

1962 Short Course Praised as "Highly Practical"



W. C. Ault, Program Chairman

October, November Issues to Carry Papers

As a prelude to the October and November issues, which will carry the technical papers delivered at the 1962 AOCs Short Course, this synopsis of the event is offered for the edification of those who were unable to attend. Entitled "Developments in Fat Chemistry," the Short Course was held at Lehigh University, Bethlehem, Pa., July 8-11. A registered attendance of 76 first enjoyed an informal buffet supper at the University Center early Sunday evening.

The Official Program was opened Monday morning by H. A. Nelville, President of Lehigh University, who welcomed the AOCs forum to the campus.

Fat Chemistry—Past, Present, Future

The initial presentation of the Short Course was delivered by H. J. Harwood, Durkee's Famous Foods, who spoke on the development of the fat and oil industry. Dr. Harwood's remarks regarding the history of the industry were interspersed with observations on the chemistry involved in some of the more general reactions which he discussed relative to the study of fat and oil chemistry. The fatty chemistry industry as we know it today probably began with the application of catalytic hydrogenation to fats and fatty acids in order to convert unsaturates to saturates, or to produce fatty alcohols. The series of lectures and discussions which followed that of Dr. Har-



SPEAKERS AND CHAIRMEN for the Monday Session of the 1962 Short Course. Front row, left to right: Richard Sasin, H. J. Harwood, R. O. Feuge, A. J. Stirton, and G. S. Sasin. Rear, left to right: A. N. Wrigley, W. C. Ault and R. A. Reck.

wood serve to vividly evidence the wide variety of fat-derived products available today, and the many and varied uses thereof.

Derivatives of Fats for Use as Foods

R. O. Feuge, Southern Regional Research Laboratory, showed the importance of practical methods of manufacture with regard to the development of new edible products from fats. He elaborated on the chemistry involved in the preparation of various surface active agents, and the resulting problems which must be met in order to obtain economical products of reasonable purity and uniformity. Particular emphasis was placed upon the problem of the preparation of cocoa butter-fats from domestic oils. Included was a recent discovery which could alter this situation. Mr. Feuge also touched upon the manufacture of specialty fats such as the aceto glycerides and brominated oils. In illustrating some of the related reactions, Mr. Feuge speculated as to the probable mechanism involved.

Sulfur Derivatives of Fatty Acids

G. S. Sasin, Drexel Institute of Technology, presented this topic, stressing derivatives of sulfur which are formed by the reaction with the carboxyl and olefinic groups. He pointed out that the thiols under free radical conditions add to oleic and 11-undecenoic acid to form sulfides, including in his discussion the preparation of long-chain sulfur-containing dibasic acids. Dr. Sasin's discussion also covered the formulation of thio esters and thio glycols from the thiols and dithiols upon treatment with the acyl halide. He gave some of the properties of the compounds discussed.

Nitrogen Derivatives of Long Chain Fatty Acids

In his discussion of Nitrogen Derivatives of Long Chain Fatty Acids, R. A. Reck pointed out that of the thousands of compounds prepared, there are about 100 used commercially. He covered sources of raw materials, stating that the most important source was tallow, followed by coconut oil, tall oil, and fish oil. In his opening remarks, Mr. Reck stated that although there were many methods of effecting this introduction of nitrogen, commercial acceptability was extended to comparatively few.

The remainder of the presentation was concerned with these methods. The most important was the reaction of the fatty acid with ammonia at an elevated temperature. From

this general reaction, products such as amides, nitriles, acyl, substituted amides, ethoxylated amides, amino ethers, amines (primary, secondary, and tertiary), N'-alkyl morpholines, and quaternary ammonium compounds resulted. The chemistry involved in the preparation of each of these materials together with present or potential use was covered.

Phosphorus Derivatives of Fatty Acids

Richard Sasin, Drexel Institute of Technology, described methods used for the preparation of fatty phosphorous derivatives and their physical properties. Alkyl phosphonates may be prepared by the addition of dialkyl phosphonates to olefinic materials or the reaction of trialkyl phosphites with alkyl bromides according to Arbuzov reaction. The products are quite stable to hydrolysis except in the presence of very strong acid and have interesting low temperature plasticizer applications.



SPEAKERS AND CHAIRMEN for the Tuesday Session of the 1962 Short Course. Front row, left to right: H. J. Harwood, A. E. Rheineck, Richard Sasin. Rear, left to right: T. W. Findley, H. J. Dutton, R. R. Allen, L. A. Goldblatt and J. C. Cowan.

The Importance of Water at the Pigment-Vehicle Interface

A. C. Zettlemoyer, Lehigh University, discussed the effect of water content on the flow properties of pigment-vehicle dispersions. This presentation, dramatically illustrated with moving pictures, dealt with the effect of changes in the relative humidity of the ambient air on these properties. Dr. Zettlemoyer explained how these slight moisture changes affected the degree of dispersion of pigment articles. Present knowledge of this field was evaluated.

α -Sulfo Fatty Acids and Derivatives. Synthesis, Properties, and Use

Preparation and properties of the α -sulfonated acids and their derivatives was reviewed by A. J. Stirton, Eastern Regional Research Laboratory. Salts, esters, amides, reduction products, and decarboxylation products of the sulfoacids were described. Esters having 14-19 carbon

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SPEAKERS AND CHAIRMEN for the Wednesday Session of the 1962 Short Course. Front row, left to right: L. S. Silbert, J. P. Friedrich and J. C. Cowan. Rear, left to right: W. C. Ault and E. H. Pryde.

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atoms, and having their sulfoester group near the center of the chain were good wetting agents, while those having the hydrophile at the end were better detergents.

Evaluation of the α -sulfo compounds in terms of solubility, metal ion stability, surface and interfacial, tension, wetting, foaming emulsification, detergency lime soap dispersion, and critical micelle concentration serves to discover general relations between structure and useful properties.

Alkyds: Past, Present, and Future?

W. M. Kraft, Heyden Newport Chemical Corp., reviewed the structural variations and marketing potential for alkyd resins. The properties of several typical alkyd systems were detailed in terms of their functional and use concepts. Polyesters of high "functionality" are esterified with fatty acids to produce alkyds. Considerable emphasis was placed on the future place of the alkyd resin in the protective coatings market. A particularly promising future may be in store for alkyds in combination with epoxidized oils.

The Chemistry and Technology of Some Drying Oil Fatty Esters of Polyvinyl Alcohols

Drying oil fatty esters of polyvinyl alcohols were discussed by A. E. Rheineck, North Dakota State University. He discussed and compared the various methods of preparation, and showed how variations in preparative methods and starting materials give considerable variations in the coatings produced. Esters prepared by direct esterification seemed to be somewhat superior.



Just a portion of the 75 registrants are shown discussing many and varied subjects after their evening meal, culminating the Tuesday Session of the Short Course.

Fatty Acid Derivatives in Polyurethanes

Preparation and some newer uses for polyurethanes were described by L. A. Goldblatt, Western Regional Research Laboratory. Urethane derivatives have been reported more than a century ago and are now being developed into many varied uses. Since urethanes are made by reaction with almost any active hydrogen, they can make use of many fat based materials such as alcohols, acids, and amides.

Preparation and Reactions of Epoxidized Fatty Esters

T. W. Findley discussed the preparation and reactions of epoxidized fatty esters. Epoxy fatty esters are used as stabilizers in most polyvinyl chloride compounds. This market amounts to 40-50 million lb annually, and includes four types of esters. Dr. Findley summarized the reactions of epoxidized oils, pointing out that selective reactions were possible, giving products with high functionality, functional purity, and wide compatibility with polyvinyl chloride.

Kinetics of Linolenate Hydrogenation

This discussion by H. J. Dutton, Northern Regional Research Laboratory, emphasized the complexity of the kinetics involved in the reduction of linolenates, as well as the difficulties involved in analyzing the reaction product mixtures. Recent studies of the reduction of linolenate by heterogeneous catalysis and by homogeneous reaction with

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hydrazine were reviewed in terms of intermediates formed and reaction rates. Application of this basic information to flavor stabilization of soybean oil and to production of dibasic acids from linseed oil was discussed.

Commercial Hydrogenation of Fats

This subject was presented by R. R. Allen, Anderson, Clayton and Co. The catalytic liquid phase partial hydrogenation of fats to produce stocks of various consistencies at constant iodine value may be explained by the half-hydrogenation-dehydrogenation theory. The effect of the variables, agitation, pressure, temperature, and catalyst can be explained on the basis of solubility of hydrogen and thus guides may be formulated to produce the desired product. The problems inherent in handling large volumes of reactants were discussed.

Dimer Acids

Dimer acids, as presented by J. C. Cowan, Northern Regional Research Laboratory, can be prepared from unsaturated fatty acids by a Diels-Alder reaction, by free radical reaction, or by Lewis acid catalysis. The properties of the dimer acids depend on the conditions used and upon the starting materials. One unique property of dimer acid is that it never crystallizes. Dr. Cowan pointed out the many possible applications for dimer acids.

Liquid C-18 Saturated Monocarboxylic Acids. Their Preparation, Characteristics, and Potential Uses

J. P. Friedrich discussed the preparation of "cyclic acids" from tri-unsaturated fatty materials, and the conversion of these acids into liquid C-18 saturated acids. The liquid acids contain a vicinal disubstituted cyclohexane ring, and have several components present.

Fatty Peroxides: Synthesis, Analyses, and Reactions

L. S. Silbert, Eastern Regional Research Laboratory, briefly introduced peroxide chemistry, and proceeded to review the more efficient methods for syntheses and analysis of selected classes of peroxides, with emphasis on their utility and limitations to long chain fatty derivatives. A few selected reactions of peroxides were used to illustrate their increasing potential value as synthetic intermediates.

Aldehydic Materials by the Ozonization of Vegetable Oils

The final technical paper of the 1962 Short Course was presented by E. H. Pryde, Northern Regional Research Laboratory. He discussed the preparation of aldehydic materials by reductive decomposition of ozonides of the unsaturated fatty acids. Methanol proved to be the best for the oxonolysis, reducing by-product formation and chain degradation. Zinc and acetic acid reduction of the ozonides gave excellent yields of aldehydes.

Lecture—Discussion Combination Benefits All

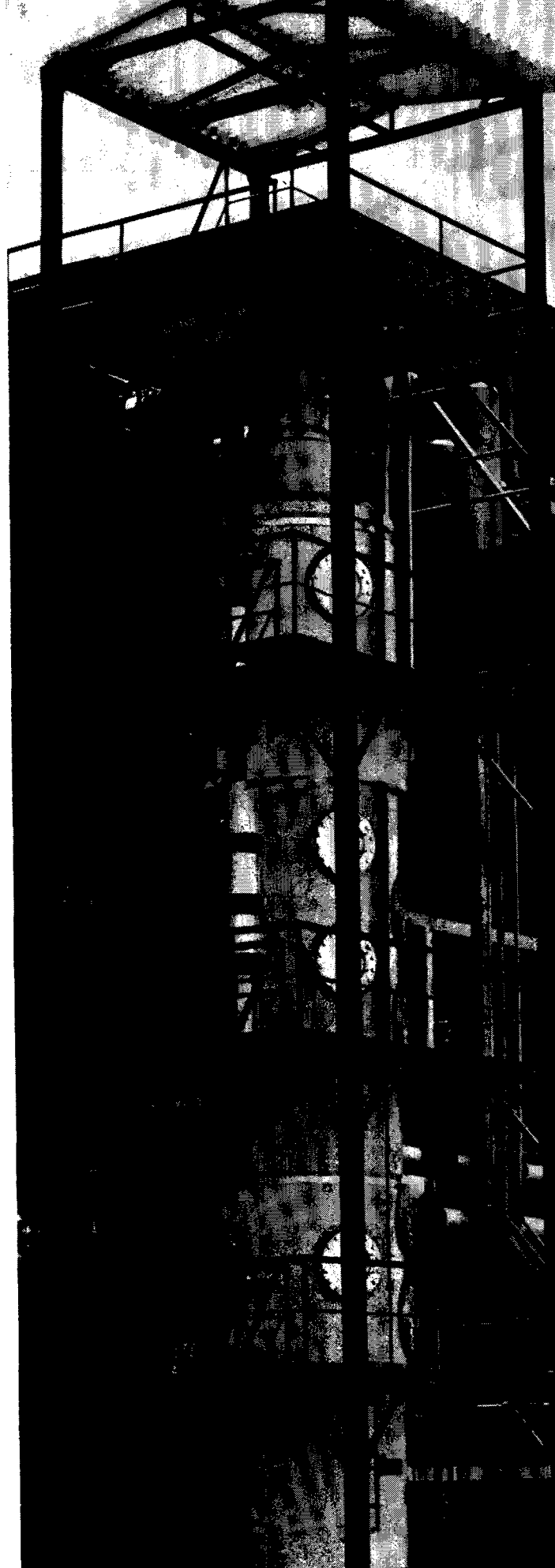
Each participating lecturer allowed an open discussion period at the end of his presentation. These periods invariably developed into discussions. The program was so designed as to bring together the lecturers and their audiences frequently. All agree that they were afforded thorough exposure to the subjects offered, and to the authorities who conducted the program.

Hard Work Brought Success to Course

The meeting can be characterized as a great success on a broad front. The Planning Committee presented a varied program for the edification and entertainment of all those attending. The University Officials spared no effort to assure that the participants were comfortably accommodated and that activities were carefully coordinated.

Everyone agreed that most subjects were of direct benefit

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A. C. Zettlemoyer (left) explains measurement of film properties to H. J. Dutton, during the Short Course Tour of the National Printing Ink Research Institute.

in his work. This was attested to by the almost perfect attendance at each lecture. The discussions were held in an unhurried atmosphere which was conducive to proper assimilation of the material offered.

The following is a list of those who attended the 1962 Short Course:

- Angel Abrego-Lopez, Industrias Gonzales, S.A., Monterrey, N.L., Mexico.
- Marvin O. Bagby, Northern Regional Research Laboratory, Peoria, Ill.
- Edward W. Bell, Northern Regional Research Laboratory, Peoria, Ill.
- Raymond G. Bistline, Jr., Eastern Regional Research Laboratory, Philadelphia, Pa.
- Slobodan Bozovich, University of Oklahoma, Norman, Okla.
- Joseph E. Burch, Battelle Memorial Institute, Columbus, O.
- Raymond M. Burke, Drew Chemical Corp., New York, N.Y.
- Herman W. Campbell, Witeco Chemical Co., Chicago, Ill.
- Edward J. Conklin, The Procter & Gamble Co., Cincinnati, O.
- Murray Cooperman, The Baker Castor Oil Co., Bayonne, N.J.
- John A. Dyer, U.S. Bureau of Commercial Fisheries, Boston, Mass.
- Kenneth A. Earhart, Coatings Resins Consultant, Allentown, Pa.
- Roger E. Eisenhauer, Northern Regional Research Laboratory, Peoria, Ill.
- Abner Eisner, Eastern Regional Research Laboratory, Philadelphia, Pa.
- Stanley Eng, Glyco Chemicals, Inc., Williamsport, Pa.
- Jacqueline Fetsko, National Printing Ink Institute, Bethlehem, Pa.
- Harold D. Fisher, General Mills, Inc., Kankakee, Ill.
- A. H. Gapsch, Thiokol Chemical Corp., Trenton, N.J.
- Erich J. Gaultitz, Jr., Bureau of Commercial Fisheries, Seattle, Wash.

- Elizabeth M. Haeberer, Eastern Regional Research Laboratory, Philadelphia, Pa.
- Richard Kassabian, M. Neumunz and Son, Inc., New York, N.Y.
- Larry D. Kirk, Northern Regional Research Laboratory, Peoria, Ill.
- Charles F. Krewson, Eastern Regional Research Laboratory, Philadelphia, Pa.
- Vincent Lamberti, Lever Brothers Co., Edgewater, N.J.
- Harry J. Lipman, Mallet and Co., Inc., Carnegie, Pa.
- Carter Litehfield, Texas Agricultural Experiment Station, College Station, Tex.
- William Maik, Canada Packers, Ltd., Toronto, Ont., Canada
- Elmer W. Maurer, Eastern Regional Research Laboratory, Philadelphia, Pa.
- J. E. Mehrens, Darling and Co., Chicago, Ill.
- D. Joe Moore, Northern Regional Research Laboratory, Peoria, Ill.
- Wilfred R. Noble, Eastern Regional Research Laboratory, Philadelphia, Pa.
- James E. Obetz, Varichem Corp., Denville, N.J.
- John L. O'Donnell, Northern Regional Research Laboratory, Peoria, Ill.
- George Palladino, Nopco Chemical Co., Newark, N.J.
- Theodore Perlstein, Eastern Regional Research Laboratory, Philadelphia, Pa.
- E. M. Perry, Arnold, Hoffman & Co., Inc., Providence, R.I.
- Thomas B. Richey, Jr., Malmstrom Chemical Corp., Newark, N.J.
- George R. Riser, Eastern Regional Research Laboratory, Philadelphia, Pa.
- Jack L. Rossen, Lever Bros. Research Center, Edgewater, N.J.
- John R. Russell, Eastern Regional Research Laboratory, Philadelphia, Pa.
- Edward J. Saggese, Eastern Regional Research Laboratory, Philadelphia, Pa.
- Ulrich W. Scheibler, Emery Industries, Inc., Cincinnati, O.
- Dan C. Schmidt, Crosby Chemicals, Inc., Picayune, Miss.
- William E. Scott, Eastern Regional Research Laboratory, Philadelphia, Pa.
- Ralph Slutkin, Durkee Famous Foods, Chicago, Ill.
- Ronald A. Spunar, Wilson & Co., Inc., Chicago, Ill.
- Heinz Stuermer, Drew Chemical Corp., New York, N.Y.
- Leonard J. Swicklik, Distillation Products Industries, Div. of Eastman Kodak Co., Rochester, N.Y.
- Kak Yuen Tao, Industria Gaucha De Oleos Vegetais S.A., Santa Rosa, Brazil, S.A.
- W. B. Tarver, Union Bag-Camp Paper Corp., Savannah, Ga.
- Henry A. Walens, Eastern Regional Research Laboratory, Philadelphia, Pa.
- Ross Walker, Archer-Daniels-Midland Co., Minneapolis, Minn.
- James K. Weil, Eastern Regional Research Laboratory, Philadelphia, Pa.
- Ralph A. Whitaker, Crosby Chemicals, Inc., Picayune, Miss.
- Raymond E. Wiech, A. Gross & Co., Newark, N.J.
- Arthur N. Wrigley, Eastern Regional Research Laboratory, Philadelphia, Pa.
- E. T. Yates, Cities Service R & D Co., Cranbury, N.J.
- Harry Zimmerman, Hart Products Co. of Canada, Ltd., Guelph, Ont., Canada.



Speakers and registrants who took part in the 1962 Short Course "Developments in Fat Chemistry" at Lehigh University, July 8-11.

The ladies and gentlemen of the Toronto Convention Committee wish to extend a most cordial invitation to every reader of the Journal to attend the 36th AOCS Fall Meeting in Toronto October 1-4, and to thoroughly enjoy a trip to Canada. The Committee Chairmen are pictured above. All will be present at the Convention, working to make your

stay a success. General Chairman Sven Young has asked that all those attending feel free to contact his Committee Chairmen whenever it is felt that they may be of aid.

(Editor's note: Those attending may wish to seek out these people and offer them hearty congratulations for the many months of work they have given this program.)