

Enthusiasm and Interest Shown in Current Convention Topics

SIXTY-SEVEN PAPERS were presented in two symposia and five technical sessions at the 30th annual fall meeting of the American Oil Chemists' Society, September 24-26, 1956, at the Sherman hotel, Chicago, Ill. The two symposia were composed of 18 papers, six of which were on safety and 12 on synthetic detergents. The remaining 49 papers were presented at sessions on general fat chemistry, oil modification, analytical aspects, nutrition, and processing. The papers were presented by speakers from New Zealand, Canada, and 16 states of the U.S.A. The speakers represented nine universities, four government laboratories, and 29 companies.

The technical session was started by S. G. Brooker of Abels Ltd. with a discussion of the edible fat industry in New Zealand. Contrary to the U.S.A., hydrogenated shortenings are seldom used in New Zealand on account of their high prices, but the consumption of butter is the largest per capita of any country in the world and is more than five times that of the United States.

New Food Products

R. K. Willich and R. O. Feuge of the Southern Regional Research Laboratory reported a method for making de-oiled or partially de-oiled peanuts for the benefit of those who are making efforts to reduce the caloric intake of foods. The de-oiled peanuts still retain part of the characteristic flavor though a large part of the flavor is lost. Retaining a portion of the oil in the peanuts improves their flavor. With commercial hexane at 30°C. about 50% of the oil can be removed in about 50 hrs. from blanched peanuts having a moisture content of 3%.

Mr. Feuge also presented a method for making a cocoa butter substitute from domestic oils. By random interesterification of 70% completely hydrogenated cottonseed oil and 30% olive oil, followed by a simple crystallization from acetone, a product containing the main glycerides of cocoa butter and some closely related isomers was obtained. The finished product was found to be more compatible with cocoa butter than some commercially available candy fats.

Reactions of Fatty Acids and Oils

The autoxidation of lard at 55° and 100°C. was studied polarographically by E. J. Kuta and F. W. Quackenbush of Purdue University. Three reduction curves of peroxides were found to increase in height as the peroxide number increased. H. T. Slover and L. R. Dugan Jr. of the American Meat Institute Foundation found that the sites of oxygen attack on methyl oleate under the influence of gamma radiation from Co^{60} are similar to those obtained with other types of activation.

The thermal stability of corn oil was reported by O. C. Johnson and that of butter fat by V. R. Bhalerao. Both are associates of F. A. Kummerow at the University of Illinois.



SESSION A, MONDAY—From left to right, front row, are R. E. Campbell, L. O. Leenerts, C. D. Evans, R. T. Holman, and A. W. Schwab; standing, V. R. Bhalerao, W. D. Pohle, B. N. Stuckey, H. J. Harwood, chairman, and D. H. Wheeler.



OPENING SESSION—End men, front row, are S. G. Brooker (left) and R. O. Feuge, flanking the convention chairman and presiding officer, A. F. Kapecki. In the back are E. F. Pollard (left) and E. A. Gastrock.

The increase in viscosity of corn oil during autoxidation at 200°C. is directly proportional to the degree of aeration. Butterfat was separated into acetone-soluble, acetone-insoluble, alcohol-soluble, and alcohol-insoluble fractions. The acetone-insoluble fraction, which consisted of triglycerides of more saturated fatty acids, was found to be the most stable fraction during autoxidation at 200°C.

W. E. Tolberg and D. H. Wheeler of General Mills Inc. reported that the three geometrically isomeric types of conjugated linoleates are readily equilibrated in solution by dilute iodine plus light. Infrared absorption studies indicated that the equilibrium is at 32% *cis*, *trans* isomer and 68% *trans*, *trans* isomer with little, if any, *cis*, *cis* isomer. Other papers reported in this session included an improved process for *in situ* epoxidation with cation exchange resin catalysts, polymerization of vinyl ethers and film properties of polymers, viscosity and molecular weight studies on some vinyl ether polymers, and the preparation and properties of Diels-Alder adducts from *trans*, *trans*-conjugated soybean fatty acids.

New Antioxidants

New antioxidants obtained from the reaction of a secondary amine salt and a reducing sugar were reported by C. D. Evans and A. W. Schwab of the Northern Regional Research Laboratory. These compounds are effective in prolonging the AOM test and preventing the development of peroxides in vegetable oils and animal fats. However they do not seem to improve the flavor stability of oils and fats when evaluated organoleptically. B. N. Stuckey of Eastman Chemical Products Inc. reported that BHA and BHT are both effective in retarding the flavor, odor, and color deterioration of essential oils to be used in flavoring foods and beverages. However the BHA appears to be slightly more potent than the BHT.

Analytical Methods

Speakers in the analytical session presented new instruments and techniques, such as the most encouraging new developments in gas-phase chromatography and absorption in the near-infrared region. They also reported new developments in the technique of countercurrent distribution and analysis of colors of oils.

S. T. Preston of Podbielniak Inc. reported on the basic principles of vapor-phase chromatography and the equipment required for this method. Its application to the analysis of fats and oils is very promising. At the present time however unsaturated fatty acids still cannot be separated from saturated fatty acids by this new technique. Janina Nowakowska, Northern Regional Research Laboratory, reported on the separation of esters of mono- and dicarboxylic fatty acids by gas-liquid chromatography. Products of oxidation of C_{18} unsaturated fatty acids were separated by this method.

R. T. Holman of the Hormel Institute presented the near-infrared spectra (1.0-3.0 μ) of a variety of fatty acids, esters, and related compounds. The samples were prepared as 5% solutions in carbon tetrachloride and measured in rock salt cells with a Beckman DK-1 spectrophotometer. Distinct bands were found for acid, ester, amine, aldehyde, hydroxy, and hydroperoxy groups and for *cis* and terminal double bonds. The absorption spectra in this region may be very useful in



OIL MODIFICATION—Seated are R. T. O'Connor, Wilma Schneider, and T. W. Findley, chairman; standing, left to right, are A. N. Wrigley, L. E. Gast, H. M. Teeter, O. C. Johnson, J. K. Weil, and R. J. Gall.

differentiating *cis* and *trans* double bonds in fats. The spectrophotometric method was also used by R. T. O'Connor in the determination of the isomers of eleostearic acids, which were prepared by a simplified method.

A spectrophotometric method for the evaluation of oil colors was studied by W. D. Pohle and S. E. Tierney of Swift and Company. This method is based on the optical density measurement at 500 millimicrons. The advantages of the proposed method for evaluating oil color are that it expresses more exactly the amount of color removal during bleaching and makes possible more exact evaluation of bleaching earth. E. H. Melvin of the Northern Regional Research Laboratory emphasized complete color characterization of vegetable oils and pointed out the difference between Lovibond values and complete color descriptions.

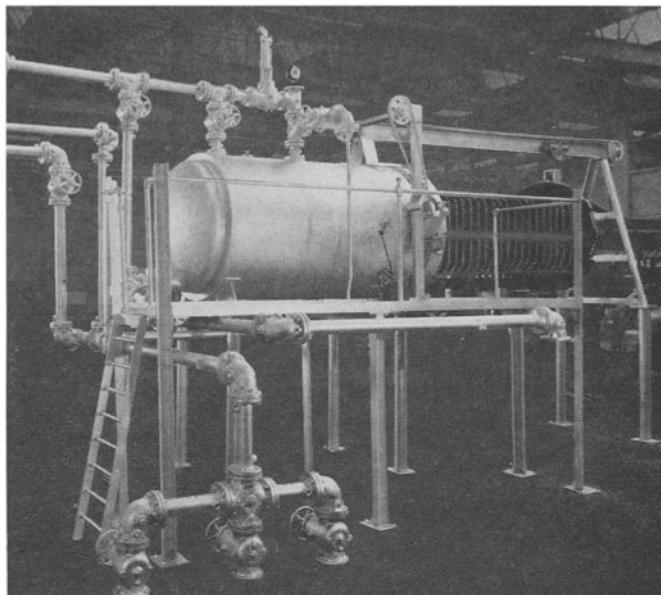
The glyceride structure of soybean oil was reported by C. R. Scholfield, Northern Regional Research Laboratory. With the use of pentane-hexane and a furfural-nitroethane mixture as solvents in 200-tube countercurrent extractor he concluded that fatty acids of soybean oil are randomly distributed in the glycerides. The application of periodate-permanganate oxidations for location and amount of unsaturation in mono-unsaturated fatty acids; the analysis of corn oil for tocopherols; and a modified method for iodometric determination of peroxides in fats were also described in this session.

The Interrelationship of Dietary Fat and Dietary Protein with Respect to Serum Cholesterol

In the nutrition session F. A. Kummerow of the University of Illinois reported a study of the interrelationship of dietary fat and dietary protein with the use of 3,000 chickens. In *ad libitum* feeding he found that the increase of dietary protein along with dietary fat improved growth markedly. Equalized feeding experiments have shown that when the intake of protein, energy, minerals, and vitamins was kept constant and when fat made up part of the calorie source replacing some of the carbohydrate, the growth rate was markedly improved. Chickens fed with 20% corn oil and 40% protein with 0.3%



ANALYTICAL SESSION—In front are Edwin Kuta, Katharine Hivon, R. J. Buswell, chairman, and Janina Nowakowska; in back, E. H. Melvin, C. R. Scholfield, E. P. Jones, W. E. Link, and H. J. Weiser Jr.

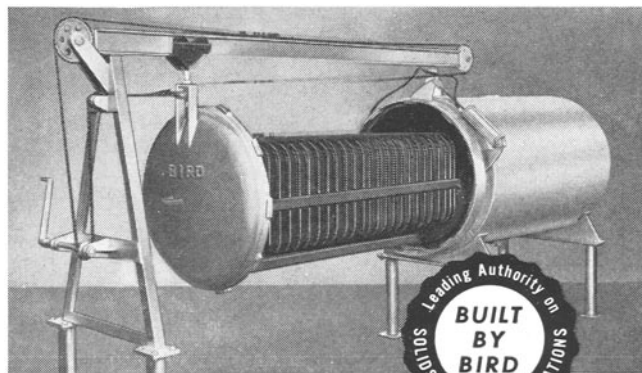


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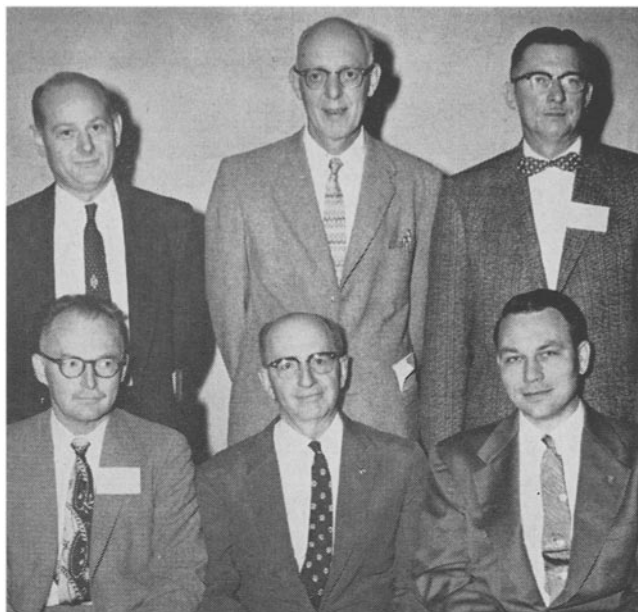
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SAFETY SYMPOSIUM—These six are (seated) W. T. Coleman, A. E. MacGee, chairman, N. H. Witte; (standing) R. P. Hutchins, W. F. Bollens, and H. D. Fincher.

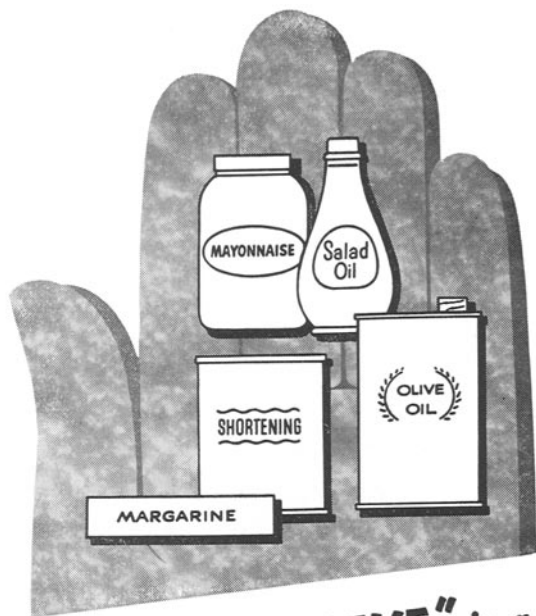
cholesterol added to the diet showed lower serum cholesterol than those fed with 1% corn oil and 40% protein with or without cholesterol added, which in turn are lower in serum cholesterol than those fed with 1% corn oil and 20% protein with or without cholesterol added. Chickens fed on the same level of corn oil and cholesterol showed higher serum cholesterol with 20% protein than those fed with 30% protein, which in turn are higher in serum cholesterol than those fed with 40% protein.

R. R. Allen of the Anderson Clayton Company presented a study of the metabolism of triglycerides containing *cis*- and *trans*-fatty acids. He found that *trans*-acids were noted in all the tissues and in the feces samples from the rats fed the glyceryl tri-(*trans*)-8-octadecenoate, trielaidin, and margarine base stock. No *trans*-acids were found in the tissues or feces of the olive oil, trilaurin, and triolein groups or in the rats sacrificed at the beginning of the experiment. He showed that the position of the *trans* double bonds appears not to affect the efficiency of metabolism and that in all cases 87% of the *trans*-glycerides were digested, 0.9% excreted, and 11.9% deposited by the rats. The deposition of dietary eicosenoic and erucic esters in the body fat of rats was reported by C. Y. Hopkins of the National Research Council of Canada. He observed appreciable quantities of the ingested eicosenoic and erucic acids in the skin and subcutaneous tissue of rats.

H. Kaunitz of Columbia University reported that when polymers of autoxidized lard and cottonseed oil were fed *ad libitum* to rats at a 10% level, at least 70% of the polymers were found to be absorbed. L. L. McKinney of the Northern Regional Research Laboratory reported that the toxic factor in the trichloroethylene-extracted soybean oil meal, which is capable of producing a refractory, hemorrhagic, aplastic ane-



NUTRITION—These speakers are R. R. Allen, F. A. Kummerow, W. C. Pritchett, chairman, Roslyn B. Alfin-Slater, and D. H. Saunders in front row; L. C. King, C. Y. Hopkins, R. O. Feuge, E. De Ritter, and L. L. McKinney in back row.



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PROCESSING—First row shows L. K. Arnold, A. M. Gavin, chairman, G. S. Stout, R. K. Rao; second row, J. E. Thompson, J. J. Spadaro, N. W. Myers, L. F. Albright, and G. J. Ziegenhorn.

nia when fed to cattle, is associated with the proteins. The toxicity was lost on hydrolyzing the protein with acid. A review of the present status of acetoglycerides and a study of the provitamin A activity and stability of synthetic B-carotene in vegetable oil and margarine were also presented in the nutrition session.

The nutrition session was concluded by L. C. King of Northwestern University on recent research developments in the nutrition of lipids. He believes that the main drive for the research in lipids today is fear. The three major fields in which most of the recent investigations have been done, *viz.*, carcinogenic effects of heated fat, deterioration of nutritional value of used fat, and the relationship of lipids and coronary diseases, are all caused by the fear of the role of fat in death. Premature interpretation of incomplete results may lead to unnecessary alarm. He suggested that extensive nutritional studies of all the components of lipids should be carried out.

Processing

Nine papers were presented in the processing session, three of which were given by L. K. Arnold of Iowa State College on the solubility and extraction of vegetable oils with alcohols. L. F. Albright, Purdue University, discussed the hydrogenation of refined and bleached cottonseed oil in a dead-end hydrogenator with sufficient agitation to eliminate essentially all mass-transfer resistances, thus approximating the activities of the reactants at the catalyst surface and hence determining the effect of operating variables on the chemical reactions.

The advantages of using acetic anhydride instead of caustic in refining soybean oil was reported by N. W. Myers of the A. E. Staley Manufacturing Company. The operating data of a commercial plant indicated that substantial over-all refining loss savings and upgraded by-products, such as lecithin and a sterol-rich deodorizer distillate, were achieved. The application of pressure-tight, multi-stage countercurrent centrifugal contactors for continuous, automatic washing and finishing of soap produced by kettle saponification was presented by G. J. Ziegenhorn, Podbielniak, Inc.



SYNTHETIC DETERGENTS—Morning speakers are Jerome Kritchevsky, N. W. Ziels, chairman, W. M. Bright (first row), D. B. Hatcher, C. E. Stevens, P. E. Geiser, and Lloyd Osipow (second row).



SYNTHETIC DETERGENTS—Final speakers at the fall meeting are Carl Pacifico, R. H. Rogers Jr., chairman, W. G. Spangler (seated); D. L. Anderson, Carl E. Johnson Jr., and J. C. Harris (standing).

The multi-stage jet ejectors were discussed by C. S. Stout of the Elliott Company, and the use of an inert gas system to protect lard and shortening materials from oxidative deterioration during storage and handling was described by J. E. Thompson of the Reliable Packing Company.

Safety Symposium

The attitude towards safety of two refineries, one solvent manufacturer, and one oil mill machinery manufacturer, was described in the technical safety symposium. Extensive questioning and discussion during this session indicated clearly the success of this symposium.

N. H. White, Central Soya Company, mentioned the special equipment and operating features which contribute to safety in extraction-plant operations. W. F. Bollens listed safety measures adopted in the solvent-extraction plants of Swift and Company. R. P. Hutchins of the French Oil Mill Machinery Company stressed safety and design in solvent-extraction plants. The importance of safety measures in solvent-extraction plants was also discussed by A. E. MacGee of the Skelly Oil Company.

Personal characteristics affecting safety in solvent-extraction operations were enumerated by H. D. Fincher, Anderson, Clayton and Company. The importance of using persons who do not easily get excited was emphasized. The legal view of safety in solvent-extraction plants was outlined by O. J. Jones, Western Oil Company. Specifications for safety in solvent-extraction plants in the state of Texas were discussed.

Synthetic Detergent Symposium

The synthetic detergent symposium, first of its kind in the history of the American Oil Chemists' Society, attracted the largest audience among all the sessions of the fall meeting. It is also interesting to note that there was a large number of non-members registered to attend this symposium.

A total of 12 papers were presented in the synthetic detergent symposium with three other papers on detergents offered in other sessions. These symposium papers covered the history, survey, and preparation, properties, applications, and evaluations of the various types of surfactants. The papers in the other sessions touched on foam stability evaluation of hand dish-washing detergents by L. O. Leenerts and H. J. Myers of the Purex Corporation, the ethoxylation of fatty acids and alcohols by A. N. Wrigley, and the triethanolammonium, alkaline earth, and other salts of alpha-sulfonated fatty acids by J. K. Weil. The last two authors are both with the Eastern Regional Research Laboratory.

W. J. Bright, Lever Brothers Company, opened the synthetic detergent session with a discussion of the milestones in the development of synthetic detergents. An interesting survey of surfactants was summarized by Carl Pacifico of the American Alcolac Corporation. A total of 1,059 million pounds of surfactants were used in 1955. Twenty-five different classes of surfactants in 24 different types of applications were included in this survey.

The history, preparation, properties, and applications of six important types of synthetic surfactants were reported: *viz.*, alkylaryl sulfonates by P. E. Geiser of the Continental Oil Company, fatty alcohol sulfates by D. B. Hatcher of the Stepan Chemical Company, alkyloamides by Jerome Kritechsky of Ninol Laboratories, non-ionic surfactants by C. E. Stevens

of Antara Chemicals, ampholytic agents by D. C. Anderson of General Mills Inc., and sugar esters by C. Osipow of Foster D. Snell Inc.

Analytical methods for the organic portion of the detergent products were reviewed by W. G. Spangler of the Colgate-Palmolive Company, and those for the inorganic portion of the detergent products by J. C. Harris, Monsanto Chemical Company.

Two special applications of surfactants were also covered in the synthetic detergent symposium. C. E. Johnson of the California Research Corporation submitted an evaluation of surfactants in oil-field flooding, and J. E. Seymour of the Illinois Farm Supply Company reported on the status of research related to the use of surfactants on various crops and soils. The enthusiasm shown by oil chemists about the synthetic detergent symposium indicates the desirability of publishing more papers about surfactants in the future in the Journal of the American Oil Chemists' Society.

S. S. CHANG
Swift and Company
Chicago, Ill.

CHICAGO REGISTRATION

(Continued from page 10)

difficult words in the titles in the printed program, spoke about the redevelopment of civic pride in Chicago, suggested that high school and college boys be invited in to see industrial plants, and called Chicago the biggest transportation center in the world (8,700,000 air passengers last year).

The December issue will carry more convention news and pictures.

Meeting

The fourth conference on cottonseed processing as related to the nutritive value of the meal, sponsored jointly by the National Cottonseed Products Association and the Southern Utilization Research Branch of the U.S.D.A., will be held January 14-16, 1957, at the Southern branch laboratory, 1100 Robert E. Lee boulevard, New Orleans, La.

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