleic acid peroxidation in pH range from 5.6-7.8, the catalysis increasing with pH. A complex of ferrous ion and ethylenediaminetetraacetic acid (a non-heme iron model) in a 1 to 1 ratio accelerated peroxidation at lower pH; no catalysis took place above pH 6.4. Most chelating agents eliminated Fe(II)-EDTA catalysis, but had no effect on MetMb catalysis. Reducing agents, both ascorbic acid and thiols, on the other hand, accelerated Fe(II)-EDTA catalysis but inhibited MetMb catalysis.

2. LINOLEATE OXIDATION CATALYZED BY TISSUE HOMOGENATES. *Ibid.*, 593-95. In beef tissue homogenate, both types of catalysts—hemoprotein and non-heme iron—are active catalysts of linoleate oxidation. Although the pH-dependent catalytic pattern of beef homogenate was similar to MetMb catalysis, the presence of non-heme iron could be identified by adding ascorbate or 8-OH-quinoline. Ascorbate-stimulated oxidation could be inhibited by chelating agents. Furthermore, lower concentrations of phosphate buffer rendered the non-heme iron more active at acidic pH. Linoleate oxidation was also catalyzed by H<sub>2</sub>O<sub>2</sub>-treated (heme-free) beef homogenates. The oxidation was accelerated either by thiols or by ascorbate.

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3. CATALYSTS OF OXIDATIVE RANCIDITY IN MEATS. H. Liu and Betty M. Watts. *Ibid.*, 596-98. After removal of MetMb by treating with H<sub>2</sub>O<sub>2</sub>, a significant lipid oxidation was demonstrated, especially at lower pH where non-heme iron is most active. The catalytic activity of hemoprotein is limited in raw meat. Oxygen can be removed from the tissues and MetMb reduced back to Mb by the reducing enzymes. This is especially true at higher pH. Possible limitations of the heme-catalyzed reactions in meat by high (inhibition) levels of myoglobin, or because of separation of reactants in cellular structures, are discussed. The effect of additives was in line with the interpretation that lipid oxidation is catalyzed by both non-heme and hemoprotein.

EFFECTS OF PH AND TEMPERATURE ON VOLATILE CONSTITUENTS OF CARAWAY. Y. Yin, N. Zarghami and D.E. Heinz (Dept. of Consumer Sciences, Univ. of Calif., Davis, Calif. 95616). *J. Food Sci.* 35, 531-33 (1970). The major volatile components of caraway seed oil were isolated and identified; and the effects of heat and pH on these volatile constituents were studied. Gas chromatographic analysis of the treated oil indicated that the two principal components, carvone and limonene, undergo little change even when subjected to harsh conditions. The chemical nature of the trace components changes only when the oil is subjected to high temperature or to solutions of varying pH.

COMPARISON OF THE MOST USED METHODS FOR DETERMINING AFLATOXIN. A. Prevot and C. Bloch (ITERG, Paris). *Rev. Franc. Corps Gras* 18, 151-6 (1971). Collaborative analyses for aflatoxin were run on peanut meal and on standard solutions using the most common physical and chemical methods. Statistical analysis of the results gave relatively high coefficients of variation (40%), but these were about the same as found in the literature.

SELECTIVE SOLVENT REFINING OF OILS. C. Thomopoulos (National Tech. Univ. of Athens, Greece). *Rev. Franc. Corps Gras* 18, 143-50 (1971). Miscella refining of highly acidic oils (20-60% free fatty acids) by selective extraction of the acids was studied. Ethanol was the most effective of the solvents tested. Hydrating the alcohol slightly reduced considerably the amount of neutral oil lost. After this treatment, it was still necessary to refine the oil with alkali.

## • Biochemistry and Nutrition

DIETARY MANAGEMENT OF HYPERLIPOPROTEINEMIA. R.I. Levy, Merme Bonnell and Nancy C. Ernst (National Heart and Lung Inst., N.I.H., Bethesda, Md.). *J. Amer. Dietetic Assoc.* 58, 406-16 (1971). A review article which covers descriptions of the plasma lipoproteins, the physiology of lipid transport and the classification, diagnosis, and dietary management of hyperlipoproteinemia. Somewhat different diets are required for treatment of each of the five recognized types.

RESEARCH IN CARDIOVASCULAR DISEASES. T. Cooper and S.C. Mitchell (National Heart and Lung Inst., N.I.H., Bethesda, Md.). *J. Amer. Dietetic Assoc.* 58, 401-5 (1971). A review of various programs of the National Heart and Lung Institute, which have dietary components, for the prevention, diagnosis, and treatment of diseases of the heart and lung.

SULFOLIPID I OF MYCOBACTERIUM TUBERCULOSIS, STRAIN H37RV. NATURE OF THE ACYL SUBSTITUENTS. M.B. Goren, Olga Broki, B.C. Das and E. Lederer. *Biochemistry* 10, 72-71 (1971). Sulfolipid I of *Mycobacterium tuberculosis*, strain H37Rv, was previously characterized as a 2,3,6,6'-tetraacyltrehalose 2'sulfate. The structures of the acyl functions have been elucidated largely by mass spectrometry, and are reported herein. Three principal (and related) series of carboxylic acids were found: palmitic-stearic acids with minor amounts of other homologs; a multibranch series, the "average" member of which is 2,4,6,8,10,12,14-heptamethyltriaconanoic acid; and a second, related, oxygenated multibranch group consisting principally of 17-hydroxy-2,4,6,8,10,12,14,16-octamethyldotriaconanoic acid. Homology by 42 mass units is prominent in both series and suggests a biogenesis involving successive incorporations of propionate onto a palmitate residue. All representatives of the two methyl-branched series are dextrorotatory; they are therefore very likely of the L configuration and related to the phtienoic (mycolipenic) acids.

COMPARISON OF ACTIVITY OF 25-HYDROXYCHOLECALCIFEROL AND DIHYDROTACHYSTEROL IN THE THYROPARATHYROIDECTOMIZED RAT. Helen C. Harrison and H.E. Harrison (Dept. of Ped., Johns Hopkins Univ. Schl. of Med. and Balt. City Hosp., Baltimore, Md. 21205). *Proc. Soc. Exp. Biol. Med.* 136, 411-14 (1971). Assays of the activity of synthetic 25-hydroxycholecalciferol in

the thyroparathyroidectomized rat indicate that it is no more potent than ergocalciferol. These and other data indicate that both 25-hydroxycholecalciferol and ergocalciferol are only 1/5 as active as dihydrotachysterol in this assay. These results suggest that the pharmacologic action of vitamin D as a substitute for parathyroid hormone operates through a mechanism different from the physiologic action of this sterol derivative.

THE EFFECTS OF HYPOCHOLESTEROLEMIC AGENTS ON CHOLESTEROL ESTERIFICATION IN VITRO. J.S. Scheppe and R.A. Jungmann (Chicago Wesley Mem. Hosp., and Dept. of Biochem. and Med., Northwestern Univ. School of Med., Chicago, Ill. 60611). *Proc. Soc. Exp. Biol. Med.* 136, 449-51 (1971). The hypocholesterolemic agents Atromid-S and Choloxin stimulate the in vitro synthesis of cholesterol esters from free cholesterol by a rat liver microsomal preparation. Atromid-S enhances, in particular, the formation of cholesteryl oleate and linoleate. Choloxin has its primary effect on cholesteryl oleate. SU-13437 stimulates the formation of all cholesterol esters. SaH-2348 primarily affects the rate of formation of cholesteryl oleate and linoleate.

## • Drying Oils and Paints

CASHEW NUT SHELL LIQUID DISTILLATION RESIDUE—ITS UTILIZATION IN COATINGS. II. T. Ramalingam, B.G.K. Murthy and M.A. Sivasamban (Regional Res. Lab., Hyderabad-9). *Paint India* 21(2), 15-8 (1971). A satisfactory primer can be prepared using this medium.

POLAROGRAPHIC DETERMINATION OF ZINC AND CHROMIUM IN MARINE PAINTS. J.C. Chaudhuri and A.K. Audi (Naval Chem. and Metallurgical Lab., Naval Dockyard, Bombay). *Paint India* 21(2), 13-4 (1971). Method is simple, rapid, accurate and a good replacement for the gravimetric method for zinc and the volumetric method for chromium.

DETERMINATION OF THE LEAD IN MARINE UNDERWATER ANTI-CORROSIVE PAINT BY EDTA. J.C. Chaudhuri, A.K. Audi and Miss C.C. Sankholkar (Naval Chem. and Metallurgical Lab., Naval Dockyard, Bombay). *Paint India* 21(1), 31, 36 (1971). The lead is extracted from the pigment and titrated with EDTA. Results are very close to those obtained by the gravimetric method.

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