ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: N. E. Bednarcyk, J. E. 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

CHLOROPHYLL DEGRADATION AND LIPID OXIDATION IN FROZEN UNBLANCHED PEAS. K. A. Buckle and R. A. Edwards (Univ. of New South Wales, Kensington, Australia). *J. Sci. Food Agr.* 21, 307–12 (1970). Storage of hand-podded, unblanched frozen peas for 20 months at −9.4C resulted in considerable conversion of chlorophylls to pheophytins, as well as formation of phytol-free derivatives, a decrease in total pigment and the formation of peroxides and TBA-reactive materials. Greater storage stability was found in samples blanched prior to storage and to a lesser extent in unblanched peas stored under nitrogen or at −23.3C. Lipoxygenase and chlorophyll bleaching activities of extracts from frozen unblanched peas decreased during storage, lipoxygenase being the more stable. Model system studies with pea and soya extracts indicated that chlorophyll loss and lipid oxidation during storage were most likely caused by lipoxygenase and a lipohydroperoxide breakdown factor shown to be present in crude extracts.

PHOSPHOLIPIDS OF MARINE ORIGIN, V. THE CRAB—A COMPARATIVE STUDY OF A MARINE SPECIES (CYCLOGRAPSUS PUNTATUS) AND A FRESH WATER SPECIES (POTAMON). A. J. De Koning (Univ. of Botswana, Lesotho and Swaziland, Roma, Lesotho, Southern Africa). *J. Sci. Food Agr.* 21, 290–3 (1970). A comparison has been made between phospholipids extracted from a marine crab and from a fresh water crab. Marine crab (body and viscera) contained a phospholipid fraction which liberated 2-aminoethylphosphonic acid upon hydrolysis, while this substance was absent from the fresh water crab. Marine crab phospholipids had a higher content of phosphatidylcholine (57%), a higher content of phosphatidylserine (5%) but a lower content of phosphatidylethanolamine (22%) than phospholipids from the fresh water crab (respective values: 52, 2 and 27%). Marine crab phospholipids and nonphosphorylated lipids were richer in C_{20} and C_{22} fatty acids but poorer in $C_{18:2}$ acid than were the corresponding lipids from the fresh water crab.

COPPER-CATALYZED OXIDATION OF LINOLEIC ACID IN BUFFERED AQUEOUS SOLUTIONS, I. EFFECT OF ASCORBIC ACID. W. A. Allan and H. L. Wood (Dep't of Agr., Univ. of Queensland, Brisbane, Australia). *J. Sci. Food Agr.* 21, 282–9 (1970). Ascorbic acid at a concentration of 10^{-3} M was a more effective pro-oxidant in the presence of low copper concentrations than at high concentrations, particularly in the initial stages of oxidation or in the lower pH range (5.5–4.7). This suggested a much more complex role for ascorbic acid than that of copper-reducing agent. Reaction of the ascorbic acid radical with oxygen and consequent formation of free HO radicals was considered to be the most likely initiation reaction resulting from the oxidation of ascorbic acid to dehydroascorbic acid by copper. Dehydroascorbic acid was also found to be an effective prooxidant in the presence of copper.

FREEZE-DRIED TURKEY MUSCLE, I. CHANGES IN NITROGENOUS COMPOUNDS AND LIPIDS OF DEHYDRATED TURKEY DURING STORAGE. M. J. Fishwick and S. Zmarlicki (Agr. Res. Council, Norwich, England). *J. Sci. Food Agr.* 21, 155–60 (1970). Changes in proteins and lipids were followed during the storage of freeze-dried turkey breast muscle in air and nitrogen. Oxidation of sulphydryl groups accounted for part of the oxygen uptake of air-stored samples and was accompanied by a decrease in soluble nitrogen greater than in controls stored under nitrogen. The major deteriorative process at low moisture content was a type of lipid browning reaction which was oxygen-dependant and caused discoloration and poor odor. Autoxidation of lipids catalyzed by haem pigments and producing rancid flavors was not a major factor in freeze-dried turkey muscle. Lipid hydrolysis occurred at water contents of 8.2 and 5.4% but not at 0.8%.

II. ROLE OF HAEM PIGMENTS AS CATALYSTS IN THE AUTOXIDATION OF LIPID CONSTITUENTS. M. J. Fishwick. *Ibid.*, 160–3. A study by reflectance spectroscopy of the haem compounds of turkey breast and leg muscle showed that the structure of the main component, myoglobin, changed during the freeze-drying process to form a low-spin complex, ferromyochromagen. Ferrimyoglobin, either present in fresh muscle or introduced as an oxidation product during dehydration, forms the corresponding ferrimyochromagen. During storage in the freeze-dried state the iron complexes do not catalyze the autoxidation of unsaturated lipids. When freeze-dried muscle is rehydrated to a water content not less than 50% of that of fresh muscle, a proportion of the haem pigment is present in the form of a high-spin complex, metmyoglobin, which catalyzes autoxidation of unsaturated lipids in the rehydrated muscle.

FRAGMENTATION OF β-CAROTENE IN AUTOXIDIZING DEHYDRATED SWEET POTATO FLAKES. W. M. Walter, Jr., A. E. Purcell and W. Y. Cobb (Dept. of Food Sci., North Carolina State Univ. at Raleigh, N.C. 27607). *J. Agr. Food Chem.* 18, 881–85 (1970). Autoxidation of carotenoids in dehydrated sweet potato flakes was studied using ^{14}C-β-carotene. The flakes were oxidized in the dark in sealed containers and analyzed periodically. The major portion of β-carotene was not attacked, indicating either unavailability for oxidation or formation of autoxidation retarding substances. β-Carotene which was attacked was rapidly oxidized mainly to lower molecular weight oxidation products, although some polymerization occurred. Oxidation products were separated into gaseous, steam volatile, water-extractable, acetone soluble and insoluble fractions. Water-extractable, nonsteam volatile and acetone soluble fractions contained most of the radioactivity. Smaller amounts of radioactivity were found in insoluble, steam volatile, and gaseous fractions.

SELECTIVITY IN THE HYDROGENATION OF COTTONSEED OIL IN THE PRESENCE OF FIXED CATALYSTS. A. Abdurahimov. *Izv. Vysshikh Uchebn Zavedenii, Pishchevaya Tekhnol.* 1970(3), 79–82. Selectivity with supported nickel-copper catalysts increases with increasing temperature and with the rate of inflow of the oil and decreases with increasing hydrogen pressure. A partial poisoning of the catalyst with volatile impurities increases the selectivity two- to threefold and offers the possibility of obtaining a hydrogenated fat having a more desirable consistency. (Rev. Franc. Corps Gras)

SOLUBILITY OF WATER IN FATTY ACIDS AT HIGH TEMPERATURES. G. N. Edokimov *et al. Izv. Vysshikh Echebn. Zavedenii, Pishchevaya Tekhnol.* 1970(3), 45–7. Equations are presented for determining the solubility of water in saturated fatty acids as a function of temperature and molecular weight. In a mixture of saturated fatty acids, the solubility of water follows the law of additivity. The solubility of water in oleic and stearic acids is the same. (Rev. Franc. Corps Gras)

HYDROGENATION OF FATS ON A FIXED CATALYST OF NICKEL-CHROME BY DIFFERENT METHODS. V. I. Komarov. *Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1970(3), 83–7. Hydrogenation of sunflower oil by different methods follows zero order kinetics relative to the amount of unsaturation. The activation energy, between 120 and 200C, is 3 ± 1 kcal/mole. The highest selectivity and isomerization are obtained by the "jet" method. Selectivity and isomerization are less by the "drop" method. (Rev. Franc. Corps Gras)

EASE OF HYDROGENATION OF EDIBLE WHALE OILS. F. M. Rzavskaja *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1970(3), 88–92. Oils obtained from the same species of whale differ in their ability to be hydrogenated. These differences are related to differences in the degree of oxidation or of unsaturation. Oils obtained from different species of whale contain different amounts of nitrogenous compounds. The easiest oils to hydrogenate (obtained from the tegumentary fat) contain half the amount of nitrogenous compounds as those which are difficult to hydrogenate. (Rev. Franc. Corps Gras)

COMPOSITION OF THE OIL-CONTAINING PORTION OF THE CELLS IN SUNFLOWER SEEDS. A. M. Goldovskij *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1970(3), 19–23. Water and compounds which volatilize at 100–105C are localized in the solid portions of the seed cells. Among the products of oxidation, the compounds affecting the peroxide value and the epoxide value are found in both the oil-containing and the solid portions of the cells (most often and in largest amounts in the latter location). The compounds affecting the thiobarbituric acid value are found in the solid portion. Finally, the color bodies are localized essentially in the solid portion, but they are occasionally found in very small amounts in the oil-containing portion. (Rev. Franc. Corps Gras)

FORMATION OF FREE FATTY ACIDS IN PRESSED OLIVE OILS DURING STORAGE. O. Angelidis and D. Mavropoulis. *Oleagineux* 25, 349–50 (1970). Considerable amounts of free fatty acids can form in pressed olive oils during storage due to enzymatic activity. Careful filtration of the oil prior to storage will remove the impurities which contain the enzymes.

FRACTIONATING 99 TO 100% MILK FAT AND MAKING BUTTER FROM THE SEPARATED FATS. M. S. MacCollom. *U.S. 3,519,435.* Fats of different melting points are fractionated from 99–100% milk fat by crystallization and subsequent separation by filtering, centrifuging or decanting.

METHOD FOR MAKING PLASTIC LOW FAT EMULSION SPREAD. C. D. Bauer, G. L. Neuser and H. A. Pinkalla (W. R. Grace & Co.). *U.S. 3,519,436.* Disclosed is a process for making a plastic, low-fat containing food spread for use as a butter substitute. The food spread is formed as a dispersion of a water-in-oil emulsion containing considerable amounts of water and various proportions of emulsifiers, edible fats and flavoring ingredients.

FAT SEPARATION PROCESS. M. E. Gruver, Jr. and L. R. Lyon (Sybron Corp.). *U.S. 3,519,662.* An improvement in the process of continuous rendering and separation of fats and oils from animal tissue consists in acidifying the animal tissues prior to separation into clarified fat products, stickwater, protein and associated tissue, so as to provide a stickwater effluent having a critical pH between 4.1 and 5.8 and a fat and oil content of less than about 0.4% by weight.

DEODORIZATION OF FATS. G. N. Apostolatos and A. Renold (Colgate-Palmolive Co.). *U.S. 3,522,145.* Rendered fat is improved in odor and color by the steps of: (a) mixing the fats with an enzyme-containing substance comprising a proteolytic enzyme which is active at the pH and temperature of the melted fat; and (b) mixing with the enzyme-treated molten fat a deodorizing composition comprising a fat-soluble strong acid and a carbohydrate.

COLOR STABILIZATION OF FATTY ACID FORERUNNINGS. S. S. Naskar, H. L. Hülsmann and G. Renckhoff (Dynamit Nobel A.G.) *U.S. 3,526,649.* Discoloration and subsequent darkening of fatty acid forerunnings are prevented by heating the fatty acids with at least one alkyl ester of titanic acid and/or polytitanic acid at a temperature of approximately 180–250C, and then distilling the resultant mixture to recover the fatty acids. The heating step is carried out for about 0.5–4 hrs.

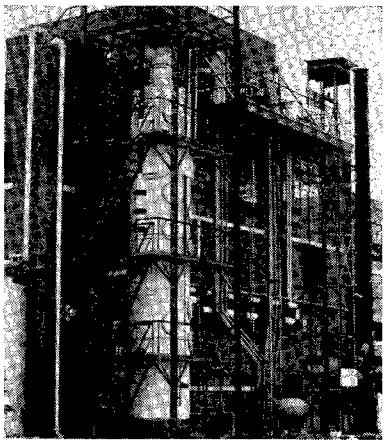
FLUID SHORTENING. J. L. Rossen (Lever Bros. Co.). *U.S. 3,523,823.* A fluid shortening for use in baking comprises 0.1% to 4% of an ester of polyglycerol, 1–10% of normally solid triglyceride, 2–15% of an ester of propylene glycol, the balance being essentially normally liquid edible triglyceride. The polyglycerol ester and the normally solid triglyceride are crystals of fat primarily in the beta phase suspended in the liquid triglyceride-propylene glycol ester solution.

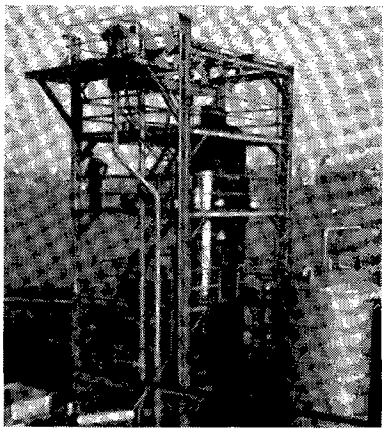
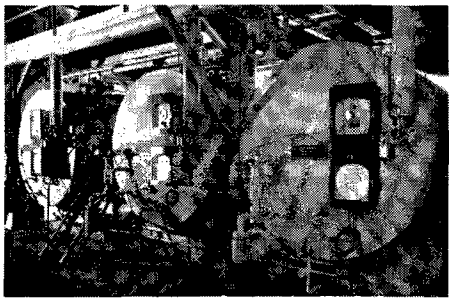
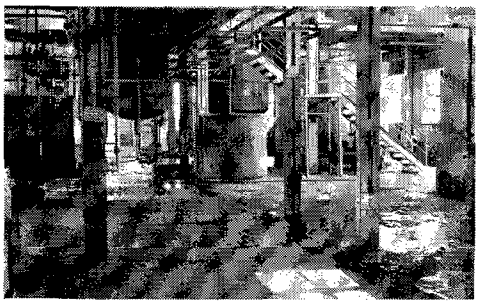
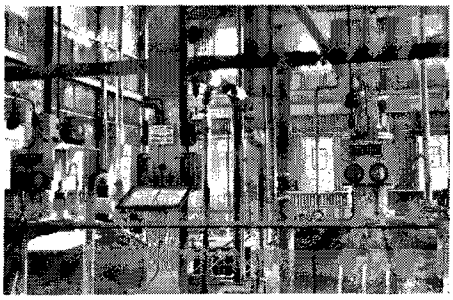
• Biochemistry and Nutrition

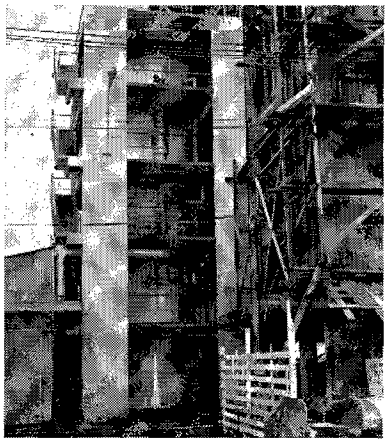
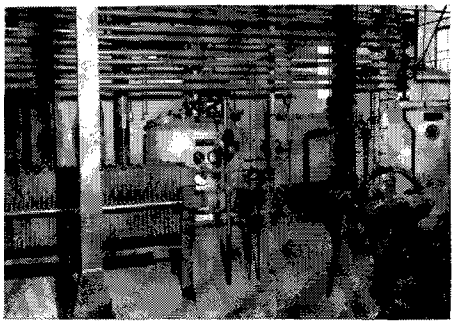
ON THE SUBCELLULAR LOCATION OF VITAMIN D METABOLITES IN INTESTINE. T. C. Chen, J. C. Weber and H. F. DeLuca (Dept. of Biochem., Univ. of Wisconsin, Madison, Wis. 53706). *J. Biol. Chem.* 245, 3776–80 (1970). Following the intravenous injection of radioactive vitamin D, no radioactivity appeared in intestinal chromatin. Instead the radioactivity of intestinal nuclei remained with a membrane fraction which is separated from chromatin at the initial step in the preparation. When "chromatin" was prepared, as much as 40% of the intestinal radioactivity appeared in the chromatin fraction in the case of chicks and 20% in the case of rats. However, the chromatin prepared by this method was heavily contaminated with membranes and cell organelles whereas the Marushige and Bonner preparations were composed of homogeneous chromatin as revealed by electron microscopy. Chemical analysis and ultraviolet spectra confirmed the electron microscopic data. Thus the previous contention that intestinal chromatin is a major site of vitamin D metabolite location is without experimental basis.

(Continued on page 582A)

SINGLE UNIT OR C
FAT AND O

OMPLETELY INTEGRATED SYSTEM
_ PROCESS PLANTS

WURSTER & SANGER oil processing plants are individually designed and built to meet each customer's particular needs. Consequently, maximum efficiency and operating economy are built-in features of all W & S systems in operation throughout the world. Repeat orders, the practical proof of satisfaction, provide a large part of our business. Write us or one of our Associates when new facilities or additions to your oil processing operations are being considered.

Neutralizing and Washing . . . Batch Process

Batch neutralization is favored under circumstances involving several varieties of feedstock. Flexibility and operating simplicity are inherent features of W & S designed units. Effective contacting of oil and reagents without emulsification minimizes the usual source of oil loss in this process. For further information, request Technical Data Sheet No. 2201.

Neutralizing and Washing . . . Continuous Process

Generally, continuous refining should be considered for capacities above 15 to 20 tons per day. This system offers the lowest operating cost together with 25% to 30% reduction of loss for most oils. We shall be glad to assist you in selecting the system best for your application.

Vacuum Drying and Bleaching . . . Batch Process

Neutralized and washed oils must be dried properly to retain their quality and derive maximum benefit from bleaching agents. W&S batch vacuum processes for drying and bleaching have no superior and are recommended for all capacities where varying types of oils must be processed. Request our Technical Data Sheet No. 2301 for further information.

Vacuum Drying and Bleaching . . . Continuous Process

Where feed stock is not changed frequently, the features of continuous bleaching become attractive. Labor attention is minimized, oil quality is constant, utility loads are low and constant rather than cyclic, users claim substantial decrease in consumption of bleaching agents and consequent decrease in oil losses.

High Vacuum Deodorizing . . . Batch Process

Deodorization is a combination of a chemical reaction and a steam distillation to remove undesirable materials and reaction products. W & S engineered design achieves operating results and maximum utility economies. This process is particularly recommended where various types of oils must be processed daily. Our Technical Data Sheet No. 2503 is available upon request discussing this operation.

High Vacuum Deodorizing . . . Continuous Process

The W & S Continuous Deodorizing System incorporates proved engineering features developed by us which achieve not only truly continuous operation and quick changeover from one oil to another but complete deodorization and production of oils of maximum stability. Let us prove its merits to you. The process and its economics are discussed in our Technical Data Sheet No. 2501, available upon request.

Winterizing

Production of most salad oils involves winterizing as an essential step, yet, until recently, a step so erratic and unreliable as to be the most troublesome oil processing operation. Now W & S engineering has developed a fully automatically controlled winterizing process that is predictable and reliable, producing an oil surpassing all cold test requirements. Details of this system are available on request. Ask for Technical Data Sheet No. 2401.

WURSTER & SANGER
DO BRASIL
Caixa Postal 7707
Sao Paulo, Brasil

LICENSEE: ,
Stork Smulders N.V.
P. O. Box 108
Amstelveen, Holland

Representative
The E. J. Nell Company
P. O. Box 612
Manila, Philippines

Representative:
Arturo Samudio & Cia. Ltda.
Calle 37 No. 44-40
Barranquilla, Colombia

WURSTER & SANGER, INC., Dept. B 164 W. 144th Street, Chicago (Riverdale), Ill. 60627 CABLE WURSANCHEM

A Division of Jacobs Engineering Co., Pasadena, Calif.—Oak Brook, Ill.—Linden, N.J.