Finished-Product Testing[1]

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Abstract

A broad picture of finished product testing is presented. Although the principles covered could refer to many products, they are more specifically discussed as applied to edible fats and oils.

Introduction

A FINISHED PRODUCT may be defined as one ready to be used and/or sold with no further processing. It is the end result of the various steps used in processing, yet it is a factor which gives direction to the choice of processing steps necessary to produce it.

Only after a destination is chosen, can plans be made as to the best route to get there. In travel toward a finished product the "road map" is some type of specification. This or a set of specifications is nothing more than a useful description of a product. This more elaborate the specifications are, the more complete the description of the product.

Specifications

A product is usually processed to conform to the specifications originating from the producer and the purchaser. These two sets of specifications may or may not be identical for a given type of product. Sometimes those from the purchaser may be the same as or simply an extension of a producer's specifications on a standard product or may be unique to a particular end-use. In the former case, added specifications may be only more assurance that a standard product will be produced in a particular manner, or the latter may be a case in which a standard product is not suited for a particular end-use.

Ideally a set of specifications should be as flexible as possible and yet define the product adequately. These two aspects are often antagonistic, and the compromise usually arrived at is based on someone's best judgment. This conflict is always present for both the producer and the purchaser. In the case of a producer, too rigid a specification may conflict with economical processing whereas vagueness of a specification may lead to poor processing practices. For the purchaser, specifications are his insurance against receiving products which are inferior and/or give poor performance, yet if they are unnecessarily rigid, he may severely limit the number of suppliers and thus eliminate competitive bidding.

If specifications are not subject to revision or change and are used as a substitute for common sense, it is possible that a submitted sample which equals or surpasses expected performance may be rejected because it did not meet specifications. Hence, it is obvious that these specifications are in need of change or modification; when this is not done, both the producer and purchaser are unnecessarily at a disadvantage.

A finished product may also be defined as one resulting from processing done in a manner that will have the highest probability of achieving some type of specification. Testing of a finished product is a final check to see if the product is actually what it was designed to be.

In preparing to examine a finished product for its characteristics, the first two things to be considered are the obtaining and identification of a sample. Analysis of a lot obviously has to be based on a sample. One dictionary definition of a sample is "a part of anything presented for inspection or shown as evidence of the quality as a whole." A sample therefore has to be taken in such a way as to be truly representative.

Proper sampling techniques will not be gone into in this paper except to emphasize that there should be a definitely prescribed, carefully followed procedure, which includes the use of a proper container.

After the sample is taken, the next step is its identification. This is often neglected even though it seems simple. All too often, samples are received with either insufficient or confusing identification. Various examples of poor practices are these. The labeling of the lids of sampling containers, not the containers themselves, which may cause confusion if the lids become mixed up by accident. The labeling of a shipping container without labeling the inner container where, again, it is possible to lose or mix up shipping containers and thus lose identification. The transferring of the contents of a damaged container to another without transferring identification.

The best way to avoid these mistakes is to have a definite procedure for identification in conjunction with a sampling plan. Thus enforcement can be accomplished by refusing a sample which is not properly identified. Failure to prescribe a procedure for both sampling and identification leads to wasteful and sometimes useless work.

Product Testing

Appearance

The first and most obvious characteristic of a finished product is its appearance. For example, a plastic all-purpose shortening is more acceptable if it is white, shiny, and smooth-appearing. This is strictly a matter of aesthetics because these characteristics may have little to do with performance. However if it is too dark, it may color the product made from it.

The whiteness of a shortening may be controlled by the amount and degree of dispersion of the gas incorporated into it. To get a true picture of the color of a shortening, it is necessary to melt it and examine it either by comparison with yellow- and red-colored Lovibond glasses or by a spectrophotometer (4).

The usual ranges of colors for shortening are 1–2 red and 10–20 yellow on the Lovibond scale. The use of Lovibond glasses is limited in that brown or green pigments will interfere with the yellow or the red comparison. A spectrophotometric method is available which is correlated with Lovibond readings and will probably eventually replace them because it is not affected by the presence of other pigments.

Although it has been said that color is not of great importance in performance *per se,* it should be noted that an unusually dark color may sometimes be indicative of poor processing techniques and/or the use of inferior raw materials. This in turn may indicate poor keeping-quality.

Flavor and Odor

The next characteristic observed after appearance is the flavor and odor of a product. It is realized that flavor and odor are inseparable, but these categories are picked because some products do not lend themselves to flavor testing and odor alone must be relied upon.

Except for margarines, olive oil, and specially flavored products, edible fats and oils are usually rated on their degree of blandness. In fact, many specifications for flavor and odor simply say "bland" or "no off-odor."

A trained person or panel usually determines the degree of blandness; "trained" means a sharp ability to detect "off" flavors and odors. A well-trained panel will give results which are in surprisingly good agreement and are reproducible. Evans (2) has published the results of some extensive work in flavor testing and panel methods.

Analytical Tests

Free Fatty Acid Content

This is based on a definite method of titration, and the results therefrom are usually expressed as oleic acid. (4). When evaluating the free fatty acid contents of a shortening,

[1] Presented at the AOCS Short Course, East Lansing, Aug. 29–Sept. 1, 1966.

one must keep in mind whether or not the shortening is a deodorized or naturally flavored product. For the former, free fatty acid content would be usually less than 0.05%. Whereas that of unprocessed lard may be as high as 0.5%. Although deodorized shortening should have a free fatty acid content of less than 0.05%, there are instances in which the addition of certain emulsifiers to the shortening will give higher results.

As long as the free fatty acid content is near these values, there is generally no correlation with performance. If the levels are much above, poor processing techniques may be indicated, also performance may be affected.

Free fatty acid is of significance in a control test for deep-fat frying operations because it measures the degree of hydrolysis. If a good fat is used in a well-controlled continuous frying operation, the free fatty acid content will reach an equilibrium value and stay there since the rate of hydrolysis is usually balanced by the rate of uptake of fatty acids by the material being fried and the dilution of the fat with fresh fat.

Iodine Value

The iodine value (4) is a measure of the degree of unsaturation in the fat and, with a known fat, will indicate its hardness or its softness. Unless the previous history of the fat or the type of fat is known in a shortening, an iodine value may be relatively meaningless by itself. For instance, shortenings from meat fat which have the equivalent physical and functional characteristics of a vegetable oil shortening generally will have a lower iodine value.

Stability Tests

Because the various tests used to measure oxidation stability of a fat product are discussed in another short course paper, it must suffice to comment that the oxidation of a fat is a complex mechanism and there is not always a direct correlation between the various tests. A test must be selected which will most adequately simulate the performance of the product according to its end-use.

Melting Point

This is not as clear-cut as the melting point used in describing pure chemicals. Melting points of fat products have to be defined as a function of the method used to determine them. Fats do not have sharp melting points because they are not pure compounds; they are mixtures of many components which may be either liquid or solid at a particular temperature.

The two most commonly used melting-points are the so-called FAC (capillary melting point) and the Wiley melting point (4). In the former case the sample is contained in a small glass tube in a water bath, and the temperature is raised at a given rate until the contents of the tube become completely clear. In the Wiley melting point a disc of solidified fat is floated in an alcohol-water solution in a tube, and the temperature is raised at a given rate until such time as the disc of fat becomes spherical. Usually the Wiley melting point will be 2 to 3° lower than the FAC melting point.

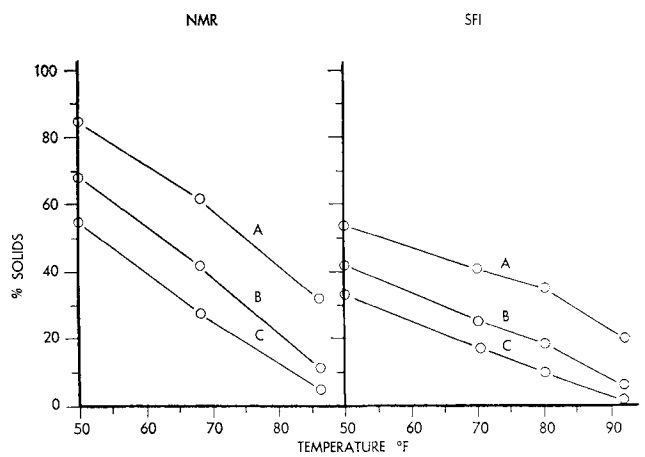

FIG. 1. Comparison of solids content of hydrogenated soybean oils by NMR and SFI.

Solid Fat Index

Dilatometry is the usual method of obtaining an index of the amount of solid and liquid fat in a product at a given temperature (1,3,4). The results are merely an index and do not necessarily reflect the absolute values of solid and liquid fat in the product at a particular temperature.

Basically, this test takes advantage of differences in specific volumes of liquid and solid fat, and measurement of the change in specific volume of the fat at various temperatures allows one to make an approximation of the percentage of fat in the solid phase at this temperature. Unfortunately different laboratories use variations of this technique, and slightly different values may be obtained.

The usual temperatures at which determinations are made are 50, 70, 80, 92, and 100F. In general, the solid fraction index may be related to the physical characteristics of the fat over the particular temperature range in use. A flat SFI curve may mean a product with a wide plastic range whereas fats with a short plastic range will have a steep curve.

A more direct measurement of solids content is now available (5). This makes use of an instrument which can measure nuclear magnetic resonance (NMR). Without going into detail about the physics involved in these measurements, it is sufficient to say that the hydrogen atom in a solid crystal does not give a signal whereas a hydrogen atom in a liquid environment does. Therefore what is measured is the actual amount of liquid in a sample; from this it is a short step to determining the solid content. SFI and NMR can be correlated, but they do not give identical results. Figure 1 shows identical determinations by NMR and SFI samples obtained in a series of hydrogenation curves on soybean oil. The most striking thing is that the solid contents of the higher level are much more divergent than the solids content of the lower level.

As more information is gathered to correlate SFI and NMR, it may well be that NMR will eventually replace SFI because it is a direct measurement rather than an index.

Congealing Point

This is determined by cooling a melted sample with stirring until the fat becomes cloudy (4). The sample is then allowed to remain quietly in the air at 68F. Under these conditions a temperature rise occurs, and the congealing point is that temperature at which the rise is at a maximum. The congeal point provides an estimate of the solidification temperature of the fat.

Titer

The titer test is similar to the congeal point test except that, instead of working with the intact fat, the titer test is done on the fatty acids separated from the fat (4).

Smoke Point

This is the temperature at which a fat will just begin to smoke (4). In most cases the smoke point is related directly to the free fatty acid content of the fat, and most well-deodorized shortenings will have about the same smoke point in the range of 400–450F. Although free fatty acid content is usually considered the principal factor in the smoke point, the presence of emulsifiers may also have an effect. There are other analytical methods, but the foregoing are the ones usually appearing on specification sheets.

Performance Testing

All of the foregoing analytical tests are of value and, when they are used judiciously, they will give an insight into the workmanship that went into the manufacture and will also predict the probability of good functioning in a finished product.

To paraphrase the old saying that "the proof of the

pudding is in the eating," it may be said that "the proof of the shortening is in the baking." Unhappily not all of the physical and chemical characteristics of a shortening that make it function in an optimum manner are known. In the not too distant past the principal proof of a shortening was its performance; but, as the knowledge of fat and oil chemistry and physics has increased, it has become possible to predict performance from a product's characteristics with a greater degree of probability. Nevertheless the final test is the examination of a shortening or edible-fat product during and after preparation of a product in an actual performance test. There are a variety of performance tests, but the principal concern in this paper is bake-shop testing.

Bake-shop testing is an analytical technique similar to any other laboratory work. It should be designed so as to incorporate techniques that are practiced in any good laboratory, including standardization of equipment and control of the environment wherever necessary.

An ideal bakery test is one in which the only variable is the shortening. Actual practice however often falls short of the ideal, and the effect of the product shortening may be confounded by the presence of other variables.

An end-use test should be designed and controlled to make a test as critical as possible. It must also be reproducible to be of value for comparative purposes. Reproducibility is a function of the control of variables, which in turn can only be controlled through the use of standard techniques. Tests have to be standardized and followed closely. Procedures must be written as fully as necessary.

Written Procedure

Wet Creaming Test

Use for Shortenings

All-purpose types

Purpose

Evaluation of the creaming property of nonemulsified shortenings by making a simple water, sugar, shortening cream

Apparatus

1. Hobart mixer model C-100 with 10-quart bowl and flat beater
2. Froemner balance No. 10–801 or equivalent; beam graduations 1 g
3. Moisture dish, aluminum, 2¼ × 2¼ in., 200 cc capacity; used for determining specific gravity of the cream

Formula (all ingredients at 75F)

Sugar (powdered)	530 g
Test shortening	414
Water	56

Procedure

Place all ingredients in bowl. Mix for one-half minute at speed No. 1. Scrape down bowl and beater. Mix for 5 minutes at speed No. 2. Measure and record the specific gravity of the cream. Continue creaming at speed No. 2, and take specific gravity readings again at 15 and 25 minutes. The bowl and beater should be scraped down after each gravity readings again at 15 and 25 minutes. The bowl and 25 minutes.

TABLE I

Numerical Scale for Pound Cake Appearance

Score		Description
5	(very good)	Grain close, regular, free of holes, cracks, or tunnels, cell wall thin
4	(good)	Grain very slightly open, regular, free of cracks or tunnels; may have an occasional hole; good cell wall thickness
3	(satisfactory)	Grain slightly open, mostly regular, a few small holes permissible; no holes or cracks; cell wall may be slightly thick
2	(poor)	Grain open or irregular or has frequent holes with some cracks or tunnels
1	(unsatisfactory)	Grain very open or has numerous holes; cracks or tunnels or cell wall thick and heavy; may have solid streaks, and graining is irregular

Report

Report final (25-minute) specific gravity reading. Maximum gravity 0.530. If between 0.500 and 0.530, a pound cake test must be run. See special instructions elsewhere.

Interpretation of test results should be as objective as possible. This involves knowing what the normal variations will be in a given test. It is also desirable to run a control along with the test samples if at all possible. If it is necessary to examine a product subjectively, there should be a numerical scoring system consistent with that particular description (Table I).

Usual Sequence in Testing

Wet Creaming Test. This is principally to evaluate the creaming properties of nonemulsified shortenings in making a simple water-sugar shortening cream. The cream is made under standard conditions. A maximum specific gravity is established; if not met or slightly below, the shortening is subjected to a more stringent testing, which is the preparation of a pound cake.

Pound Cake Test. This is purposely designed to be critical of the creaming and shortening power because it contains no chemical leavening. Like the wet creaming test, this is carried out under carefully controlled conditions.

Pound Cake Test

Use for Shortenings

All-purpose type

Purpose

Evaluation of the creaming property of shortenings by measuring the volume of a pound cake made without chemical leavening; this test is run only if the wet creaming test is between 0.500 and 0.530

Apparatus

1. Hobart mixer model C-100 with 10-quart bowl and flat beater
2. Exact-weight, scale style 347 with one-pound beam having ¼ ounce settings
3. Froemner balance No. 10–801 or equivalent, beam settings one
4. Moisture dish, aluminum, 2¼ × 2¼ inches, 200 cc capacity; used for determining batter gravity
5. Baking pans: inside top 8½ × 4½; outside bottom 7½ × 3½; depth 2½
6. Paper liners for above pans
7. Cake volumeter, rapeseed displacement type (National Manufacturing Company, Lincoln, Neb.), capacity, 3000 cc

Formula (all ingredients tempered to 75F)

		Lb	Oz
(1)	Test shortening	0	12
	Fine granulated sugar	1	8
	Cake flour (Brand X)	0	12
	Vanilla (brandy)	0	¼
(2)	Reconstituted nonfat milk solids (1 lb/gallon tap water)	0	8
(2)	Reconstituted nonfat milk solids	0	12
	Whole eggs	0	12
(3)	Cake flour (Brand X)	0	12

Procedure

Place part (1) in bowl, and mix for 30 seconds at speed No. 1. Scrape down. (*Note*: This is a preliminary mixing time and is not included in the total mixing time.) Cream two minutes at speed No. 2. Scrape down. Cream two more minutes at speed No. 2. Scrape down. Cream one minute at

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1st speed No. 1, adding ½ of part (2) during the first 20 seconds. Add part (3), and cream one minute at 1st speed. Cream one minute at speed No. 1, adding the remaining half of part (2) during the first 20 seconds. Ccrape down and cream five additional minutes at speed No. 1 (total creaming time 12 minutes).

Measure and record the specific gravity of the batter.

Scale 510 g into each of three paper-lined pans.

Bake approximately 70 min at 360F in hearth oven.

Remove from pans immediately after removed from oven.

Allow to cool to room temperature before measuring volume.

Report

Batter gravity

Cake volume (1375 cc min)

Any unusual appearance of batter of cake

(The first measurement is a batter gravity, which is a measure of a specific gravity of the batter after the prescribed mixing-time just prior to baking. The second parameter measured is the volume of the cake, which may be found by either the so-called rapeseed displacement method or by measuring. Any unusual appearance on the batter of the cake is also noted. It is possible that a cake may pass both the batter gravity test and the volume test but fail because of the appearance of the cake.)

Other Tests

Specialized shortenings, such as a high-absorption shortening, may be tested by baking a 140% sugar white cake under standardized conditions, which again is a stringent test for a so-called high-absorption or "high-ratio" shortening.

Further tests run in a bake shop may be with icing shortenings. Again, a prescribed procedure is followed, and actual icing is made with the shortening. Again the specific gravity of the final product is measured to give an indication of the creaming property of the icing shortening.

Only a few of the tests which may be used to evaluate performance have been discussed. Others which might be considered are frying tests, preparation of mayonnaise or salad dressing, preparation of puff pastry, preparation of cake mixes, evaluation of emulsifiers, or any other test that will emulate end-use performance.

Reporting

The final area to be covered is reporting of results and record-keeping. Every laboratory has some type of system, and no particular one is suitable for all. This detail is sometimes neglected or allowed to grow without thoughtful direction. There are two major concerns. Do the results go to the right place and receive prompt action? Do the records allow quick retrieval of needed information? If the answer is not "yes," then the matter should be reviewed and revised until the answers are in the affrmative.

It is hoped that this presentation will be useful in bringing attention to areas which are sometimes not given the necessary attention. If it has caused some reflection on these matters, the intent has been fulfilled.

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• Local Section News

Northeast Section

September Meeting

The first fall meeting of the Northeast Section got under way with a tremendous burst of enthusiasm. With nearly 100 people listening, Daniel Melnick gave one of the most enlightening and interesting talks this group has heard, on the controversial subject, "Essential Fatty Acids or Polyunsaturates—That Is the Question." A summary of his presentation follows:

Accepting that polyunsaturates in the diet are desirable, the preference is for the essential fatty acids as they exist naturally in vegetable oils. The isomers of the polyunsaturates produced by hydrogenation are not harmful but lack essential fatty acid acitivity and are unable to lower the serum cholesterol level. Indeed, these isomers behave like saturated fatty acids in raising the serum cholesterol level and in providing calories. Foods which may be used to control the serum cholesterol level should be properly labeled with respect to fatty acid composition. Not only should these foods have a certain minimum of polyunsaturates but the only ones to be considered in this regard should be the all-*cis*, methylene-interrupted polyunsaturated fatty acids. Saturated fatty acids in such products should not exceed a specified maximum.

The talk was well documented, and represented a vast amount of research effort. It was felt that Dr. Melnick and his associates at Corn Products were to be congratulated.

It was for work like this that Dr. Melnick was awarded the 1967 Lipid Award of the Northeast Section.

North Central Section

September Meeting

On Sept. 20, 1967, the North Central Section of The American Oil Chemists' Society held its first meeting of the new season at the Swedish Club of Chicago, 1258 North LaSalle St., Chicago.

The members are indeed grateful to the two outstanding speakers of the evening for making this one of the best-attended and most enjoyable meetings of recent years.

At 5:30 PM, J. L. Janik of the American Oil Company gave a most interesting talk on an intriguing subject, "Atomic Absorption Spectroscopy, Trace Metal Analysis and Vegetable Oils."

After dinner, Karl Zilch, Technical Director, Fatty Acid Division of Emery Industries, discussed "Synthetic Fatty Acids." Dr. Zilch has been researching fatty acids for many years, and he is internationally recognized as a true expert in this field. It was a great pleasure having him with the Section in Chicago.

November Meeting

The November Meeting will also take place at the Swedish Club, Chicago. The social hour will start at 5:00 and dinner will be served at 6:45 PM.

At 5:30 there will be a pre-dinner talk by M. E. Ginn of Armour Grocery Products Co., Chicago. Mr. Ginn's topic will be "Automational Analysis in the Soap and Detergent Industry." The detergent industry has applied automational analysis in three areas: 1) in monitoring detergent content of river water and sewage effluents, 2) in phosphate analysis for laundry detergents, and 3) in monitoring quality of bar soaps including germicide content and free alkalinity. This review will detail certain aspects of these methods in order to illustrate the technique employed.

After dinner, S. S. Chang, Professor of Food Chemistry, Rutgers University, will speak on, "Isolation and Identification of Volatile Flavor Compounds in Fats and Oils." The methodology for the isolation of volatile flavor compounds by gas chromatography, and the identification of the gas chromatographic fractions by infrared and mass spectrometry will be discussed. The techniques will be illustrated by the study of the reversion flavor of soybean oil.

Send in your reservation card or phone St 2-2455. Be sure to calendar the following meeting dates: Feb. 14, 1968; March 20, 1968; and May 15, 1968.

• New Members

Active

David H. Abrahams, Chemist, Dexter Chemical Corp., Bronx, N. Y.

John Hyland Barrett, Senior Chemist, Purex Corporation Ltd., Wilmington, Calif.

Girish C. Barua, Senior Research Chemist, Mona Industries, Inc., Paterson, N. J.

Jesse Eugene Covey, Research Chemist, W. L. Clayton Research Center, Anderson-Clayton Company, Richardson, Texas.

Robert Lewis Delmont, Chemist, Pacific Vegetable Corp., Richmond, Calif.

Betty S. Gibson, Technician No. 2, Department of Biochemistry and Biophysics, Texas A and M University, College Station, Texas.

Leo Goldberg, Manager of Operations, Dexter Chemical Corp., Bronx, N. Y.

Robert Milton Hagman, Project Engineer, Durkee Famous Foods, Chicago, Ill.

D. Robert Huffman, R and D Chemist, Huntington Laboratories Incorp., Huntington, Ind.

Yvonne Marie Imbert, Chemist, Department of Pathology, Louisiana State Medical School, New Orleans, La.

Nax Mason Joye, Jr., Chemist, United States Department of Agriculture, Naval Stores Laboratory, Olustee, Fla.

Paul Douglas Jung, Laboratory Director, MacMillan Laboratories, Atlanta, Ga.

Charles Dean Lantz, Applications Chemist, Barber-Colman Company, Rockford, Ill.

Alan Willard Leipnitz, Assistant Manager Institutional Product Development, Economics Laboratory Inc., St. Paul, Minn.

James W. Lockard, Senior Analytical and Physical Chemist, Smith, Kline and French, Philadelphia, Pa.

Jerry T. Martin, Associate Chemist, IBM Corp., Rochester, Minn.

Ralph Hamilton Payne, Laboratory Supervisor at Miami Valley Laboratories, Procter and Gamble Company, Cincinnati, Ohio.

Raymond Charles Pfleger, Bio-Chemist, Lovelace Foundation, Albuquerque, N. Mex.

Lawrence L. Pitt, Project Leader, Industrial Chemicals Research, Mallinckrodt Chemical Works, St. Louis, Mo.

Eugene Louis Schneider, Laboratory Supervisor for Organic Research, Ralston-Purina Company, St. Louis, Mo.

William Grant Schwien, Chemist, U.S. Food and Drug Administration, Kansas City, Mo.

Clyde Fredrick Smead, Jr., Senior Chemist, Chemagro Company, Kansas City, Mo.

Walter Stanley Wollak, Chemist, Swift and Company Refinery, Newark, N. J.

Herbert Zaritsky, Supervisor, Application Chemist, CIBA, Toms River, N. J.

Individual Associate

George H. Long, Jr., Instrument Analyst, House of Green, Inc., Houston, Texas.

Active Junior

James E. Evans, Research Assistant, Ohio State University, N-188 Upham Hall, Columbus, Ohio.

Ricardo Rodrigues Del Rosario, Graduate Assistant, Department of Food Science, Michigan State University, East Lansing, Mich.

Arthur C. West III, Senior in Chemistry, Illinois State University, Normal, Ill.

AACC-AOCS 1968 Joint Meeting

A Plan for Creative Interchange

Washington Hilton Hotel
Washington, D.C.
March 31–April 4, 1968

Edith A. Christensen, Chairman
Noel Kuhrt and John Holme,
Co-Program Chairmen

TIME PASSES QUICKLY—it's an all-too-familar realization!—but the AACC-AOCS Joint Meeting committee members have kept a sharp eye on clock and calendar, with the result that plans have progressed with startling rapidity from provisional stages to near-final form.

Co-Program Chairman Noel Kuhrt reports that over 150 papers have been received from AOCS members alone, and the projection is that the total number of papers from the combined membership of the two societies will surpass 250. Projected attendance is estimated at 2,000, a number likely to be increased by a large number of production, management and processing personnel, in addition to laboratory personnel. A record number of exhibits are expected. They will present the most comprehensive technical and industrial display ever to be included in meetings of either Society.

This 59th Annual Meeting of the American Oil Chemists' Society, to be a joint venture with the American Association of Cereal Chemists, will be held at the Washington Hilton Hotel, Washington, D.C., March 31–April 4. General Chairman Edith A. Christensen, a member of both Societies, is a chemist with the Grain Division, C&MS, Agricultural Research Center, Beltsville, Md. Co-program chairmen are Noel Kuhrt, AOCS and AACC, Distillation Products Industries; and John Holme, AACC, The Ogilvie Flour Mills, Montreal.

Technical Program Exceptional

Sessions of the technical program as it stands now will give unusually broad coverage of the cereal, oilseed, fat, oil, lipid and emulsifier industries, and are grouped as follows:

Sessions of Primary Interest to AOCS

Detergents—Eric Jungermann, Armour Grocery Products. Co.

Chemical Synthesis—Daniel Swern, Temple University, Philadelphia, Pa.

Fats and Oils—Madhu Sahasrabudhe, Food and Drug Directorate, Ottawa, Ontario, Canada

Determination of Blood Lipids—Robert Witter, National Communicable Disease Center, Atlanta, Ga.

Brown Fat in Hibernation—Robert Dryer, University of Iowa, Iowa City, Iowa; and Cliffe Joel, Massachusetts Mental Health Center, Boston, Mass.

Sessions of Primary Interest to AACC

Baking—Keith Tipples, Grain Research Laboratory, Winnipeg

Sorghum Grain—Lloyd Rooney, Texas A&M University, College Station, Texas

Carbohydrates—William Hoover, Kansas State University, Manhattan, Kansas

Cereal Protein—John Bernardin, Western Regional Laboratories, Albany, Calif.

Enzymes—Walter Bushuk, University of Manitoba, Winnipeg, Manitoba, Canada

Flavors—Vernon Youngs, North Dakota State University, Fargo, N. D.; and William Downey, Fritzsche Bros., N. Y.

Sessions of Mutual Interest

Aflatoxins—W. A. Pons, Southern Regional Laboratories, New Orleans, La.

Salmonella (1)—G. L. Kingsbaker, Jr., Blaw-Knox Co., Pittsburgh, Pa.

Lipolytic Enzymes—Robert Jensen, The University of Connecticut, Storrs, Conn.

Spectroscopy and X-Ray Diffraction—Robert O'Connor, Southern Regional Laboratories, New Orleans, La.

Practical Applications of Chromatography in Analysis—Gerald Feldman, Baylor University, Houston, Texas

Oilseed and Meal Analysis—Richard Doughtie, Jr., USDA, Memphis, Tenn.

Processing Technology of Oil-Bearing Materials—Ralph Potts, Armour Industrial Chemicals Co., McCook, Ill.

Emulsifiers in Food—Ira MacDonald, Atlas Chemical Co., Wilmington, Del.

Program Extended to Four-Day Period

This comprehensive program will provide an excellent opportunity for members of the two Societies to bring themselves up to date on developments in areas in which they are not as familiar as they should be.

Because of the large number of symposia and papers planned for the joint meeting, the technical portions of the program will extend over a four-day period rather than three days.

Further information concerning the meeting, provisions for making hotel reservations and details of the social and technical aspects will appear in future issues of the *JAOCS*, and *Cereal Science Today* as well, but all members are urged to begin to make arrangements NOW to join in this unprecedented and extremely interesting session.

Special Occasion for "Lady Chemists"

Men outnumber women among the chemists attending AACC and especially AOCS meetings, and until the meeting currently scheduled, no special effort has been made to provide a social function "for lady chemists only," although attractive programs for members' wives have been a traditional part of the total program.

The 1968 Joint Meeting will remedy this situation by featuring a special function for lady chemists only. The occasion will be a get-together breakfast in the lovely Cabinet Room of the Washington Hilton Hotel, Tuesday morning, April 2, 1968.

A special invitation is extended to lady chemists who will be attending their first annual meeting. They are invited to come and meet the others who represent a minority, but a select one, of the membership of the AOCS and AACC. A complimentary ticket will be included in each registration package. Be sure to join your colleagues for the occasion.

Call for Nominations, AOCS Honored Student Program

Number of 1968 Awards Increased to Fifteen

S. S. Chang, Chairman of the AOCS Honored Student Award Program, has issued a call for nominations for deserving graduate students for the year 1968.

The Honored Student Program, established in 1963 under the direction of the AOCS Education Committee, recognizes outstanding preparation for a career in the field of fats and oils by awarding selected graduate students an opportunity to attend AOCS Spring and Fall Technical Sessions. Those chosen receive an all-expense-paid trip to the Society's National Meetings.

For the year 1968, the number of awards to be conferred has been increased to fifteen. Such is expected to broaden the program by encouraging an increased number of professors to nominate their most promising students. In the past, ten students received awards each year.

Nominations are to be submitted before next February 15, in order to be considered for either the 1968 Spring Meeting in Washington, D. C., or the 1968 Fall Meeting in New York City.

Nomination, forms are available from Dr. Stephen S. Chang, Department of Food Science, Rutgers, The State University, New Brunswick, N. J. 08903.

• *Names in the News*

N. W. ZIELS (1943), Chief Chemist of Lever Brothers Company, Hammond, Ind., retired effective Oct. 1, 1967. Mr. Ziels has served the AOCS in many capacities during his years of Society membership. One of his most distinguished contributions was his ten years' service as chairman of the Examination Board, from 1954–64. His most recent position in the Society was an elective one, that of Member-at-Large of the AOCS Governing Board, 1966–67.

J. E. SHELTON, JR., has been appointed operations manager for the Republic Operations (Process Instruments Division of Beckman Instruments, Inc.), located in Chicago. Republic Operations manufactures combustion control systems and instruments, flow meters, and miniature electronic and pneumatic recorders and controllers for continuous analysis systems for process monitoring and control.

The directors of Blaw-Knox Company have elected C. F. HAUCK President and a director, it was announced by W. C. SNYDER, JR., who continued as chairman and chief executive officer. Mr. Snyder had reassumed the presidency temporarily in April of this year.

The Irregular Verb "To Hedge"

THERE WAS RECENTLY A PLAY on Broadway entitled "The Irregular Verb: To Love." The name suggests that, while the verb itself is not irregular in a grammatical sense, its meaning has many varied interpretations. The verb "to hedge" is also subject to wide variations of meaning and can assume quite different connotations under various circumstances. Some of these implications are worthy of further definition because they are so essential in commodity business.

According to dictionary definition hedging means "to shelter oneself from danger . . . to safeguard oneself from loss on a risk by making compensatory arrangements on the other side." Such a definition accurately describes the motive for a large part of hedging activity in the futures market. For that matter, it also covers hedging action in other segments of business. In either case, a purchase offset by a sale (or a sale offset by a purchase) serves "to safeguard oneself from loss on a risk by making compensatory arrangements on the other side."

To illustrate, suppose a grain elevator buys 10,000 bushels of corn and sells 10,000 bushels of corn futures. He has established a hedge, in the routine definition, against risk of a price decline while the corn is in his possession. If cash corn goes down 5¢ a bushel he loses that much on the corn he owns, but if futures go down 5¢ he can buy back the futures for a profit offsetting his loss. The same illustration would apply to a feed manufacturer who doesn't have room to store all the corn he needs. He would buy corn futures for protection against price increase, but suffered a 5¢ loss on futures while realizing a 5¢ advantage on the cash corn he purchased.

By simple reversal these same situations can be used to illustrate hedging protection in case of price increases instead of decreases.

So far we have covered only the classical examples of theoretical price protection in the most common hedging description. What if futures and cash prices don't move exactly parallel? They seldom do, even though they tend to move in the same direction. This is because supply and demand for the cash commodity are not likely to maintain exactly the same correlation with supply and demand for futures contracts. When such disparities develop it is possible for a hedged position to run into a loss, or turn into a profit.

Profitable Hedging

Anyone who hedges should be fully aware of the profit or loss possible in such a transaction. Obviously he will try to make a profit, or at least break even. Just breaking even has its advantages because bankers usually extend operating loans more freely when the collateral is hedged.

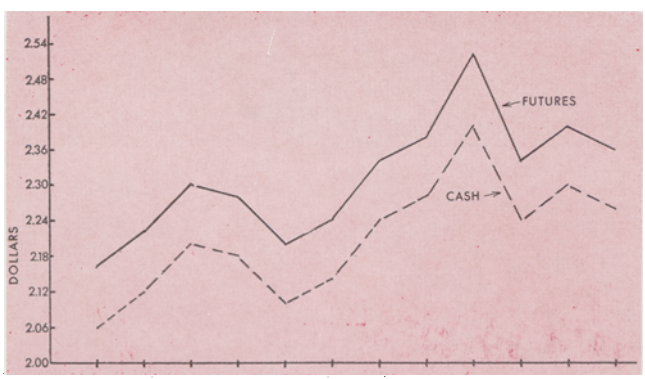

FIG. 1. Theoretically perfect price relationship between cash and future prices.

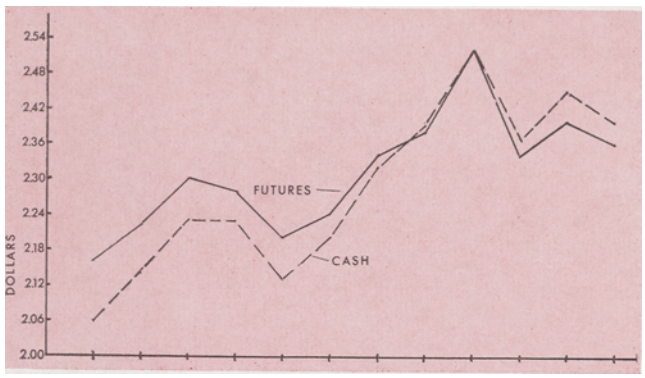

FIG. 2. Flexibility of relationship between cash and futures prices in actual practice.

But *profits* from hedging are of course more desirable. And they are predictable with a reasonable amount of regularity, though never guaranteed.

This brings us to an examination of the profit potentials of hedging, and another term called "cash basis." This term simply means the difference in price between a cash commodity and its futures price, usually the nearest futures month but any futures contract can be used. Thus in August cash corn for prompt delivery may be quoted at "3 cents over" which means over September, but at the same time cash corn for delivery in November may be 4 under December, etc. It is cash basis difference and its variable relationship with futures which results in a profit or loss in hedged positions. The basis is the single most important factor in hedging regardless of the particular commodity involved. T. A. Hieronymus, of the University of Illinois, suggests that, "to hedge is to insulate one's business activities from price-level speculation while retaining the opportunity to speculate in basis variation."

Seasonal Patterns

There are seasonal patterns to basis changes in most commodities, and it is these patterns which must be observed to realize profits from hedging. Seasonal patterns are readily explained. A grain crop which is harvested in a few short weeks must last all year, until the next harvest. Grain elevators soon fill up as farmers truck grain to town. Country elevators keep it moving as rapidly as possible to terminal elevators and end-users. But the flow is seldom smooth, and with many willing sellers the buyers of grain need not be aggressive, unless the amount marketed is below expected needs, which results in a weak cash basis at harvest time because supply of cash grain is greater than demand for it. Later in the year just the opposite may be true, thus causing a basis improvement. When the harvest is large more of the crop moves to commercial storage space. Consequently there is a large amount of hedge selling and

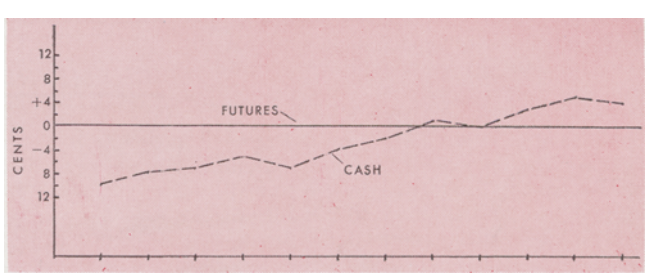

FIG. 3. Relationship in cents, under or over futures.

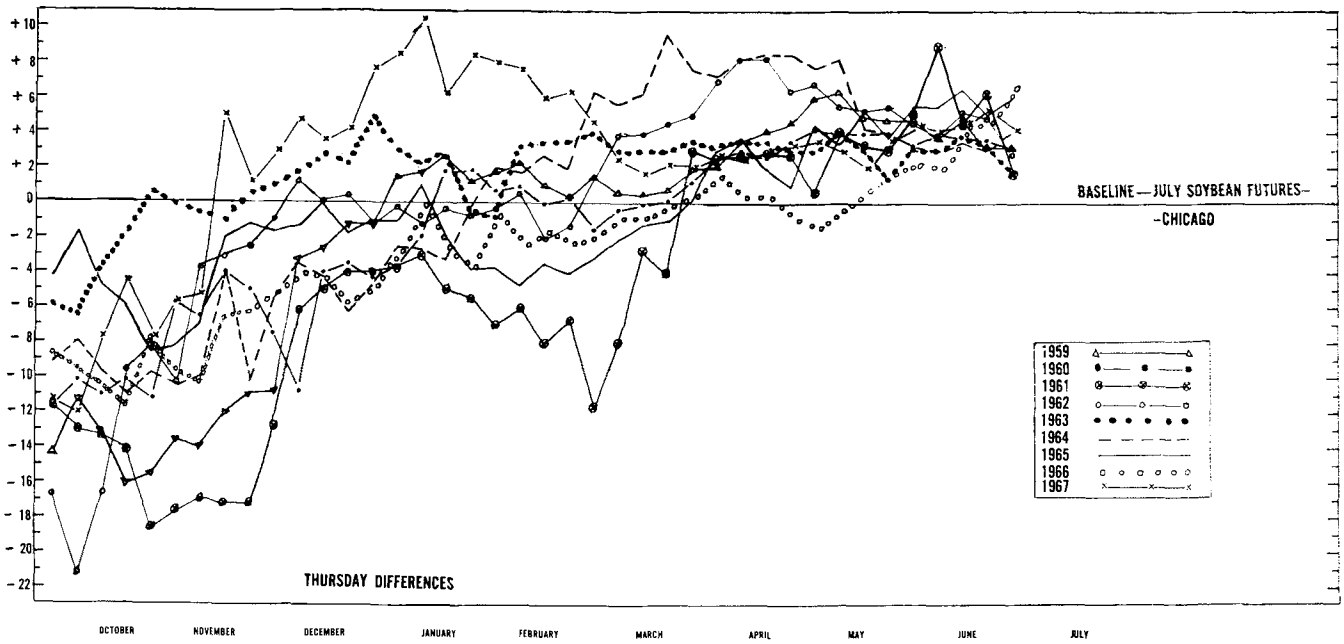

FIG. 4. Cash crude soybean oil FOB Decatur, Ill., over/under July soybean oil future Chicago.

nearby futures are low with distant months at graduated higher levels—a normal "carrying charge" situation. Conversely, when the crop is tightly held out of commercial storage channels, nearby futures months may even move to a premium over distant months—an "inverted carrying charge" condition. In the first case, the cash basis is weakest reflecting storage cost discounts while in the latter case the basis is not likely to be so weak since available storage space tries to attract more grain.

Some Illustrations

Fig. 1 shows the theoretically perfect price relationship between cash and futures prices. No risk is involved so there is no chance for loss or for additional profit.

Fig. 2 shows more nearly how flexible is the relationship between cash and futures prices in actual practice.

Fig. 3 tells the same story as Fig. 2, but is easier to read. In this way it is simple to see at a glance the basis trend. In a hedging program it doesn't matter what the price level is; just the relationship in cents under or over. (Price level means the futures price which is the focal point on which the cash basis price relationship is established). Since the hedger is long the cash commodity and short futures (or vice versa) he doesn't care whether soybeans, for example, are $2 a bushel or $3.50 a bushel. Nor does he care whether price level goes up or down, so long as the basis chart moves in favor of his position.

Fig. 4 shows a nine-year history of cash soybeans in Chicago versus July soybean futures. Fig. 5 and 6 give the story for soybean oil and soybean meal at Decatur, Illinois, since this is the primary delivery point for Chicago futures. Similar charts are available for any commodity for which there is a futures contract. It should be noted that in years when the basis starts low and works higher there are usually worthwhile carrying charge increments in futures months, while in years the basis works sideways or lower there is little difference in futures price levels or an inverted situation.

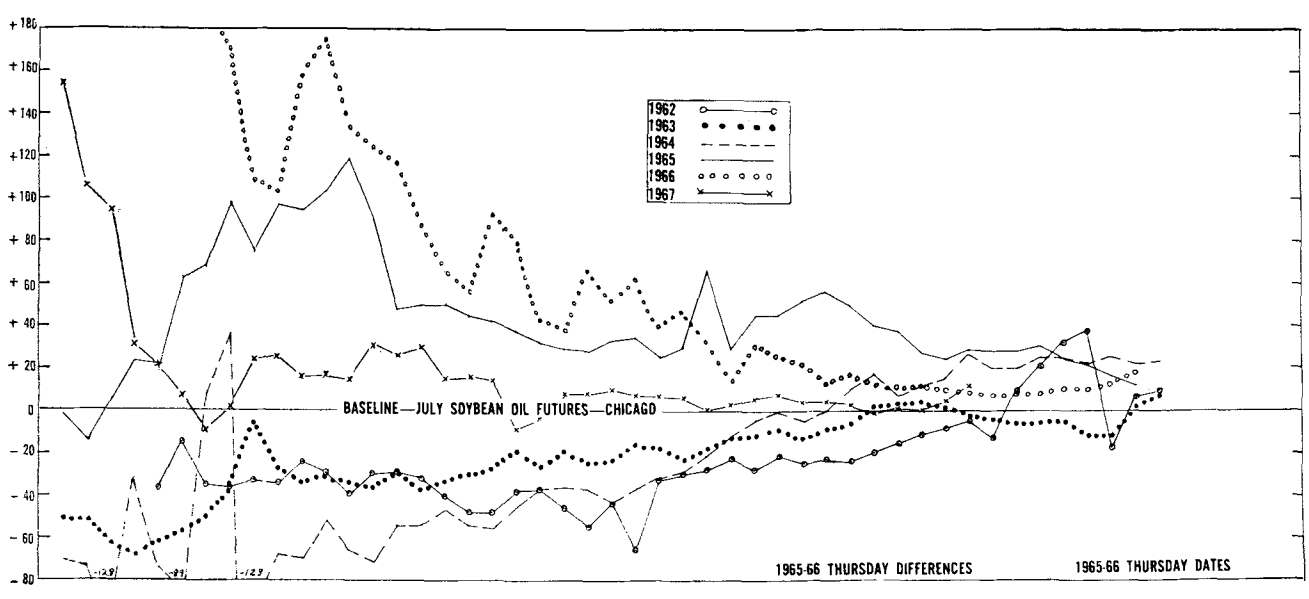

FIG. 5. Cash No. 1 yellow soybeans FOB track, Chicago, over/under July soybean futures at Chicago.

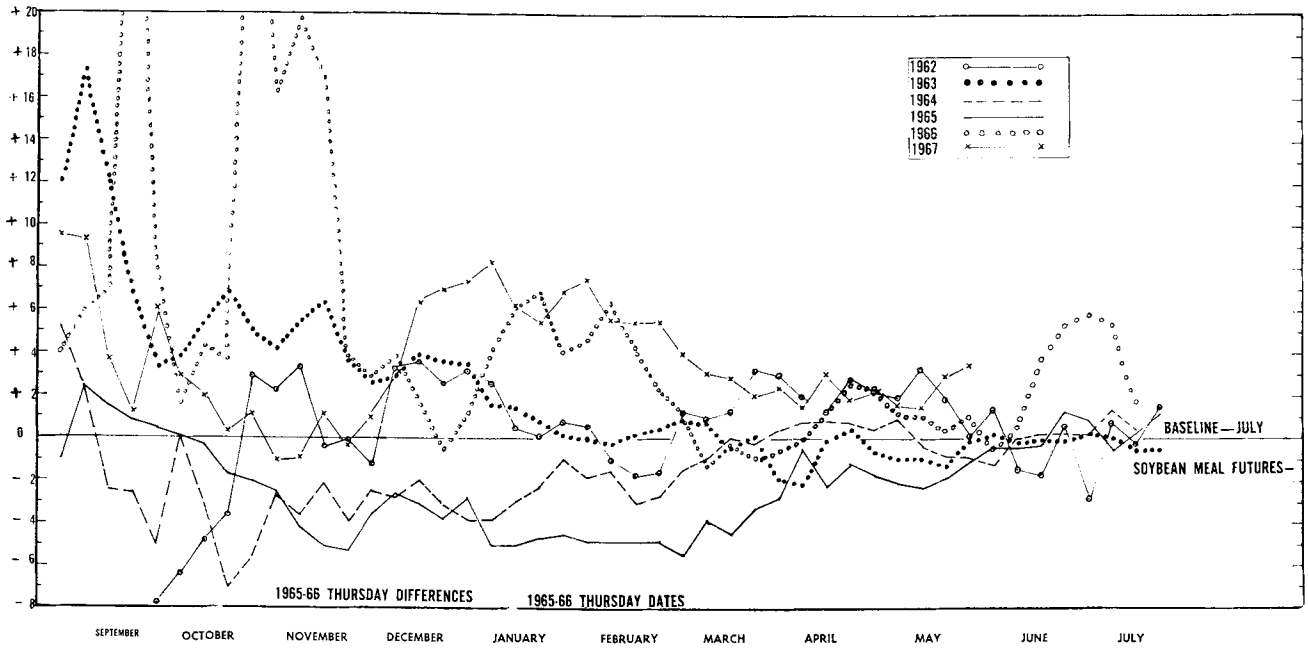

FIG. 6. Cash 44% ETL soybean meal at Decatur, Ill., over/under July soybean meal futures, Chicago.

Using the Charts

Let's assume a *grain elevator* purchased cash soybeans in November at 10¢ under the price of July futures and at the same time sold July futures in an equal amount. Then in May the beans were sold at 5¢ over July futures and at the same time the July futures contract was bought back. This provides 15¢ profit on the total transaction to apply against storage costs, less on nominal commission fee for the futures trade, while providing protection from risk of lower price levels plus more borrowing power from the bank against inventory.

Example if futures go up:

November	buy cash beans	@$2.60	$
	sell July bean futures		2.70
May	sell cash beans	2.85	
	buy July bean futures		2.80
	cash bean profit	+.25	
	futures loss		−.10
	Total gain	+.15	

Example if futures go down:

November	buy cash beans	@$2.60	$
	sell July bean futures		2.70
May	sell cash beans	2.55	
	buy July bean futures		2.50
	cash bean loss	−.05	
	futures profit		+.20
	Total gain	+.15	

A *farmer* would likely look at such charts and conclude he is better off to store soybeans at least until late December, with the most increase in basis occurring from October through December. He also would hedge by being short futures. (Example same as for elevator).

A *user* of commodities who has only limited storage capacity is automatically short the cash goods since he is constantly in need of replenishing supply for his end products. His need then is for hedge protection on the long side, so he would buy futures. He would book cash purchases for as many months ahead as possible at so many points below or above futures when it appears the basis is the lowest. He would buy futures at anytime when it appears price is moving up. Once this is done he has "booked his cash basis" and fixed the overall price. As the cash commodity is delivered he would sell futures in the pit. Or he could exchange futures with the seller who is already short futures or who is likely willing to assume a long futures position until his cash inventory is replenished. Or, on a declining market, he could wait until the date he actually purchases the cash commodity before buying futures, which would then be "given-up" to the seller. Thus the buyer has protected himself against both a rising basis and rising futures while still retaining flexibility in taking advantage of price declines.

Local Situations

For intelligent hedging decisions for a specific location it is necessary to maintain a record of local prices for comparison with futures. One local pattern may be quite different from another. Daily quotes are not required; just once a week. Basis charts can then be prepared by yourself or your broker. In this way sound judgment in a hedging program may be applied to meet individual needs.

New Hedging Definition

As we have seen, a new definition is appropriate for the verb, "to hedge." A more explicit interpretation would be: "to seek protection from risk of loss due to change in price level while retaining the opportunity to profit by taking advantage of changes in price relationship." This is the true essence of a sound hedging program. Any program which does less than this fails to fully utilize the available opportunities for profit.

DAVID M. BARTHOLOMEW
Commodity Analyst
Merrill, Lynch, Pierce
Fenner & Smith, Inc.

• *Obituaries*

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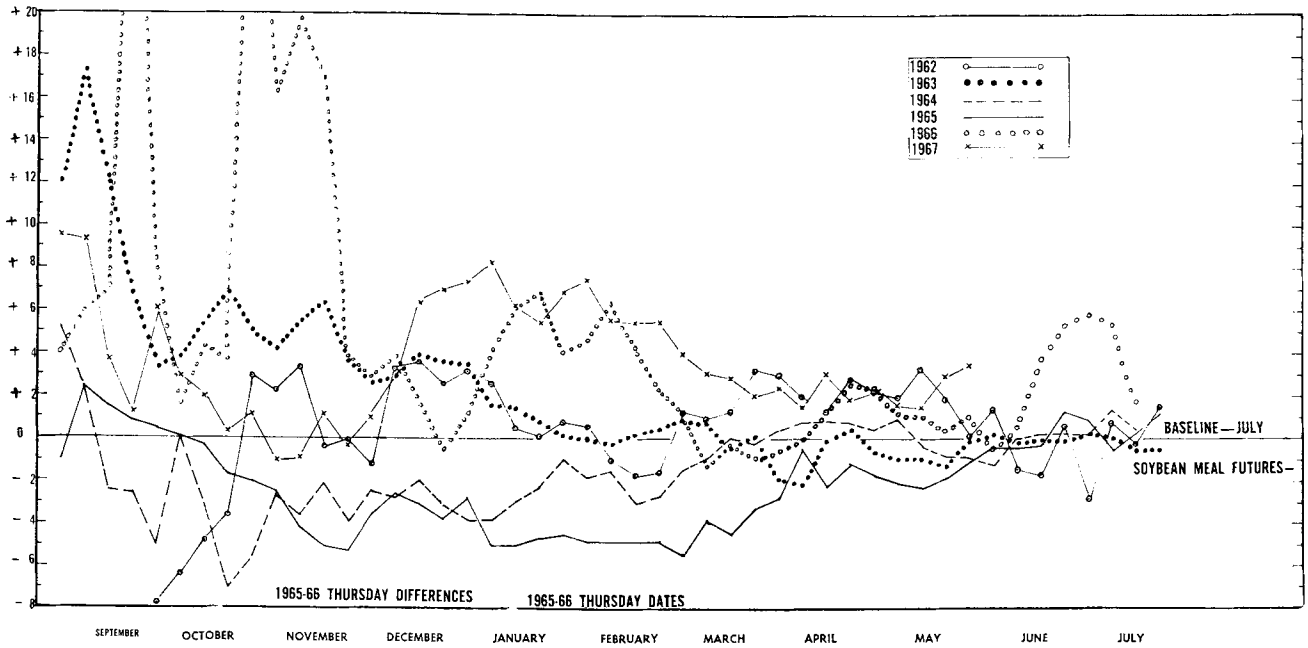

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The Nomenclature of Lipids[1]

IUPAC-IUB Commission on Biochemical Nomenclature (CBN)

Preface

The nomenclature of lipids is the concern both of organic chemists and of biochemists. The systematic names of individual lipids can always be derived by the general rules of organic nomenclature; however, such names are often complex and need to be supplemented by alternative "semi-systematic" names (as has been done, *e.g.,* for steroids and corrinoids). Another problem is that of names for groups of related and homologous compounds (including mixtures); such names are hardly ever needed by the pure organic chemist, but are very necessary in biochemical work.

Several attempts have been made in the past to standardize nomenclature in the lipid field, notably by the United States NAS-NRC Sub-Committee on the Nomenclature of Biochemistry under the Chairmanship of W.E.M. Lands (Ann Arbor, Michigan) in 1962. At about the same time, proposals were made for names for groups of lipids by a German group [see *Biochem. Z.* 335 (1962) 423].

The Biochemical Nomenclature Commission of IUPAC and the Commission of Editors of Biochemical Journals of IUB decided, in 1963, to set up an international Sub-Committee on Lipid Nomenclature under the Chairmanship of H. Hirschmann (Cleveland, Ohio); this group discussed and, with the advice of interested colleagues, modified some of the material embodied in the two earlier proposals. The IUPAC-IUB Sub-Committee, which later became responsible to the Combined Commission on Biochemical Nomenclature of IUPAC and IUB (CBN), when this was formed in January 1904, has consisted of the following: H. Hirschmann (Chairman, U.S.A.), A. Gottschalk (Australia), F. D. Gunstone (U.K.), M. L. Karnovsky (U.S.A.), E. Klenk (Germany), W. E. M. Lands (U.S.A.), J. Polonovski (France), L. L. M. van Deenen (The Netherlands). Their discussions were carried out largely by correspondence and resulted in draft proposals that were considered by CBN at its meetings in Paris (1965) and in Gothenburg (1966) and by correspondence between the meetings. The present proposals are the product of these events, and are published for the consideration of interested colleagues. It is hoped that discussion will shortly lead to the formulation of Tentative Rules acceptable to chemists in the field of lipids.

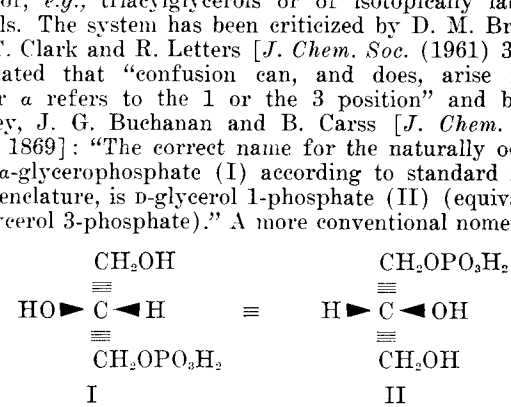
CBN is greatly indebted to the members of the Sub-committee on Lipid Nomenclature for their labors. The Introduction, prepared by the Subcommittee, explains the need for a rather novel departure in nomenclature, that of "stereospecific numbering," which we believe to be worthy of detailed trial and consideration in the special circumstances that obtain in the lipid field.

Introduction

The most complex problem faced by the Subcommittee on the Nomenclature of Lipids concerned the distinguishing of stereoisomers. In the case of glycerol, at least four different systems of designations have been proposed and have been adopted by various authors. All of these proposals possess advantages and disadvantages and none is ideal for all purposes. In view of this situation, it seems desirable to set forth the principal considerations that prompted the selection made by the Subcommittee.

All assignments of configuration in this area rest on the pioneering work of E. Baer and H. O. L. Fischer and, if priority and widest use were the sole criteria, the system first proposed by these workers [*J. Biol. Chem. 128* (1939) 475] would have to be chosen. This system provided that "an α-monoglyceride is to be put in the same category with that glyceraldehyde into which it could be transformed by oxidation without any alteration or removal of substituents" and "since we can without contraint consider the α-glycerophosphoric acids as monoglycerides, their coordination is subject to the same points of discussion." A serious limitation of this nomenclature was stated in the original publication: "An optical classification similar to that which we have suggested for the α-monoglycerides seems to be impossible for the triglycerides."

This nomenclature was later extended [E. Baer and D. Buchnea, *J. Am. Chem. Soc. 81* (1959) 1758] to compounds that could not be named under the original rule, such as "L-α-(dioleoyl)-cephalin," but as yet no extension has been proposed for the designation of the antipodal forms of, *e.g.,* triacylglycerols or of isotopically labeled glycerols. The system has been criticized by D. M. Brown, B. F. C. Clark and R. Letters [*J. Chem. Soc.* (1961) 3774] who stated that "confusion can, and does, arise from whether α refers to the 1 or the 3 position" and by J. Baddiley, J. G. Buchanan and B. Carss [*J. Chem. Soc.* (1957) 1869]: "The correct name for the naturally occurring L-α-glycerophosphate (I) according to standard rules of nomenclature, is D-glycerol 1-phosphate (II) (equivalent to L-glycerol 3-phosphate)." A more conventional nomencla-



ture, which also employs D/L prefixes, using numerals as locators and (usually) giving the substituted primary carbinol group the lower number [M. L. Karnovsky, G. Hauser and D. Elwyn, *J. Biol. Chem. 226* (1957) 881; A. A. Benson and M. Maruo, *Biochim. Biophys. Acta, 27* (1958) 189] therefore came into use. This system is readily applicable to triacylglycerols, labeled glycerol, etc. Unfortunately, the coexistence of two systems that usually employ antipodal configurational prefixes for the same substance is a potential source of confusion and ambiguity that can be avoided only if the sole outward sign indicating which convention is being followed (the use of Greek letters or numbers as locators, respectively) is always shown and recognized.

This difficulty is avoided if the *R/S* system [R. S. Cahn, C. K. Ingold and V. Prelog, *Angew. Chem.* (international edition) *5* (1966) 385] is adopted. Its universal character and its freedom from ambiguity have everything to recommend it as the general system, and therefore, the one to be used for information retrieval.

However, like the two D/L systems, when applied to glycerol derivatives, it does not bring to the fore important structural and biochemical relationships and therefore does not always provide a convenient terminology for the formulation of significant generalizations. Only a few examples are given. A large part of the chemical and biochemical

(Continued on page 572A)

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[1] A document for discussion sponsored by the IUPAC-IUB Commission on Biochemical Nomenclature, approved by the Commission in April 1967 and published by permission of the International Union of Pure and Applied Chemistry, the International Union of Biochemistry, and the official publishers of the International Union of Pure and Applied Chemistry, Messrs. Butterworths Scientific Publications.

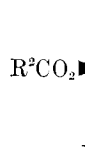
Comments on these proposals may be sent to any member of CBN: O. Hoffmann-Ostenhof (Chairman), W. E. Cohn (Secretary), A. E. Braunstein, J. S. Fruton, B. Keil, W. Klyne, C. Liébecq, B. Malmström, R. Schwyzer, E. C. Slater, or corresponding member, N. Tamiya.

Reprints of these proposals may be obtained from W. E. Cohn, Director, NAS-NRC Office of Biochemical Nomenclature, Oak Ridge National Laboratory, P. O. Box Y, Oak Ridge, Tennessee, 37830, U.S.A.

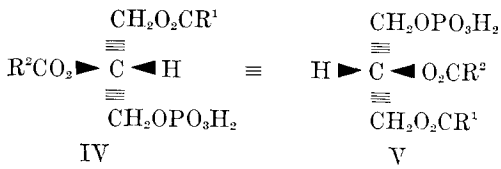
• *Nomenclature*

(Continued from page 548A)

reactions in the field of glycerol derivatives involves the formation and cleavage of ester and ether linkages. Although these transformations do not affect any of the four bonds that extend from the C-2 of glycerol, the description of these processes under the rules of the *R/S* or D/L system requires frequent changes of the configurational prefixes. For example, the phosphorylation of (*S*)-1,2-diacylglycerol (III) gives an (*R*)-phosphatidic acid (IV). The corresponding transformation under the Baer-Fischer system is D-α,β-diacylglycerol (III) → diacyl-L-α-glycerophosphoric acid (IV). Under the conventional D/L system the precursor (III) is L-1,2-diacylglycerol and the product might be formulated and named as either L-1,2-diacylglycerol 3-phosphate (IV) or as D-2,3-diacylglycerol 1-phosphate (V) [III → (IV ≡ V)]. If the former is chosen, the formal inversion is avoided, but it would be required in describing the removal of the acyl groups since the product can be properly named only as D-glycerol 1-phosphate (II) [(IV ≡ V) → (I ≡ II)].

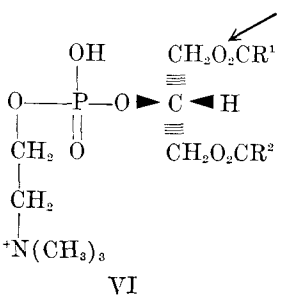


III



IV ≡ V

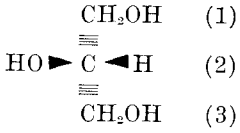
Furthermore, the enzyme phospholipase A (EC 3.1.1.4) differentiates between two ester linkages in optically active (and inactive) 1,3-diacylglycero-2-phosphorylcholines (VI) [G. H. De Haas and L. L. M. Van Deenen, *Biochim. Biophys. Acta, 84* (1964) 469], but this stereospecificity cannot be expressed by the configuration of the substrate in either D/L or *R/S* terms.



VI

Still another problem arises if one reports observations demonstrating that the distribution of fatty acids attached to the primary carbinol groups in triacylglycerols is not random. The use of the traditional configurational symbols (D/L or *R/S*) for the description of the asymmetry of such complex mixtures seems quite inappropriate.

These diverse matters present no problem if the stereochemistry of glycerol derivatives is expressed by a fourth system, "stereospecific numbering," [H. Hirschmann, *J. Biol. Chem. 235* (1960) 2762], which takes recognition of the fact that the two primary carbinol groups of the parent substance, glycerol, are not identical in their reactions with dissymmetric structures, which include nearly all biochemical processes [A. G. Ogston, *Nature, 162* (1948) 963] and that they therefore should be distinguished in nomenclature. On this basis, the numbers 1 and 3 should not be used interchangeably for the same primary carbinol group. The system proposed for deciding which carbinol group is to receive the lower number is a general one and is based on the priorities of the *R/S* system of Cahn *et al.* [*loc. cit.*]. Its application to glycerol (VII) is particularly simple: If the secondary hydroxyl group is shown to the



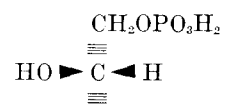
Glycerol (*sn*-numbering to right)

VII

left of C-2 in a Fischer projection, the carbon atom above C-2 is called C-1, the one below C-3; the use of this "stereospecific numbering" is indicated by the prefix "*sn*" before the stem-name of the compound. With such a terminology for distinguishing the two primary carbinol groups of free glycerol, it seemed a logical extension to describe the stereochemistry of derivatives by indicating the carbon atoms that are substituted. This additional step was first taken by R. Stjernholm and H. G. Wood [*J. Biol. Chem. 235* (1960) 2757], who spoke of glycerol 3-phosphate. (This would become "*sn*-glycerol 3-phosphate" in the nomenclature proposed here; cf. (I)). Under this system, there can be no formal inversions as long as the four bonds of C-2 remain intact; a given primary carbinol group will always have the same number no matter what the *O*-substituent on this or the other primary carbinol may be. Therefore, identity of configuration is obvious at a glance; *e.g.,* under the *sn* system, the phosphorylation mentioned above is the conversion of a 1,2-diacyl-*sn*-glycerol (III) to a 1,2-diacyl-*sn*-glycerol 3-phosphate (IV).

Similarly, the specificity of the action of phospholipase A can be expressed by stating that it acts on the ester linkage at C-1 (indicated by the arrow) of 2-*sn*-phosphatidylcholine (VI). The non-random distribution of fatty acid residues might conveniently be expressed by such statements as "the 1-position contained most of the saturated fatty acids in the triacyl-*sn*-glycerols of rat liver" [W. E. M. Lands, R. A. Pieringer, P. M. Slakey, and A. Zschocke, *Lipids 1* (1966) 444].

The main disadvantage of the *sn*-system of specifying configurations lies in the fact that it does not express "chirality" in the usual manner by configurational prefixes. This innovation is not altogether without precedent since L. Maquenne [*Les sucres et leurs principaux dérivés,* Gauthier-Villars (also G. Carré and C. Naud), Paris 1900] used numbering in a stereospecific sense to specify the configurations of the inositols. Although the use of D and L or of *R* and *S* shows more clearly an antipodal relationship, the fact that C-1 and C-3 lie across a plane of symmetry of glycerol should be sufficient to show that *sn*-glycero-1-phosphoric acid (VIII) and *sn*-glycero-3-phosphoric acid (I) are optical antipodes.



VIII

PROPOSED RULES

1. LIPIDS CONTAINING GLYCEROL

A. Individual Compounds

1.1 In designating esters, ethers, and other *O*-derivatives of glycerol, rules 10 and 11 of the Rules of Carbohydrate Nomenclature [*J. Org. Chem. 28* (1963) 281] are followed. These rules provide that: (a) if the hydrogen atom of an alcoholic hydroxyl group is replaced by another atom or group, the name of the parent compound may be retained as the root of the substituted compound and that, in such names, the prefix (denoting the substituent) is attached directly to the root; (b) an ester may be named by placing after the unchanged name of the parent compound, and separated therefrom by a space, the appropriate numeral

NEW BOOKS

ADVANCES IN CRYOGENIC ENGINEERING, Vol. 11, edited by K. D. Timmerhaus (Plenum Press, 1112 p, 1966).

This volume is the latest in the series of cryogenic engineering conference publications, and represents the proceedings for the 1965 conference. The volume contains 76 papers, and the papers are largely oriented towards cryogenic applications as applied to space systems. The book is divided into ten topical sections with each section containing two to ten papers germane to the general topic of that section. Topics covered are: Insulation (thermoinsulation as applied in space vehicles and storage of liquefied gases); Refrigeration (directed towards the production and maintenance of low temperatures); Space Technology (cryogenic storage, temperature measurement, liquid measurements—sloshing and level—and other space applications); Cryogenic Properties (mostly thermodynamic properties of liquefied gases); Phase Equilibria and Thermodynamics (the text concentrates entirely on very low temperature systems); Mechanical Properties (exotic materials, glass reinforced plastics, and nuclear radiation effects); Heat Transfer (mostly boiling of cryogenic liquids); Equipment (cryostats, transfer systems, vacuum applications); Superconductivity and Magnets (cooling, performance, and applications). In addition the volume contains two invited papers, one on "The Impact of the Space Age on Cryogenics," and the second on "Helium Refrigerator and Liquefier." This volume is typical of the proceedings of this series of conferences, and as usual the papers are generally of good quality. The topics cover the spectrum of cryogenic engineering with a special flavor of space application.

While this volume should be in the library of all cryogenic engineers, it probably has limited appeal to readers of the *Journal*. In particular, the majority of the papers consider applications and temperatures below 100 Kelvin. As in past years some basic information is given, particularly in the sections on Insulation, Phase Equilibria and Thermodynamics, and Superconductivity and Magnets, which could be useful in solving problems occurring in higher temperature applications.

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FUNDAMENTAL PHENOMENA IN THE MATERIAL SCIENCES, Volume 2, Surface Phenomena, edited by L. J. Bonis and H. H. Hausner (Plenum Press, 1966, 208 p., $12.50).

This is a compilation of ten papers from the Second Symposium on Fundamental Phenomena in the Materials Sciences held in January, 1964 at Boston, Massachusetts. The subject common to these papers is the role of interfacial phenomena in the chemistry and physics of solid and liquid materials. Surface structure, friction, and interactions such as adsorption and adhesion are the broad topics considered. These subject areas serve to illustrate that workers in diverse disciplines are concerned with common problems.

The authors and their papers are: H. C. Gatos, "The Structure and Electronic Configuration of Crystalline Surfaces"; L. H. Germer, "Present and Proposed Uses of Low-Energy Electron Diffraction in Studying Surfaces"; P. M. Ku, "The Effects of Oxide and Organic Films on Sliding Friction"; F. F. Ling, "The Deformational and Geometrical Aspect of Surfaces in Sliding Contact"; Ernest Rabinowicz, "Effect of Surface Energy on Lubrication"; Imre Farkass, "Problems of Producing a Clean Surface by Outgassing in Ultrahigh Vacuum"; Sydney Ross, "Physical Adsorption by Homogeneous and Heterogeneous Solid Surfaces"; F. M. Fowkes, "The Relation of the Attractive Forces at Interfaces to Wetting, Spreading, Adsorption, and Long-Range Attractive Forces"; J. J. Bikerman, "Solid-to-Solid Adhesion"; C. M. Adams, Jr., "Spreading, Penetration, and Capillary Flow in Metallic Systems"; Helen C. Friedemann, "Bibliography on Surface Phenomena (Selected References, 1963–1965)." Discussions following each paper provide for some very interesting reading also.

This volume should be useful to anyone who wishes to discover what the current "state of the art" is. Although the ten papers, naturally, do not fully describe all current areas of surface research, the bibliography by H. H. Friedemann makes the coverage more complete, indicating several other areas of study which are not included in the papers or discussions. The authors of the papers are all prominent workers in their individual specialized areas and have made significant contributions to other symposia dealing with surface and interfacial phenomena. However, three of the authors do not document their statements by providing appropriate references thereby decreasing the utility of this volume.

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THE SEPARATION OF BIOLOGICAL MATERIALS (British Medical Bulletin Vol. 22, No. 2, May 1966, $5); paperback 9XII, 193 p. Medical Department, the British Council, 65 Davies St., London W. 1).

This special issue of the British Medical Bulletin is devoted to a series of review articles covering recent advances in the separation of biological materials. The topics covered are as follows: Physical chemistry of porous systems (gel chromatography and gel filtration), molecular sieve chromatography (Sephadex gels, Agar, agarose, polyacrylamide gels), recent advances in electrophoretic techniques, density gradient separation in the ultracentrifuge, countercurrent distribution, recent development in the apparatus and technique of gas-liquid chromatography, and separation of lipids by chromatography. Separate articles are devoted to the separation and isolation problems of subcellular particles, viruses, nucleic acids, proteins, and subunits, peptides, amino acids, carbohydrates and mucoid substances, as well as separable polymers in bacterial cell walls. The articles dealing with gel chromatography and gas chromatography as well as the general chromatography of lipids will be of primary interest to persons in the area of lipid chemistry.

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ADVANCES IN CHROMATOGRAPHY, Vol. 2, edited by J. Calvin Giddings and Roy A. Keller (Marcel Dekker, Inc., 377 p., 1966, $14.50).

Volume 2 of *Advances in Chromotography* is a two-part continuation of a series describing recent advancements in chromatography. Developments in the ion exchange chromatography of amino acids, ion mobility in electrochromatography, chemical structure in relation to paper chromatography, gradient techniques in thin-layer chromatography, and chromatographic processes in geology are explained in Part I, while Part II covers gas-liquid chromatography (GLC): chromatographic band broadening, GLC of carbohydrates, ionization detectors, and tempera-

(Continued on page 567A)

• *New Books . . .*

(Continued from page 550A)

ture programming. The format of Volume 2 is identical to that of its predecessor in that a brief outline of the subject matter is prefixed to each paper, and the table of contents for the entire volume is a composite of these outlines. An effective author index at the end of the book cites all references used throughout the text, but I feel that it would also be helpful to have a more detailed subject index.

The contributors to this volume have excelled in reporting major developments and trends without sacrificing the details necessary for depth of understanding. In addition, the editors have successfully encouraged the authors to show their pertinent data in the form of figures and tables and to present their opinions of the specific status of developments, with the result that this volume represents much more than a mere cataloging of information already in the literature. This distinguishes the *Advances in Chromatographic* series from *Chromatographic Reviews,* a series initiated in 1959 strictly for the purpose of presenting review articles. The purpose of *Advances in Chromatography,* to critically evaluate major developments and to specifically summarize and focus the authors' own research efforts, has been successfully attained in Volume 2. It is highly recommended for researchers attempting to keep abreast of progress in the many diverse areas of chromatography. The wide variety of topics included in the series also makes it an excellent reference and survey source for those workers in other fields who must use chromatography.

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TECHNIQUES AND METHODS OF POLYMER EVALUATION, VOL. 1, THERMAL ANALYSIS, edited by P. E. Slade, Jr., and L. T. Jenkins (MARCEL DEKKER, INC., New York, p. 253, 1966).

Only in recent years have the well-known techniques of differential thermal analysis (DTA) and thermogravimetric analysis (TGA) been utilized to any significant extent by polymer scientists. The editors' objective in this book, Volume 1 of *Techniques and Methods of Polymer Evaluation,* is to present a thorough review of the fields of DTA and TGA as applied to polymers. The objective has been met admirably, offering the first book reviewing recent instrumental techniques and representative applications of thermal analysis to polymers.

The book consists of five chapters, contributions from government and industrial laboratories, and a 650-word or term index that holds up well to test. The first two chapters more than adequately describe the instrumentation, techniques and some representative applications of DTA to polymer research and development. The information here is not found in older books, for heats involved in polymeric transitions and reactions are small by inorganic standards, and entirely new instruments and techniques have been required. The third and fourth chapters on TGA review instrumentation and analyses of data, although more examples of applications to actual research problems would be welcome. The last chapter is limited to analyses of volatile products of thermal degradation, and includes keys to the literature.

The book is well written, contains a minimum of errors, and is to be recommended both to workers in the field and to those interested in the applications of thermal analyses to polymer chemistry and physics.

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J. F. Kincaid (left), Assistant Secretary of Commerce for Science and Technology, main speaker at the Society of Cosmetic Chemists seminar banquet September 22 at Chicago's Ambassador West Hotel, is shown discussing his address with seminar chairman M. J. Root (right), vice-president for research and development with the Barr-Stalfort Company, Chicago-based aerosol custom packaging firm.

Dr. Kincaid discussed reforms being initiated by the Department of Commerce to modernize the U. S. Patent system to keep pace with the vast number of applications being submitted as a result of the world technological explosion. Kincaid said that the reforms would bring US systems more closely into harmony with those of other nations.

• *AOCS Past Presidents Series*

With the following biographical sketch of V. C. Mehlenbacher, the *Journal* continues a series begun in the October issue, compiled and written by R. W. Bates. The series will include the twenty presidents who have served the Society since 1947, when the first series of this kind was completed.

V. C. MEHLENBACHER, 1949

The 40th President of the American Oil Chemists' Society was V. C. Mehlenbacher. Mel was born in Kensington, Minnesota in 1901.

He obtained his BS in Chemical Engineering from Tri-State College at Angola, Indiana and his MS in Chemistry from the University of Southern California.

V. C. Mehlenbacher

Mel spent his entire professional career with Swift & Co., where he started as an analytical chemist in 1926. In 1929 he moved to Los Angeles as Chief Chemist where he remained until 1936. He returned to Chicago for one year and then spent the years from 1937–41 as head of the Eastern Division in Newark. He returned to Chicago and until his retirement in 1966 was Head of Analytical Methods Research, Assistant Chief Chemist, Chief Chemist and General Manager of the Quality Assurance Department.

He found time during his active career to write a number of books which include: *A.O.C.S. Official and Tentative Methods, 2nd Ed.; Analysis of Fats and Oils*; a chapter entitled "Determination of Hydroxyl Groups" in *Organic Analysis*, published by Interscience; "Analysis of Natural Fats," in *Scott's Standard Methods*, as well as "Instrumental Methods of Analysis" in the same volume. He contributed two sections to the *Handbook of Analytical Chemistry*, published by McGraw-Hill. In addition, he was the author or co-author of nearly three dozen technical papers.

Mel was extremely active in the American Oil Chemists' Society. His committee involvements included: FAC Chairman, 1939–61; Oil Characteristics, 1938–46; Sampling, 1937–45; Soybean Analysis, 1944–47; Color 1944–45 and 1950–54; Seed and Meal Analysis, 1945–59; Analytical Methods, 1945–50, and Bailey Award Chairman, 1959.

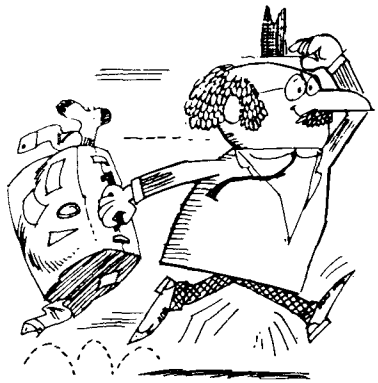
He was elected an Honorary Member of the American Oil Chemists' Society in 1964.

Mel and Mrs. Mehlenbacher live in La Grange, Illinois. They have two children and five grandchildren.

• *Industry Items*

TRACOR, INC., scientific research and instrument manufacturing company, has agreed to acquire Westronics, Inc., Fort Worth manufacturer of chart recorders and indicators. Tracor, headquartered in Austin, Tex., has branches in nine states and the District of Columbia. Westronics is established in Forth Worth, with regional sales offices in Encino and Oakland, Calif., Ramsey, N. J., and Kansas City, Mo.

VOTATOR DIVISION OF CHEMETRON CORPORATION will construct new manufacturing, office and research buildings at Jeffersontown, Ky. The new facilities will be nearly double the size of Votator's present plant in Louisville and are scheduled for completion in the summer of 1968. The expansion will enable the division to increase its production of food and chemical processing equipment and dielectric heating apparatus.



Meetings

AOCS National Meetings

1968—Washington, D. C., Washington Hilton Hotel, March 31–April 4 (Joint with AACC); New York, Statler Hilton Hotel, Oct. 20–23.

1969—San Francisco, San Francisco Hilton, April 20–23. Minneapolis, Radisson Hotel, Oct. 5–8.

AOCS Section Meetings

Northeast Section—Philadelphia, Whyte's Restaurant, New York City, Dec. 5, 1967; Feb. 6, 1968.

North Central Section—Nov. 15, 1967, Swedish Club, Chicago, Ill.; Feb. 14, 1968, IIT, Chicago.

Northern California Section—Nov. 17, 1967, Point Orient Restaurant, San Francisco.

Other Organizations

Nov. 27–Dec. 1, 1967—Exposition of Chemical Industries, New York Coliseum, New York.

* Dec. 1, 1967—Law of Food Packaging, Labeling and Advertising workshop sponsored by Inter-University Center Inc., Chicago, Ill.

* Dec. 6, 1967—Society of Cosmetic Chemists, Semiannual Scientific Meeting, American Hotel, New York, N. Y.

Jan. 9–11, 1968—Chemical Marketing Workshop, Saul Gordon Associates Center for Professional Advancement, Lake Hopatcong, N. J.

Jan. 24–26, 1968—Soap and Detergent Association, Forty-first Annual Meeting, Waldorf-Astoria Hotel, New York, N. Y.

* Jan. 28-Feb. 2, 1968—ASTM Winter Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

Feb. 9–11, 1968—Symposium and Convention of the Oil Technologists' Association of India.

Feb. 12–13, 1968—Cottonseed Processing Clinic, New Orleans.

March 3–8, 1968—Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Inc., Penn-Sheraton Hotel, Pittsburgh.

March 27–28, 1968—Symposium on Mineral Waste Utilization, IIT Research Institute, Chicago, Ill.

April 1–4, 1968—Materials Engineering/Sciences Exposition and Conference (ME/SE), Sheraton Hotel, Philadelphia, Pa.

* April 3–5, 1968—National Pollution Control Exposition Conference, Astrohall, Houston, Texas.

April 16–17, 1968—Meat Packers' and Processors' Conference, Sheraton-Pennpike Motor Inn, Fort Washington, Pa.

May, 1968—International Chemistry Exhibition and "Conference Internationale des Arts Chemiques," Paris, France.

May 13–17, 1968—Seventh National Meeting of the Society for Applied Spectroscopy, Sheraton-Chicago Hotel, Chicago.

June 25–28, 1968—Gas Chromatography and Its Exploitation, 7th International Symposium, Falkoner Centret, Copenhagen, Denmark.

* Additions to previous calendar

ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: J. G. Endres, Kazuo Fukuzumi, J. Iavicoli, K. Kitsuta, F. A. Kummerow, Gladys Macy, E. G. Perkins, T. H. Smouse, J. A. Thompson and R. W. Walker

• Fats and Oils

THE STRUCTURE AND CONFIGURATION OF NEUTRAL PLASMALOGENS. H. H. O. Schmid, W. J. Baumann and H. K. Mangold (Univ. of Minnesota, The Hormel Inst., Austin, Minnesota 55912). *J. Am. Chem. Soc.* **89**, 4797–8 (1967). A neutral plasmalogen in flesh, liver and eggs of the shark *Hydrolagus colliei* (ratfish) was detected and was separated by adsorption chromatography from the major lipid constituents of these tissues, viz., 0-alkyldiglycerides and triglycerides. The total lipids of ratfish liver contained about 5% of neutral plasmalogens and thus constituted a convenient source. Chemical reactions, specific optical rotations and spectroscopic data prove that the fraction isolated from the liver of *Hydrolagus colliei* consisted of D(+)-1-0-*cis*-alk-1′-enyldiglycerides.

ENZYMATIC STEREOSPECIFICITY IN THE HYDRATION OF EPOXY FATTY ACIDS. STEREOSPECIFIC INCORPORATION OF THE OXYGEN OF WATER. W. G. Niehaus, Jr. and G. J. Schroepfer, Jr. (Dept. of Chem. and Chemical Engineering, Univ. of Ill., Urbana). *J. Am. Chem. Soc.* **89**, 4227–8 (1967). A soluble (100,000 g) extract, prepared from a pseudomonad (NRRL-2994), catalyzes the stereospecific hydration of the Δ^9-olefinic bond of oleic acid, yielding 10-D-hydroxystearic acid (or 10-R). The same enzyme preparation catalyzes the hydration of *cis*- and *trans*-9,10-epoxystearic acids, yielding threo- and erythro-9,10-dihydroxystearic acids, respectively. In the case of the *trans*-epoxystearate the recovered, unreactive substrate after prolonged and repeated incubation with the enzyme preparation was also optically active. This finding constitutes a clear example of the use of an enzyme to effect the resolution of a racemic epoxide, a result which would be difficult, if not impossible, to obtain by other methods.

STRUCTURES OF TRIGLYCERIDES OF BOVINE MILK SERUM. SHORT CHAIN TRIGLYCERIDES. L. J. Nutter and O. S. Privett (Univ. of Minn., The Hormel Inst., Austin). *J. Dairy Sci.* **50**, 1194–99 (1967). The structures of the triglycerides containing short chain fatty acids of bovine milk serum were determined by a combination of argentation-thin-layer and liquid-liquid partition chromatography. Some 168 different molecular species of triglycerides containing short chain acids were detected on the basis of a difference in degree of unsaturation or carbon number exclusive of positional isomers. All species present in amounts greater than the order of 0.01% were determined. The short chain fatty acids were widely distributed among the triglycerides, but significant amounts of triglycerides containing more than one short chain acid were detected. Although previous evidences for an interrelationship in the biosynthesis of triglycerides and lecithin were observed, comparison of the fatty acid and molecular species composition of the classes in milk serum in the present study did not reveal a direct relationship between the synthesis of these compounds.

FATTY ACID COMPOSITION AND FLAVOR OF AUTOXIDIZED MILK FAT. K. G. Raghuveer and E. G. Hammond (Dept. of Dairy and Food Industry, Iowa State Univ., Ames). *J. Dairy Sci.* **50**, 1200–5 (1967). Typical flavors that developed during autoxidation of milk fat were not altered by deodorization, randomization, hydrolysis and resynthesis, or removal of unsaponifiables. This indicated that the flavor of autoxidized milk fat depends only on the fatty acid composition. Various synthetic mixtures of unsaturated fatty acids were interesterified into tridecanoin to see if they would reproduce the flavor of autoxidized milk fat. A mixture of 1.5% linoleic, 0.5% linolenic, and 0.2% arachidonic acids in tridecanoin satisfactorily reproduced the flavor typical of the early stages of autoxidation. A mixture of polyunsaturated fatty acids isolated from milk fat and incorporated into tridecanoin at the 3% level gave improved reproduction of the later stages of autoxidation in milk fat.

TRIGLYCERIDE STRUCTURE OF COWS' MILK FAT. I. PRELIMINARY OBSERVATIONS ON THE FATTY ACID COMPOSITION OF POSITIONS 1,2 AND 3. R. E. Pitas, J. Sampugna and R. G. Jensen (Dept. of Animal Industries, Univ. of Conn., Storrs). *J. Dairy Sci.* **50**, 1332–6 (1967). Pancreatic lipolysis has proven to be extremely useful in the determination of milk fat triglyceride (TG) structure; however, with pancreatic lipase alone, the separate compositions of positions 1- and 3- cannot be determined. A positional analysis can be accomplished by the method of Brockerhoff, in which the 1,2- and 2,3-diglycerides (DG's) from a pancreatic lipolysis of fat are converted to phosphatidyl phenols. These are then digested with phospholipase A, which is specific for the 3-(L)-phosphatidyl phenol, releasing the 2 (β) acid, and forming a lysophosphatide containing an acid in the 1-position. Subsequent analysis of the fatty acids in the various fractions allows determination of the 1- and 3-positions separately. With this procedure, it is possible to ascertain whether the fatty acids of milk fat are randomly distributed between the 1- and 3-positions or if mixtures of single enantiomers exist.

CHROMATOGRAPHIC SILICA GEL: SURFACE AREA DETERMINED BY ADSORPTION. R. L. Hoffman, D. G. McConnell, G. R. List and C. D. Evans (Northern Reg. Res. Lab., U. S. Dept. Agr., Peoria, Ill. 61604). *Science* **157**, 550–1 (1967). The surface area of silicic acid, a form of silica gel, has been determined by adsorption of methanol from a benzene solvent. The method is straightforward, uses inexpensive apparatus and should be applicable to other particulate adsorbents.

FATTY ACIDS IN DROSOPHILA MELANOGASTER. III. CHARACTERIZATION OF COMPONENT FATTY ACIDS BY PAPER CHROMATOGRAPHY. Mikio Kato (Kato Audition Res. Inst., Kyoto, Japan). *Can. J. Biochem.* **45**, 457–463 (1967). It has been previously reported that the interferences of unsaturated fatty acids with the chromatographic identification of saturated fatty acids may be minimized by mercuration. Since simple hydrazones of unsaturated fatty acids with their mercurated derivatives give different color reactions on treatment with diphenylcarbazone, the component saturated and unsaturated fatty acids in pupal lipids of *Drosophila melanogaster* were identified on the same chromatographic paper. The amounts of individual fatty acids were calculated from the spectrophotometric data by an easier method than that described in the previous reports. The quantities of saturated and unsaturated acids in different strains of *D. melanogaster* appeared to be related to their genetic nature.

INTERESTERIFICATION OF RICE OIL. Kyōichi Suga, Shōji Watanabe and Tsu Pai Pan (Chiba Univ.). *Yukagaku* **16**, 474–5 (1967). Rice oil (cloud point 0.5C) was interesterified by use of 0.1–0.5% sodium methoxide catalyst. Winterization gave an oil with cloud point −6C.

THE DECOMPOSITION PRODUCTS PRODUCED FROM HYDROPEROXIDES DURING CATALYTIC HYDROGENATION OF OILS. Tsukasa Kawada (Kao Soap Co., Tokyo). *Yukagaku* **16**, 453–7 (1967). Soybean oils with peroxide number 5 and 10 were hydrogenated and deodorized. The deodorized oil was fractionated into polar glyceride and non-polar glyceride by column and thin-layer chromatography. The polar glycerides were converted to methyl esters and fractionated again into polar acid ester and non-polar acid ester. The IR spectra and R_f value of the polar acid ester were identical with those of ω-hydroxyacid ester which was derived from oleyl alcohol. Non-polar acid contained lower molecular weight fatty acids which were absent in original oil. These lower fatty acids and polar acids were found only in hydrogenated oil from the oil with peroxide number 101 and not in oil with peroxide number 5.

NEW METHODS FOR THE HYDROGENATION OF ALIPHATIC UNSATURATED COMPOUNDS. Tōru Takagi (Nagoya Univ.). *Yukagaku* **16**, 441–8 (1967). A review with 94 references.

STUDIES ON THE DETERIORATION OF FRYING OILS IN CONTINUOUS WATER-SPRAYING AND HEATING SYSTEM. III. LOWERING OF FAT STABILITY AND TYPE OF FAT DETERIORATION. Etsuji Yuki (Food Industrial Expl. Station, Hiroshima Pref.). *Yukagaku* **16**, 449–53 (1967). The stability of fatty oil in deep frying was examined by (1) heating with the exclusion of air and water, (2) heating with air but without water, (3) heating with water but without air, and (4) heating with air and water. Heating method (1) showed no deterioration, good stability was maintained and addition of antioxidant or synergist was effective. Methods (2) and (4) showed thermal oxidation with rapid lowering of stability. The addition of an antioxidant or synergist was ineffective after a certain degree of deterioration was reached. Method (3) showed no thermal oxidation but hydrolysis occurred. The stability could be improved by addition of antioxidant or synergist. Indications were noted that the lowering of stability was not caused from deterioration but it was due to the loss of antioxidant potency by steaming and an increase of iron content from the vessel.

CONJUGATED FATTY ACIDS IN SOME CUCURBITACEAE SEED OILS. Mary J. Chisholm and C. Y. Hopkins (Div. of Pure Chem., NRCC, Ottawa, Canada). *Can. J. Biochem.* 45, 1081–1086 (1967). Punicic acid was identified as a component of the seed oils of *Cyclanthera explodens* (26%) and *Cayaponia africana* (38%). α-Eleostearic acid was identified in *Momordica dioica* (55%) and its occurrence in *Telfairia occidentalis* (7 and 12%) was confirmed. Evidence of conjugated acids was noted in *Fevillea peruviana* and *Bryonia alba*. The oils of four other species of Cucurbitaceae had no conjugated acids. The distribution pattern of fatty acids in this family was discussed.

IDENTIFICATION AND LOCALIZATION OF THE FATTY ACIDS IN HAEMOPHILUS PARAINFLUENZAE. D. C. White and R. H. Cox (Dept. of Biochem., Univ. of Lexington Med. Cent., Lexington, Kentucky). *J. Bacteriol.* 93, 1079–1088 (1967). *Haemophilus parainfluenzae* is capable of synthesizing 22 fatty acids. These fatty acids were equivalent to 4% of the bacterial dry weight. These fatty acids were localized in the membrane-wall complex, which contained the respiratory pigments, quinone and phospholipids. The fatty acids which could be extracted with organic solvents comprised 86% of the total fatty acids of the cell. These fatty acids were distributed as 98% in the phospholipids and 1.9% in the neutral lipids, of which 0.5% were free fatty acids. Palmitic, palmitoleic, oleic and vaccenic acids comprised 72% of the total fatty acids and were found almost exclusively in the phospholipids. The phospholipids also contained the cyclopropane fatty acids. The neutral lipids contained significant proportions of the odd-numbered branched and straight-chain fatty acids. The nonextractable wall complex contained 14% of the total fatty acids. These wall fatty acids were rended soluble only after saponification. The wall fraction contained all of the β-hydroxymyristic acid and most of the myristoleic and pentadecenoic acids.

COMPLEX LIPIDS OF RHODOMICROBIUM VANNIELLI. Chong-eel Park and L. R. Berger (Dept. of Biology, Western College for Women, Oxford, Ohio). *J. Bacteriol.* 93, 221–229 (1967). The major lipid components of the phospholipid fraction of *Rhodomicrobium vannielli* were the *O*-ornithine ester of phosphatidylglycerol 46.5%, phosphatidylcholine 26.5%, phosphatidylglycerol 9.7%, bis-phosphatidic acid 6.7%, phosphatidylethanolamine 4.5%, phosphatidic acid 1.8%, lysophosphatidyl glycerol-*O*-ornithine ester 3.2%, and N,N-ornithine amide 0.95%. The major fatty acid was vaccenic acid (90% of the total fatty acids).

FATTY ACIDS OF EXTRACTABLE AND BOUND LIPIDS OF RHODOMICROBIUM VANNIELLI. *Ibid.*, 230–236. Vaccenic acid was the major fatty acid of all fractions of the lipids of *Rhodomicrobium vannielli*. The extractable fraction consisted of simple lipids (1.87% of cell dry weight), phospholipids (4.2%), sulfolipid (0.01%), coenzyme Q (0.09%) and pigments (3.1%). The cell residue contained the bound lipid which was composed of a non-polar fatty acid fraction (1.86%) and a polar hydroxy fatty acid fraction. The fatty acids of each fraction were quantitated. Coenzyme Q was isolated and identified.

THE STRUCTURE OF BUTTER TRIGLYCERIDES. E. Fedeli (Nat. Center Lipochemistry, Milan, Italy). *Riv. Ital. Sostanze Grasse* 44, 220–2 (1967). Short chain butter triglycerides were separated from long-chain glycerides by TLC on silica gel-coated plates. The short chain fraction was further fractionated into a saturated and an unsaturated fraction by means of TLC on $AgNO_3$-impregnated plates. The fatty acid composition of all fractions separated showed that the unsaturated fraction contains one mole of unsaturated fatty acid per mole of triglyceride. The gas chromatographic analysis of the triglycerides in the short-chain fractions revealed the presence of glycerides with from 26 to 40 C atoms in the molecule, the largest amounts being present as C_{36} and C_{38} triglycerides, with relatively small differences between the saturated and the monounsaturated fractions. The tentative conclusion is reached that butyric acid is present in almost all glyceride molecules of the saturated fraction, while the C_4-$C_{18:1}$-X and the C_4-$C_{18:1}$-X (where X is one of the other acids) are prevalent in the monounsaturated fraction.

RESULTS OF OLIVE TREE FERTILIZING EXPERIMENTS IN POOR SOILS. G. Petruccioli (Olive Experim. Inst., Spoleto, Italy). *Olearia* 20, 154–61 (1966). The statistical evaluation of re-

sults obtained over a period of 12 years during which fertilization experiments were conducted on olive trees growing in poor, shallow soil, using both natural and chemical fertilizers, indicates the usefulness of fertilizers in increasing the yield per plant in both fruits and oil.

HAZELNUT OILS OF DIFFERENT CULTIVORS GROWN IN SICILY. E. Bazan and G. Lotti (Univ. of Palermo, Palermo, Italy). *Olearia* 20, 187–91 (1966). Hazelnut oil samples from 14 Sicilian cultivators have been examined. Oil content and unsaponifiable content are influenced by variety while fatty acid composition is practically unchanged. Fatty acid composition was as follows: 16:0 3.7–6.8%; 16:1 trace to 0.58%; 18:0 2.0–5.1%; 18:1 80.2–85.7% and 18:2 6.2–10.7. U.V. and I.R. data are also reported on this oil.

ABOUT THE FORMATION OF ELAIDINIC ACID DURING THE HEAT TREATMENT OF OLIVE OIL WITH BLEACHING EARTH. C. Zeni and F. DeFrancesco (Prov. Agric. Inst., S. Michele Adige, Italy). *Olearia* 20, 193–5 (1966). Heat treatment with bleaching earth has been shown to induce the formation of elaidinic acid in olive oil, the amount produced being strongly temperature-dependent and increasing with increasing amounts of bleaching earth. No elaidinic acid is formed at temperatures below 100C, while up to 5–10% can be formed at 150C.

A NOVEL METHOD OF DETECTING COMPONENTS SEPARATED BY TLC USING A FLAME IONIZATION DETECTOR. F. B. Padley (Unilever Res. Lab., Welwyn, England). *Chem. Ind. (London)* 1967, 874–6. A method employing a flame ionization detector as a means of estimating components directly on a thin-layer chromatogram has been developed and tested on a mixture of mono-, di- and triglycerides. Further work is required to adapt the method for accurate quantitative determinations.

THE UNSAPONIFIABLE MATTER IN SICILIAN OLIVE OILS. G. Lotti, V. Averna and E. Bazan (Univ. of Palermo, Palermo, Italy). *Olearia* 20, 149–53 (1966). Samples of olive oil from Sicily have been found to contain from 1.04 to 1.48% unsaponifiable. Analysis of the unsaponifiable gave the following results: I.V. 152–263, total hydrocarbons 620–1,090 mg/100 g, squalene 260–620 mg/100 g. A linear relationship was found to exist between the total hydrocarbon content and the amount of squalene present.

SHORT-CHAIN FATTY ACID ANALYSIS. A COMPARISON BETWEEN TWO GAS-CHROMATOGRAPHIC METHODS. A. K. Lough, R. S. Reid, M. Murray and F. M. Black (Rowett Res. Inst., Aberdeen, U.K.). *J. Sci. Food Agr.* 18, 214–6 (1967). The composition of a number of known mixtures of volatile fatty acids in aqueous solution and of volatile fatty acids in samples of rumen liquor were estimated by two gas-liquid chromatographic procedures, one of which operated in conjunction with an automatic titrating device and the other with a flame ionization detector. It was found that the method using the flame ionization detector was more accurate and yielded results more rapidly than did the one in which the automatic titration device was employed.

THE FATTY ACID COMPOSITION OF OLIVE OILS FROM THE ITALIAN REGION OF PUGLIA. A. Cucurachi (Agric. Exper. Stat., Bari, Italy). *Riv. Ital. Sostanze Grasse* 44, 260–6 (1967). The gas chromatographic analysis of 158 samples of olive oil from the Italian region of Puglia, collected during eight growing seasons, gave the following average results: 16:0 13.8%; 16:1 1.8%; 18:0 2.1%; 18:1 69.6%; 18:2 11.4%; 20:0 0.35%; 18:3 0.58% and 20:1 0.23%. An appreciable variation in I.V., between 83.7 and 86.6, has been observed between samples produced in different years.

UTILIZATION OF ANIMAL FATS IN INDUSTRY. B. Ostric-Matijasevic (Yugoslav Inst. of Meat Technol., Belgrade, Yugoslavia). *Riv. Ital. Sostanze Grasse* 44, 273–7 (1967). A review is given of the role played by animal fats in the bread, biscuits and canned meat industries.

PROBLEM RELATING TO ANIMAL FAT REFINING. R. Guillaumin (Inst. Tech. des Corps Gras, Paris, France). *Riv. Ital. Sostanze Grasse* 44, 278–82 (1967). A review of current refining technology.

CURRENT AND POTENTIAL USES OF ANIMAL FATS IN RELATION TO THEIR QUALITY. A. Uzzan (Inst. Tech. des Corps Gras, Paris, France). *Riv. Ital. Sostanze Grasse* 44, 283–7 (1967). The characteristics are surveyed which fats must possess for use in margarine and shortening manufacture, in the bread, biscuits and pastry manufacture and in the food preservation industry. Industrial uses of animal fats are also discussed.

STUDIES ON OLIVE OIL EXTRACTION. J. M. Martinez Moreno (Inst. de la Grasa, Sevilla, Spain). *Riv. Ital. Sostanze Grasse* 44, 211–9 (1967). A review is offered of the research work being carried out since 1954 at the Instituto de la Grasa y sus Derivados in Sevilla, Spain. Among the results obtained to date are: extraction processes employing surfactants to improve the quantitative yield; development of laboratory techniques to determine extraction yields more exactly; the utilization of by-products; research into the genetic formation of oil in the olive. The finding that olives grown in uranium-bearing terrain contain appreciable amounts of uranium has led to the discovery of an important uranium deposit in Spain.

MOLECULAR DISTILLATION AS A METHOD OF SEPARATION IN THE VEGETABLE OIL INDUSTRY. J. Hollo and E. Kurucz (Tech. Univ. of Budapest, Budapest, Hungary). *Riv. Ital. Sostanze Grasse* 44, 249–59 (1967). The results of pilot plant experiments employing molecular distillation for the refining of vegetable oils are reported. Using sunflowerseed oil, very satisfactory results have been obtained after 1–3 passes through a molecular still at temperatures in the 60–100C range, with acidity and peroxide number comparable to or better than those obtained in conventional alkali refining. A lower loss of tocopherol has been measured by the molecular distillation technique. Operating on hardened oils, molecular distillation is also capable of producing a sharp separation of the isooleic acid created during hydrogenation.

A SIMPLE PROCEDURE FOR THE ESTIMATION OF VERY SMALL AMOUNTS OF NITROGEN IN LIPIDS. G. H. Sloane-Stanley (Royal College of Surgeons, London). *Biochem. J.* 104, 293–5 (1967). About 0.1 μg atom of combined nitrogen, present in lipids and a few other compounds, can be determined quantitatively by the gentle digestion of dry samples in 10 ml test tubes with perchloric acid for 30 min, followed by estimation of the resulting ammonia through the stable blue color (λ_{max} 635 mμ) produced by addition of phenol and nitroprusside, an alkaline phosphate buffer and alkaline hypochlorite. The results are linear with from 0.015 to 0.15 μg atoms of nitrogen, or up to 1 μg atom if the final solutions are diluted with water after full color development.

PREPARATION OF LIQUID SHORTENING AND PRODUCT. J. G. Endres and L. A. VanAkkeren (Armour and Co.). *U.S. 3,325,292.* In a process for preparing a liquid shortening a quantity of triglyceride oil is separated into two fractions, the first representing 25–50% and the second 75–50% of the oil. 6–10% emulsifier (based on final product) is added to the first fraction and 2–10% solid triglyceride (based on final product) is added to the second fraction. Both fractions are separately chilled and crystallized and then combined at a temperature between 50F and ambient to form a liquid shortening having a stable suspension of particulate fat solids in 85–90% liquid oil at temperatures in the 60–90F range.

PROCESS FOR REMOVING THE HALPHEN TEST RESPONSE FROM ALKALI REFINED COTTONSEED OIL. E. T. Rayner and H. P. Dupuy (U.S. Sec'y of Agr.). *U.S. 3,326,947.* A process for eliminating the Halphen test response in alkali refined cottonseed oil comprises (1) treating the alkali refined cottonseed oil in an inert atmosphere at a temperature of 235C for about two hours with at least about four equivalents, based on the cycloprene acid content of the oil, of a member selected from the group consisting of capric acid and cottonseed fatty acids, and (2) deodorizing by heating under vacuum at 235C for an additional period of about one hour.

SEPARATION OF TOCOPHEROLS AND STEROLS FROM DEODORIZER SLUDGE AND THE LIKE. F. E. Smith (Eastman Kodak Co.). *U.S. 3,335,154.* An improvement is claimed in the process for separating sterols and tocopherols from a deodorizer sludge containing an esterification reaction mixture consisting essentially of an esterification catalyst, water, sterols, tocopherols, a lower monohydric aliphatic alcohol and its fatty acid esters. The improvement consists in separating substantially all of the sterols from the mixture without prior distillation by admixing sufficient water to give a mixture having a water concentration from 5 to 60% by wt., while maintaining a temperature from 0 to 40C, thus causing substantially all of the sterol to crystallize out, leaving a two-phase mixture with an aqueous phase consisting of water, alcohol and esterification catalyst, and an oil phase consisting of the tocopherols and fatty acid esters of the alcohol. The two phases are separated and the esters are removed from the oil phase, yielding a high purity tocopherol concentrate.

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• Fatty Acid Derivatives

PERACID TYPE POLYMER. III. PREPARATION OF PERACID TYPE POLY-P-VINYLBENZOIC ACID AND ITS APPLICATION TO EPOXIDATION. Tōru Takagi and Minoru Kobayashi (Nagoya Univ.). *Yukagaku* **16**, 462–7 (1967). Poly-p-vinylbenzoic acid ion exchange resin was synthesized. This was converted into peracid type resin by use of hydrogen peroxide and methanesulfonic acid. The peracid type resin of oxidation capacity 2.13 meq./g. was obtained and the conversion of COOH to COOOH was 48.4% under the best condition. The conversion of COOH to COOOH was increased from 15 to 30% with an increase in the degree of cross-linking from 1 to 40%. The conversion rate was relatively slow in comparison with peracid type Amberlite XE 89, but the loss in the conversion was slight. The stability in air was better than that of peracid type XE 89 in benzene, methanol and dioxane at 40°C. Cyclohexane and methyl oleate were epoxidized by peracid type resin in the yields of 50–60%.

CHLOROPHOSPHONATION OF SATURATED FATTY ACID. Satoshi Nakasato, Katsuhiko Higuchi and Kenzi Morita. *Yukagaku* **16**, 457–61 (1967). Laurie acid was chlorophosphonated with 0.3 mole of phosphorous trichloride per 0.15 mole of lauric acid, followed by introduction of dry oxygen into the solution with the flow rate of 70 ml/min for 3 hrs. The product was distilled *in vacuo* after treating with methanol and the residue was fractionated by silica gel column chromatography. The product was confirmed as monophosphonolauric acid by analysis and potentiometric titration. Comparison of NMR and IR spectroscopic analysis of the product with the spectra of synthesized α-phosphonolauric acid indicated that the chlorophosphonation occurred on carbons other than α- and terminal carbons in the alkyl chain.

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SYNTHESIS OF MIXED GLYCERIDES. J. E. Thompson (Procter & Gamble Co.). *U.S. 3,337,596*. A process is described for synthesizing specific mixed triglycerides from partial glycerol esters in such manner that substantially no ester group rearrangement occurs. The process comprises reacting a partial glycerol ester derived from a C_8 to C_{22} monocarboxylic acid with a molar excess of an unsymmetrical acid anhydride having the structural formula: XCOOY where X is either an alkyl or an alkenyl radical with 7 to 21 C atoms, and Y is an organic radical selected from the group consisting of benzoyl, p-nitrobenzoyl and phosphoryl radicals having the structural formula $(RO)_2\overset{|}{P}\rightarrow O$, where R is either phenyl or a C_1 to C_5 saturated alkyl radical. The reaction is carried out in the presence of a perchloric acid catalyst, the molar ratio of catalyst to anhydride exceeding about 0.01 to 1.

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News of Federation for Paint Technology

New Officers Announced

H. L. Fenburr, Chief Engineer of Hanna Paint Mfg. Co., Columbus, Ohio, became the 46th President of the Federation of Societies for Paint Technology on Oct. 17, 1967, during the Federation's 45th Annual Meeting in Minneapolis, Minn.

M. E. Schleicher, of McDougall-Butler Co., Inc., Buffalo, N. Y., was named President-Elect and W. W. Vasterling, of Davis Paint Co., N. Kansas City, Mo., was elected Treasurer.

C. Homer Flynn Fund Grows

Contributions to the C. Homer Flynn Memorial Scholarship Fund during 1967 have amounted to $640. The contributions were made by: F. K. Daniel; M. A. Glaser; New England Society for Paint Technology; Pacific Northwest Society for Paint Technology; and Piedmont Society for Paint Technology.

The C. Homer Flynn Memorial Scholarship Fund was founded by the Federation in 1964, in memory of C. Homer Flynn, late Executive Secretary. Purpose of the fund is to provide scholarships to meet tuition or any other costs of college, postgraduate, professional or any other education of deserving students: a) who are preferably children of persons associated with the protective coatings industry; or b) who have indicated an interest in protective coatings technology. Wherever possible, scholarships are placed in locations where they can be administered by one of the Federation's Constituent Societies.

The first scholarship was presented in 1966 to Richard Cooper, of Newark College of Engineering, Newark, N.J.

The second scholarship was awarded to T. A. Valerio, Pratt Institute, Brooklyn, N.Y., earlier this year.

The Federation's 1967 Scholarship Committee is composed of Chairman C. M. Scholle, E. J. Dunn, Jr., H. L. Fenburr, H. B. Gough, R. W. Matlack, M. E. Schleicher, and R. A. Williams.

1968 Annual Meeting and Paint Show

The 46th Annual Meeting and 33rd Paint Industries' Show of the Federation of Societies for Paint Technology will be held at the Hotel Americana in New York City, October 23–26, 1968.

The Program Committee will be headed by Frank O'Dea, of Swing Paints, Ltd., Montreal, Que.

S. L. Davidson, of National Lead Co., Hightstown, N.J., and Moe Bauman, of Farnow, Inc., South Kearny, N.J., will be Co-Chairmen of the Host Committee.

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STERILE MONO- AND DIGLYCERIDE PHARMACEUTICAL VEHICLE PRODUCT FOR WATER AND/OR OIL-SOLUBLE THERAPEUTIC SUBSTANCES. V. K. Babayan (Drew Chemical Corp.). *U.S. 3,331,742*. A method for preparing for sterilization and maintaining sterility of a therapeutic composition and for imparting germistatic and bacteriostatic properties comprises dissolving a water- and/or oil-soluble therapeutic substance in a mono- and diglyceride partial ester of at least one saturated fatty acid having 2 to 12 C atoms with a polyhydric alcohol, sterilizing, and introducing the sterilized composition into an environment where molds, spores and similar organisms are able to survive and thrive.

PREPARATION OF POLYMERIC PLASTICIZERS FROM TALL OIL FATTY ACIDS. G. L. Braude (W. R. Grace & Co.). *U.S. 3,337,594*. An improvement is claimed in the continuous process for the production of polymeric plasticizers from tall oil fatty acids in which the said acids are ozonized, oxidized, purified and esterified with propylene glycol. The improvement consists in conducting the purification step by condensing the fatty acids at 100–200C for 15–60 minutes with a condensation agent such as silica, alumina or aluminum chloride, in an amount of 0.1–10 pounds per hour of condensation agent for each 100 pounds of fatty acids.

SYNTHESIS OF MIXED GLYCERIDES. J. E. Thompson (Procter & Gamble Co.). *U.S. 3,337,596*. A process is described for synthesizing specific mixed triglycerides from partial glycerol esters in such manner that substantially no ester group rearrangement occurs. The process comprises reacting a partial glycerol ester derived from a C_8 to C_{22} monocarboxylic acid with a molar excess of an unsymmetrical acid anhydride having the structural formula: XCOOY where X is either an alkyl or an alkenyl radical with 7 to 21 C atoms, and Y is an organic radical selected from the group consisting of benzoyl, p-nitrobenzoyl and phosphoryl radicals having the structural formula $(RO)_2\overset{|}{P}\rightarrow O$, where R is either phenyl or a C_1 to C_5 saturated alkyl radical. The reaction is carried out in the presence of a perchloric acid catalyst, the molar ratio of catalyst to anhydride exceeding about 0.01 to 1.

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• Biochemistry and Nutrition

EFFECT OF DIETHYLSTILBESTROL ON ENERGY AND PROTEIN UTILIZATION BY CHICKS FED A DIET HIGH IN FAT CONTENT. L. B. Carew, Jr. and F. W. Hill (Dept. of Poultry Sci. and Grad. School of Nutr., Cornell Univ., Ithaca, N. Y.). *J. Nutr.* 92, 393–8 (1967). Comparative studies were made of the effect of diethylstilbestrol on the utilization of dietary energy and protein by chicks fed diets containing glucose or corn oil as the major energy component. The metabolizable energy value of the high fat diet was decreased, but metabolic efficiency of energy utilization increased, by treatment of chicks with diethylstilbestrol. Restriction of energy intake amplified the depressive effect of diethylstilbestrol on metabolizable energy yield, and in itself caused a depression in metabolizable energy value of the high fat diet. Diethylstilbestrol treatment of chicks markedly decreased nitrogen retention at restricted levels of energy intake when the high fat diet was used. None of these effects was observed when glucose was the major dietary energy component. It is concluded that the effect of estrogens on certain metabolic processes is influenced by the form in which dietary energy is supplied.

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ACCUMULATION AND ELIMINATION OF DIETARY GOSSYPOL IN THE ORGANS OF RAINBOW TROUT. J. N. Roehm, D. J. Lee and R. O. Sinnhuber (Dept. of Food Sci. and Technol., Oregon State Univ., Corvallis, Oregon). *J. Nutr.* 92, 425–8 (1967). A study was made to determine the pattern of accumulation and elimination of dietary gossypol from various organs of rainbow trout. Young fingerling trout were fed purified diets containing gossypol at levels of 250 and 1000 ppm. Fish fed 1000 ppm gossypol for 18 months accumulated large amounts of gossypol in their tissue, with the highest concentration being in the liver and the lowest in the muscle tissue. After the fish had received a gossypol-free recovery diet for 10 weeks, these tissue levels were only partially depleted, with the free gossypol levels being lowered much more than the bound. The bound gossypol content of the liver was not significantly reduced over this 10-week period. Fish raised with a gossypol-free control diet for 9 months and then fed 1000 ppm dietary gossypol for 2 months accumulated much lower levels of free gossypol in their organs, but levels of bound gossypol approached those of fish fed gossypol for 18 months. Fish fed 250 ppm dietary gossypol for 12 months accumulated lower concentrations of gossypol in their organs. In all cases, the liver accumulated the highest concentration of gossypol.

METABOLISM OF THE GEOMETRIC ISOMERS OF LINOLEIC ACID IN THE RAT. O. S. Privett, E. M. Stearns, Jr. and E. C. Nickell (Univ. of Minnesota, The Hormel Inst., Austin, Minn.). *J. Nutr.* 92, 303–10 (1967). Studies are reported on the extent and mode of conversion of the geometric isomers of linoleic acid in the rat. Conversion of the *trans*-9,*trans*-12-isomer of linoleic acid to the 20:4 species was virtually nil; in fact, this compound appeared to function as an antimetabolite in the conversion of oleic and palmitoleic acids. The conversion of *trans*-9,*cis*-12-linoleic acid to 20:4 acids likewise was very inefficient indicating that a *cis* double bond in the 9-position is required for the interconversion of polyunsaturated fatty acids. Determination of the specific position of the *trans* double bond in the tetraene isolated from animals fed *cis*-9,*trans*-12-linoleate indicated it was converted to 20:4 by the same pathway as all-*cis* linoleic acid. However, its conversion to 20:4 was not nearly as efficient as linoleic acid.

METABOLISM OF BUTYRATE-3-^{14}C IN THE RUMINANT UNDER VARIOUS METABOLIC STATES. L. A. Menahan, L. H. Schultz and W. G. Hoekstra (Depts. of Dairy Sci. and Biochem., Univ. of Wisconsin, Madison). *J. Dairy Sci.* 50, 1417–28 (1967). The metabolism of butyrate-3-^{14}C administered intraruminally to goats either fasted and phlorizined, fasted, or fasted and pregnant was studied under conditions of butyric acid loading. In addition, tracer amounts of butyrate-3-^{14}C were infused intraruminally to a fed goat. The specific activity of the plasma and urine ketones compared to rumen butyrate indicated that butyrate contributed at least 20–40% to the production of both β-hydroxybutyrate and acetoacetate plus acetone, in both the fed and fasted ruminant. When ketone body accumulation from butyrate was minimal, as in the fed and fasted non-pregnant ruminant, the total incorporation of the label from butyrate-3-^{14}C into plasma glucose and liver glycogen increased relative to that found in the ketotic ruminants, but in no animals were major amounts of butyrate-^{14}C incorporated into glucose or glycogen. The contribution of rumen butyrate or its metabolites to carbon dioxide production in the fasting ruminant under butyrate loading amounted to 15–20%.

CHEMICAL, PHYSICAL, AND BIOLOGICAL PROPERTIES OF A LIPOPOLYSACCHARIDE FROM ESCHERICHIA COLI K-235. F. C. McIntire, H. W. Sievert, G. H. Barlow, R. A. Finley and Agnes Y. Lee (Molecular Biology Dept., Res. Div., Abbott Labs., North Chicago, Illinois). *Biochemistry* 6, 2363–72 (1967). Studies on a lipopolysaccharide (LPS) from the cells of *E. coli* K-235 were focused upon the relationship of toxicity, pyrogenicity, and antibody neutralization to the state of aggregation, molecular charge and lipid content. Disaggregation to a unit of 400,000 mol wt was achieved by three different procedures: 1) removal of esterified fatty acids by alkaline hydroxylaminolysis, 2) the introduction of approximately 200 succinyl groups/molecule, and 3) dissolution with an equal weight of sodium dodecyl sulfate (SDS). Succinylation markedly increased the anionic character of LPS. Both succinylation and the removal of lipid gave high yields of completely water-soluble products which showed surprisingly little evidence of heterogeneity. A high degree of molecular asymmetry is indicated by very low $S_{20,w}$ values in relation to light-scattering figures for molecular weights. Disaggregation by SDS did not decrease pyrogenicity in the rabbit. Compared to LPS dissolved with SDS, the succinyl derivative showed no great loss of pyrogenicity and toxicity, but there was a marked loss of ability to neutralize antibody to LPS. The removal of lipid resulted in a very great loss of pyrogenicity and toxicity, but only slight loss of antibody-neutralizing ability.

CONTROL OF LIPOGENESIS IN ADIPOSE TISSUE OF FASTED AND FED MEAL-EATING RATS. G. A. Leveille (Div. of Nutr. Biochem., Dept. of Animal Sci., Univ. of Ill., Urbana, Ill.). *J. Nutr.* 92, 460–6 (1967). The capacity of adipose tissue from meal-eating rats (animals having access to food for a single daily 2-hour period) to incorporate acetate-1-^{14}C into fatty acids *in vitro* was markedly stimulated by ingestion of the daily meal. Adipose tissue of fed meal-eating rats (killed after the daily meal) was found to contain more glycogen and less fatty acids than tissue from animals killed before the daily meal (fasted). These data suggest that lipogenesis is inhibited in adipose tissue of fasted meal-eating rats by the elevated level of free fatty acids (or fatty acyl CoA) and that glucose (supplied by ingestion of the daily meal or by addition to the incubation medium *in vitro*) stimulates fatty acid esterification by conversion to α-glycerophosphate, thereby lowering the level of free fatty acids and removing their inhibitory effects. In accord with this mechanism it was shown that pyruvate can stimulate *in vitro* fatty acid synthesis in adipose tissue of fasted meal-eating rats and that this stimulatory effect is related to the conversion of pyruvate to α-glycerophosphate. Data are also presented demonstrating that glucose is a more effective precursor of α-glycerophosphate in rat adipose tissue than is pyruvate and that glucose is apparently utilized preferentially when both substrates are available. The possible physiological significance of these observations in the meal-fed rat is discussed.

• *Finished-Product Testing . . .*

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1st speed No. 1, adding ½ of part (2) during the first 20 seconds. Add part (3), and cream one minute at 1st speed. Cream one minute at speed No. 1, adding the remaining half of part (2) during the first 20 seconds. Ccrape down and cream five additional minutes at speed No. 1 (total creaming time 12 minutes).

Measure and record the specific gravity of the batter.

Scale 510 g into each of three paper-lined pans.

Bake approximately 70 min at 360F in hearth oven.

Remove from pans immediately after removed from oven.

Allow to cool to room temperature before measuring volume.

Report

Batter gravity

Cake volume (1375 cc min)

Any unusual appearance of batter of cake

(The first measurement is a batter gravity, which is a measure of a specific gravity of the batter after the prescribed mixing-time just prior to baking. The second parameter measured is the volume of the cake, which may be found by either the so-called rapeseed displacement method or by measuring. Any unusual appearance on the batter of the cake is also noted. It is possible that a cake may pass both the batter gravity test and the volume test but fail because of the appearance of the cake.)

Other Tests

Specialized shortenings, such as a high-absorption shortening, may be tested by baking a 140% sugar white cake under standardized conditions, which again is a stringent test for a so-called high-absorption or "high-ratio" shortening.

Further tests run in a bake shop may be with icing shortenings. Again, a prescribed procedure is followed, and actual icing is made with the shortening. Again the specific gravity of the final product is measured to give an indication of the creaming property of the icing shortening.

Only a few of the tests which may be used to evaluate performance have been discussed. Others which might be considered are frying tests, preparation of mayonnaise or salad dressing, preparation of puff pastry, preparation of cake mixes, evaluation of emulsifiers, or any other test that will emulate end-use performance.

Reporting

The final area to be covered is reporting of results and record-keeping. Every laboratory has some type of system, and no particular one is suitable for all. This detail is sometimes neglected or allowed to grow without thoughtful direction. There are two major concerns. Do the results go to the right place and receive prompt action? Do the records allow quick retrieval of needed information? If the answer is not "yes," then the matter should be reviewed and revised until the answers are in the affrmative.

It is hoped that this presentation will be useful in bringing attention to areas which are sometimes not given the necessary attention. If it has caused some reflection on these matters, the intent has been fulfilled.

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• Biochemistry and Nutrition

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VITAMIN A, SULFATION AND BONE GROWTH IN THE CHICK. E. Havivi and G. Wolf (Dept. of Nutr. and Food Sci., Mass. Inst. of Technol., Cambridge, Mass.). *J. Nutr.* 92, 467–73 (1967). The enzyme ATP-sulfurylase, though present in chick liver, brain and spinal cord, was not affected by vitamin A deficiency. However, the vitamin deficiency caused increased organic (but not inorganic) deposition in chick bone, increased water content and increased total wet weight of bones. Chondroitin sulfate, as measured by uronic acid concentration and sulfate uptake, was higher in the epiphyses of deficient bone. Tricarboxylic acid cycle and glycolysis reactions and uptake of amino acids into protein took place at a higher rate in deficient bone. No differences were found for collagen formation. These results suggest that the increased metabolic activity of deficient bone may accompany some form of overgrowth of the deficient bones, possibly of the intercellular matrix.

THE ENZYMATIC CONVERSION OF ALL-TRANS β-CAROTENE INTO RETINAL. D. S. Goodman, Helen S. Huang, Masamitsu Kanai, and T. Shiratori (Dept. of Med., Columbia Univ. College of Physicians and Surgeons, New York, New York 10032). *J. Biol. Chem.* 242, 3543–54 (1967). Studies were conducted dealing with the cleavage *in vitro* of β-carotene into 2 molecules of retinal. The cleavage reaction was catalyzed by a soluble enzyme, from rat intestinal mucosa, which was partially purified by precipitation with ammonium sulfate between 20 and 45% saturation. Addition of an appropriate detergent was required in order to effect the conversion *in vitro* of β-carotene into retinal. In the absence of bile salt or synthetic detergent no enzyme activity was seen. In the absence of added lipids, the reaction was stimulated by the addition of cell particles to incubations containing bile salt. The particles apparently functioned to provide membrane-bound lipids, and were able to stimulate the reaction to the same maximal rate as that obtained by the addition of an effective detergent-lipid combination.

THE BIOSYNTHESIS OF CELL WALL LIPOPOLYSACCHARIDE IN ESCHERICHIA COLI. R. D. Edstrom and E. C. Heath (The Dept. of Physiological Chem., The Johns Hopkins Univ. School of Med., Baltimore, Maryland 21205). *J. Biol. Chem.* 242, 3581–3588 (1967). *E. coli* J-5, a uridine diphosphate galactose 4-epimeraseless mutant of *E. coli* 0111-B4, produces a cell wall lipopolysaccharide which lacks galactose and colitose (3,6-dideoxyl-L-xylohexose) and contains reduced quantities of glucose and N-acetylglucosamine. With the use of a particulate fraction of the cell envelope of this mutant (which contains glycosyl transferases and lipopolysaccharide acceptor), the transfer of galactose, glucose, N-acetylglucosamine, and colitose to the incomplete lipopolysaccharide was demonstrated.

DISCOVERY OF UBIQUINONES-1, -2, -3, AND -4 AND THE NATURE OF BIOSYNTHETIC ISOPRENYLATION. G. D. Daves, Jr., R. F. Muraca, J. S. Whittick, P. Friis and K. Folkers (Stanford Res. Inst., Menlo Park, Calif.). *Biochemistry* 6, 3861–5 (1967). High-sensitivity mass spectrometry of paper chromatographically pure samples of the dominant ubiquinone from three diverse microorganisms has revealed the presence of trace amounts of ubiquinones-1, -2, -3, and -4. The presence of these ubiquinones in bacteria was confirmed by special chromatographic techniques using paraffin-impregnated thin-layer plates. Ubiquinones-1, -2, -3, and -4 have previously been known by synthesis, but not by natural occurrence. There is no absolute structural specificity in certain species for the biosynthetic formation of a single multiprenyl pyrophosphate or in its reaction with *p*-hydroxybenzoic acid. Instead, biosynthetic isoprenylation takes place so that a series of ubiquinones are formed in which the number of isoprene units contained in the side chains varies from the number of units in the dominant ubiquinone for a given species (6, 8, or 10 for the species studied) to one. The relative concentrations of the ubiquinones diminish with diminishing chain length.

EFFECT OF LIGHT INTENSITY ON THE LIPID COMPOSITION OF EUGLENA GRACILIS. G. Constantopoulos and K. Bloch (Conant Lab., Harvard Univ., Cambridge, Mass. 02138). *J. Biol. Chem.* 242, 3538–42 (1967). Cultures of the phytoflagellate *E. gracilis* were grown at light intensities varying from 120 to 610 footcandles. With increasing light intensity, the con-

tent of chlorophyll and of total lipids declined, whereas the percentage of 4,7,10,13-hexadecatetraenoic acid and of α-linolenic acid rose sharply. The increased content of the two polyunsaturated fatty acids was even more pronounced in the chloroplast lipids and was greatest when the monogalactosyl glyceride fraction was analyzed separately. In *Euglena*, in spinach, and in *Chlorella vulgaris* all of the C_{16} polyunsaturated acids and the major portion of α-linolenic acid are localized in the monogalactosyl glyceride fraction. The finding that Hill reaction activity and lipid unsaturation show the same response to change in light intensity is discussed with respect to the possible role of polyunsaturated fatty acids in photosynthetic oxygen evolution.

EFFECTS OF DIETARY SAFFLOWER OIL OR HYDROGENATED COCONUT OIL ON GROWTH RATE AND ON SOME BLOOD AND TISSUE COMPONENTS OF PIGS FED A FAT-FREE DIET. G. M. Babatunde, W. G. Pond, L. Krook, L. D. Van Vleck, E. P. Walker, Jr. and P. Chapman (Dept. of Animal Sci., New York State College of Agr. and N. Y. State College of Vet. Med., Cornell Univ., Ithaca, N. Y.). *J. Nutr.* **92**, 293–302 (1967). The effects of feeding diets containing no fat, 3% hydrogenated coconut oil (HCO) or graded levels (0.1, 0.5, 1.0 or 3%) of safflower oil (SO) on serum cholesterol, lipids and protein level; on total heart and liver cholesterol and lipid level on growth rate and skin condition were studied in weanling Yorkshire and Yorkshire × Hampshire pigs. Pigs fed the fat-free diet for 21 weeks developed severe skin lesions not observed in pigs fed HCO diets. Highly significant elevation of serum, liver and heart lipid and liver cholesterol, and a highly significant depression of total serum protein were observed with the feeding of HCO or fat-free diets. Serum cholesterol was significantly increased by HCO as compared with the fat-free diet or diets containing SO during the repletion period. Total heart cholesterol, growth rate and erythrocyte fragility were unaffected by diets. It is concluded that growth rate is not adversely affected in the pig by fat-free diets and that HCO does not produce skin lesions in the pig characteristic of fatty acid deficiency. Of all the correlation coefficients analyzed, only the serum cholesterol and total serum lipids were consistently highly significantly correlated, while serum protein was significantly inversely related to the total liver lipid.

SUBSTRATE SPECIFICITY OF O-L-LYSYLPHOSPHATIDYLGLYCEROL SYNTHETASE. ENZYMATIC STUDIES ON THE STRUCTURE OF O-L-LYSYLPHOSPHATIDYLGLYCEROL. W. J. Lennarz, P. P. M. Bonsen, and L. L. M van Deenen (Dept. of Phys. Chem., the Johns Hopkins Univ. School of Med., Baltimore, Maryland). *Biochemistry* **6**, 2307–12 (1967). A particulate enzyme fraction, prepared from crude extracts of *Staphylococcus aureus*, catalyzes the formation of L-O-lysyl-^{14}C-phosphatidylglycerol upon addition of L-lysyl-^{14}C-tRNA. Treatment of this enzyme fraction with organic solvents to remove endogenous lipids yields a preparation which has a marked requirement for the addition of phosphatidylglycerol in the enzymatic synthesis of L-O-lysyl-^{14}C-phosphatidylglycerol from L-lysyl-^{14}C-tRNA. Specificity studies with a variety of natural and synthetic phospholipids indicate that the enzymatic transacylation reaction is highly specific for phosphatidylglycerol. A variety of analogs of phosphatidylglycerol, including 2′-deoxy- and 3′-deoxyphosphatidylglycerol, have been prepared with the use of phospholipase D. Tests on the ability of these compounds to serve as substrates in the enzymatic formation of lysylphospholipids have revealed that only 2′-deoxyphosphatidylglycerol (not 3′-deoxyphosphatidylglycerol) can serve as an acceptor of the lysyl group. These results indicate that the enzymatic amino-acylation occurs on the primary (3′) hydroxy group of the glycerol moiety of phosphatidylglycerol, and that the structure of the enzymatically formed lipid is 3-phosphatidyl-1′-(3′-O-L-lysyl)glycerol.

MECHANISMS OF SYNTHESIS OF WAXY ESTERS IN BROCCOLI (BRASSICA OLERACEA). P. E. Kolattukudy (Dept. of Biochem., The Connecticut Agr. Expt. Station, New Haven, Conn.). *Biochemistry* **6**, 2705–17 (1967). Broccoli (*Brassica oleracea*) leaf is shown to contain enzymes capable of synthesizing waxy esters from fatty alcohols by direct esterification with fatty acids and by an acyl transfer from phospholipids and acyl coenzyme A (acyl-CoA). Young broccoli leaves readily incorporated stearyl alcohol-U-^{14}C mostly into waxy esters. The major part of the esterifying activity of broccoli leaf homogenate was located in the soluble proteins, but this system was not stimulated by addition of ATP, CoA and palmitic acid, or of palmityl-CoA.

THE HISTOCHEMISTRY AND ULTRASTRUCTURE OF LIPID PIGMENT IN THE ADRENAL GLANDS OF AGING MICE. T. Samorajski and J. M. Ordy (Cleveland Psychiatric Inst., Cleveland, Ohio 44109). *J. Gerontology* **22**, 253–63 (1967). Histologic, histochemical and ultrastructural investigation was undertaken with an inbred strain of C57BL/10 female mice to examine the formation of lipid within cells of the adrenal glands at 4, 8, 20 and 30 months of age. Qualitative histochemical comparisons revealed that the pigment and parenchymal cells of the inner zona reticularis contained a variety of lipids, including cholesterol and/or cholesterol ester, sphingolipids, phosphoglycerides, a strongly acid lipid, and probably triglyceride. Reactions specific for lipid pigment included positive staining for sulfatides, peroxidases, and vicinal polyhydroxyl groups. Primary fluorescence of lipid pigment only was observed during irradiation of unstained sections with near ultraviolet light. The results of the present study are in general accord with previous observations suggesting that pigment deposition may originate in cells of the inner portion of the adrenal cortex and that they may be of endogenous origin.

RELATIONSHIP OF GLYCERYLPHOSPHORYLCHOLINE TO OTHER CONSTITUENTS OF BULL SEMEN. K. L. MacMillan, C. Desjardins, K. T. Kirton and H. D. Hafs (Dept. of Dairy, Mich. State Univ., East Lansing). *J. Dairy Sci.* **50**, 1310–13 (1967). Glycerylphosphorylcholine (GPC), sperm numbers, fructose and citric acid were measured in semen samples collected from five mature bulls twice every Monday and twice every Thursday for six weeks. Seminal GPC was significantly correlated with a) the numbers of sperm in first and second ejaculations ($r = 0.72$ and 0.53, respectively), b) the volume of semen of both ejaculations ($r = 0.62$ and 0.49, respectively), and c) the seminal content of fructose ($r = 0.41$ and 0.43, respectively) and citric acid ($r = 0.55$ and 0.33, respectively). Glycerylphosphorylcholine in the semen was 14% greater after a four day interval between ejaculations than after a three-day interval; none of the other measured constituents differed significantly in this respect. The results suggested that epididymal resorption of sperm was proportionately more rapid than that of GPC, and that measurement of both of these parameters in future experiments may provide simultaneous information on the secretory and resorptive functions of the epididymis.

THE LINOLEIC ACID REQUIREMENT OF CHICKS. D. T. Hopkins and M. C. Nesheim (Dept. of Poultry Sci. and Grad. School of Nutr., Cornell Univ., Ithaca, N. Y. 14850). *Poultry Sci.* **46**, 872–3 (1967). In two experiments using highly purified sources of linoleic acid, the linoleic acid requirement of chicks was estimated to be approximately 0.8 to 1.4% of the diet. Chicks used in these experiments were from hens fed diets low in linoleic acid. The response in early growth to linoleic acid was considerably greater in chicks from linoleic acid depleted hens compared to those from hens receiving safflower oil in their diet. Linoleic acid deficiency in chicks resulted in reduced growth rate, enlarged livers and increased fat content of livers compared to chicks receiving adequate levels of linoleic acid. The linoleic acid content of livers of chicks fed diets low in linoleic acid decreased to a very low level and accumulation of 5,8,11-eicosatrienoic acid in liver lipids was observed. A highly purified source of oleic acid improved growth rate of chicks deficient in linoleic acid but had no effect on other signs of linoleic acid deficiency.

LIPID COMPOSITION OF THE CARCASS OF MICE BEARING THE KREBS-2 CARCINOMA. C. Caruthers (Biochem. Res. Dept., Roswell Park Memorial Inst., Buffalo, N. Y. 14203). *Proc. Soc. Exptl. Biol. Med.* **125**, 953–7 (1967). The lipid composition of the carcass of mice bearing the Krebs-2 carcinoma for periods varying from 1 to 5 weeks was determined. The only change of questionable significance occurred after 5 weeks of tumor growth at which time the carcass neutral lipids were decreased and the phosphatides were increased. Prior to the 5th week the neutral lipids increased somewhat. No change was found in the amount of carcass neutral lipid classes—the triglycerides, sterol esters, cholesterol, mono- and diglycerides and free fatty acids—as a result of the growth of the Krebs-2 carcinoma. Furthermore no significant change was found in the fatty acid composition of the free fatty acids, sterol esters and triglycerides of the carcass lipids following growth of the carcinoma from 1 to 5 weeks.

PREVENTION OF CHOLESTEROL-INDUCED HYPERCHOLESTEROLEMIA AND ATHEROSCLEROSIS IN RABBITS BY AN ACTIVE PEROXIDASE SUBUNIT FROM HEPATOCATALASE. Josefina Caravaca, C. Velasco

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and E. G. Dimond (Inst. for Cardiopulmonary Diseases, Scripps Clinic and Res. Found., La Jolla, Calif. USA). *J. Athero. Res.* **7**, 355–360 (1967). Hepatocatalase peroxidase (HCP), an active peroxidase oxidase subunit isolated from beef liver catalase, prevented cholesterol-induced hypercholesterolemia and atherosclerosis in rabbits with no apparent toxicity or undesirable side-effects. No allergic or immunological reactions were observed throughout a 15-week period of daily treatment with parenteral HCP.

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EXCRETION OF PHOSPHOLIPIDS BY MEN ON FAT-FREE DIET. S. S. Ali and A. Kuksis (Banting and Best Dept. of Med. Res., Univ. of Toronto, Toronto, Ontario). *Can. J. Biochem.* **45**, 689-702 (1967). The fecal excretion of phospholipids was determined in three adult males during the last 4 days of three 8 to 16 day periods on a fat-free diet. The phospholipids were isolated and identified by column and thin-layer chromatography on silicic acid. The individual phospholipids were quantitatively estimated by gas chromatographic determination of the component fatty acids, using methyl heptadecanoate as internal standard. The range of total excretion of phospholipids was 64–100 mg/day per 100 g of dry feces. In all samples, the major phospholipids were tentatively identified as phosphatidyl ethanolamine, phosphatidyl glycerol, and phosphatidyl inositol. Phosphatidyl ethanolamine made up 31–41% of the total lipid excretion. All the phospholipids contained about the same fatty acids (C_{14}–C_{27}), but in somewhat varying proportions. Because of the occurrence of large amounts of the odd carbon number, among both branched and long chain fatty acids, which are not commonly associated with mammalian metabolism, the presence of phospholipids in the feces was attributed to bacterial synthesis.

EXCRETION OF PHOSPHOLIPIDS BY MEN ON HIGH FAT DIETS. *Ibid.*, 703–714. The fecal excretion of phospholipids was determined in three adult males during the last 4 days of eight dietary periods of 8–16 days on high corn oil and butterfat diets (35–60% of calories from fat). The phospholipids were isolated, identified and quantitatively estimated by a combination of column, thin-layer, and gas chromatographic techniques. On both high fat diets, the chief components of the fecal phospholipid mixtures were tentatively identified as phosphatidyl glycerol, phosphatidyl ethanolamine, phosphatidyl choline and phosphatidyl inositol. The output of total phospholipids in three subjects on butterfat ranged between 33 and 168 mg/day. Substitution of hydrogenated corn oil (45% of calories) and corn oil (60% of calories) for butterfat (35–60% of calories) led to increased excretion of phospholipids, 300 and 430 mg/day, respectively, for hydrogenated and refined corn oil. Addition of sitosterol to a butterfat diet also led to increased phospholipid output (208 mg/day), as did the mixing of butterfat and corn oil (180 mg/day). The changes in the total output of the phospholipids were accompanied by alterations in the proportions of the individual phospholipids as well as of the component fatty acids. It is concluded that the ingestion of corn oil or plant sterol leads to increased fecal output of phospholipids, when compared with butterfat and fat-free diets. A change in the activity or the population of the intestinal flora is suggested to explain this observation.

GANGLIOSIDES IN DEVELOPING RAT BRAIN. ISOLATION AND COMPOSITION OF SUBCELLULAR MEMBRANES ENRICHED IN GANGLIOSIDES. M. W. Spenc and L. S. Wolfe (Donner Lab. of Exp. Neurochem. Montreal Neurological Inst., Montreal, Canada). *Can. J. Biochem.* **45**, 671–688 (1967). Neurones in the central nervous system of vertebrates contain considerable amounts of a complex group of acidic glycosphingolipids, the gangliosides. Determination of gangliosides, cholesterol, phospholipid phosphorus, neutral glycolipid hexose, and protein in developing rat brain showed that the deposition of gangliosides is predominately a premyelin event. A light membrane fraction enriched in gangliosides relative to protein was obtained from neonatal rat-brain crude mitochrondrial fractions by sucrose density-gradient centrifugations. Adult rat-brain fractions of similar density were not enriched in gangliosides because of the presence of myelin. If the initial homogenization and the separation of the crude mitochrondrial fraction were carried out in 0.32M sucrose at pH 9.2, the ganglioside enrichment of the light membrane fraction from both adult and neonatal rat brain was doubled. By further separation of the light membrane fraction on a second density gradient, particulate material was obtained from neonatal rat brain which consisted almost entirely of vesicular membrane elements. Based on dry weight, it contained gangliosides 7–9%, phospholipids 36–40%, cholesterol 5–7%, neutral glycolipids 1–3%, protein 28–29%, and cations (Na^+, K^+, Ca^{2+}, Mg^{2+}) 8%. This membrane fraction is likely derived from the neuronal plasma membrane or the endoplasmic reticulum.

THE LIVER PHOSPHOLIPIDS OF THE DEVELOPING CHICK EMBRYO. R. C. Noble and J. H. Moore (Nat. Inst. for Res. in Dairying, Shinfield, Reading, Great Britain). *Can. J. Biochem.* **45**, 627–639 (1967). The concentrations and fatty acid compositions of the individual phospholipids in the livers of chick embryos on the 13th, 15th, 17th, 19th and 21st days of incubation were compared with the concentrations and fatty acid compositions of the individual yolk phospholipids. The liver phospholipids contained higher proportions of the phosphatidyl ethanolamine, phosphatidyl serine, and disphosphatidyl glycerol, and lower proportions of phosphatidyl choline, than did the yolk phospholipids. There was a constant increment (0.96 mg/day) of phosphatidyl choline in the liver during the period of incubation studied. The phosphatidyl choline, phosphatidyl ethanolamine, and phosphatidyl serine of the liver generally contained higher concentrations of stearic, arachidonic, and docosahexaenoic acids, and lower concentrations of palmitic and oleic acids than did these phospholipid fractions in the yolk. The fatty acid compositions of the sphingomyelin in the liver and yolk were similar. The most pronounced changes in the fatty acid composition of the liver phospholipids during embryonic development were observed in the phosphatidyl choline fraction. These changes suggested that the α-palmitoyl-β-arachidonyl phosphatidyl choline in the liver was gradually replaced by α-stearoyl-β-linoleoyl phosphatidyl choline and α-stearoyl-β-docosahexaenoyl phosphatidyl choline.

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BACTERIAL PHOSPHATIDES AND NATURAL RELATIONSHIPS. M. Ikawa (Dept. of Biochemistry, Univ. of New Hampshire, Durham, New Hampshire). *Bacteriol. Revs.* **31**, 54–64 (1967). The phosphatide constituents of bacteria are summarized. Phosphatidylcholine and phosphatidylethanolamine, abundant in higher animals, are found in only a few groups of bacteria. Phosphatidylinositol seems to be absent from most bacteria excepting the Mycobacteria. The phospholipids comprising the major portion of lipids in bacteria are phosphatidylglycerol,

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• *New Literature*

E. H. SARGENT & Co. has prepared bulletin 129 on its series of Welch Duo-Seal vacuum pumps, including two-stage and single-stage models with vented exhaust, mechanical-diffusion combinations and the ultrahigh vacuum turbo-molecular pump. Sargent's bulletin AR describes its potentiometric recorders, including its selective range recorders, SR recorders for gas chromatography, SRL recorders for linear of log recording, and its MR multi-range recorders. (4647 W. Foster Ave., Chicago, Ill. 60630.)

GALLARD SCHLESINGER MFG. CORP. has a new technical bulletin listing indicator papers, reagent papers and test papers, manufactured by Macherey, Nagel & Company, Dueren, Germany, and now available in the United States. Also available are reagent papers for the determination of a wide variety of ions and radicals and special test papers for applications in food processing, sugar refining, dyestuff manufacture and virtually all chemical process industries. (584 Mineola Ave., Carle Place, L. I., New York, 11514.)

The new GELMAN-CAMAG preparative TLC kit has advantages over column chromatography for the separation of comparable quantities: speed; small volume of solvent required; ease of finding suitable solvents by trial runs on standard TLC layers; sharp and easily detected zones; ease in elution of separated compounds; ease of visualization of separated fractions; and greater homogeneity of each layer. (Information Department, Gelman Instrument Company, P. O. Box 1448, Ann Arbor, Mich. 48106.)

THE FLUOROCARBON COMPANY has published a new 16-page brochure on Teflon TFE resin fittings, valves, and pumps designed for fluid handling systems. The brochure includes technical data and prices of the products which are used to convey highly-corrosive or ultra-pure fluids, free from contamination and leaks. (1754 S. Clementine, Anaheim, Calif. 92803.)

BROOKS INSTRUMENT DIVISION, Emerson Electric Co., has available a new technical bulletin on a series of flow recorders that receive output signals directly from electromagnetic flowheads without the need of additional electronics. Designated the Model 7620 Series, Brooks-Mag Flow Recorders, these solid state, high system accuracy instruments can be used with any flowhead and are available in integrating and nonintegrating models. (Hatfield, Pa., 19440.)

The ROBERT L. STONE Co., Division of Tracor, Inc., is pleased to announce the availability of two new product bulletins describing their 202 series of DTA Laboratory Instruments. ST-104 is a 2-page bulletin outlining the various Sample Holders and Thermocouple Types available for the 202 Series DTA. A description of the exceptional Stone range of sample holders and thermocouples is provided along with a Material Specifications section delineating choice of materials. ST-104 describes the Stone components available for simultaneous DTA and Effluent Gas Detection.

Fluorescence News, Vol. 2. No. 4, a newsletter on fluorescence issued by the AMERICAN INSTRUMENT COMPANY, INC., features an article on the importance of sensitivity and specificity in fluorescence measurements, abstracts of papers presented at the University of Maryland-Aminco Symposium of Fluoresence, and regular features such as a bibliography of recent articles on fluorescence. (Free on request, American Instrument Company, Inc., 8030 Georgia Ave., Silver Spring, Md. 20910.)

PALMERTON PUBLISHING COMPANY INC., will provide two new industrial directories, covering the adhesives industries and the paint industry. The Adhesives Red Book will appear in February 1968 and the Paint Red Book will appear in June 1968. The two new directories will resemble Palmerton's Rubber Red Book, which has been published since 1936. (101 W. 31st St., New York, N. Y. 10001.)

A complete bound volume of the 15 papers presented at last June's Second Symposium on the Deposition of Thin Films by Sputtering is now available from CONSOLIDATED VACUUM CORPORATION, who co-sponsored the meeting with the University of Rochester. Among the contributors are: Jack Morton of Bell Telephone Laboratories, Patterson and Shirn of Sprague Electric, Rodite and Dreikorn of IBM, Groemel and Sapoff of Victory, M. P. Lepselter of Bell Labs, and N. L. Sigournay, Smith's Industries, England. (Price, $16.50. "Sputtering Transactions," Consolidated Vacuum Corporation, 1775 Mt. Read Blvd., Rochester, N. Y. 14603.)

E-C APPARATUS CORPORATION has released Technical Bulletin 128, containing illustrated instructions for assembly and operation of Vertical Gel Electrophoresis Cells. The 16-page booklet shows graphically many useful techniques for using this versatile laboratory instrument. Write to E-C Apparatus Corporation, 755 St. Mark's St., Philadelphia, Pa. 19104.

DREW CHEMICAL CORPORATION, New York, has released three bulletins:

A 24-page technical bulletin on Neobee Oils outlines the general descriptions, physiological properties, typical analyses, solubility tendencies, physical properties, applications and cosmetic formularies for Drew's Neobee Oils M5, 13, 0 (triglycerides) and M 20 and 3 (polyol diesters.)

An 8-page technical bulletin describes the typical characteristics, physical properties, solubility tendencies, cosmetic applications and formularies for Drew's isopropyl myristate and isopropyl palmitate.

A data sheet on butyl stearate describes the specifications, physical characteristics and solubility tendencies of Drew's cosmetic grade butyl stearate. (Drew Chemical Corp., Industrial Division, 522 Fifth Avenue, New York, N. Y., 10036.)

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and E. G. Dimond (Inst. for Cardiopulmonary Diseases, Scripps Clinic and Res. Found., La Jolla, Calif. USA). *J. Athero. Res.* **7**, 355–360 (1967). Hepatocatalase peroxidase (HCP), an active peroxidase oxidase subunit isolated from beef liver catalase, prevented cholesterol-induced hypercholesterolemia and atherosclerosis in rabbits with no apparent toxicity or undesirable side-effects. No allergic or immunological reactions were observed throughout a 15-week period of daily treatment with parenteral HCP.

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diphosphatidylglycerol and lipoamino acids. Phylogenetic relationships of bacterial groups are discussed and a rough relationship is set up among the Eubacteria based on Gram staining reaction, spore forming ability, ability to grow without oxygen and presence of phosphatidyl-choline and -ethanolamine.

IMPROVED ASSAY METHOD FOR PHOSPHOLIPASE C. S. Kurioka and P. V. Lui (Dept. of Microbiology, Univ. of Louisville, School of Medicine, Louisville, Kentucky). *Appl. Microbiol.* **15**, 551–555 (1967). Dispersal of a lecithin sol in the presence of calcium ions with deoxycholate was found to increase the speed of reaction of phospholipase C. An assay method for phospholipase C was developed where the acid soluble phosphate liberated by phospholipase C was converted to inorganic phosphate by alkaline phosphatase and assayed in this form.

ISOLATION AND PURIFICATION OF STAPHYLOCOCCAL LIPASES. D. V. Vadehra and L. G. Harmon (Dept. of Food Science, Michigan State Univ., East Lansing, Mich.). *Appl. Microbiol.* **15**, 292–295 (1967). An extracellular lipase was isolated from the culture fluid of *Staphylococcus aureus*. The lipase was purified 350–450 times by alcohol and pH fractionation with subsequent chromatography on Sephadex G200 and Biogel 300. The purified lipase gave a single peak on electrophoresis.

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• *New Books . . .*

(Continued from page 550A)

ture programming. The format of Volume 2 is identical to that of its predecessor in that a brief outline of the subject matter is prefixed to each paper, and the table of contents for the entire volume is a composite of these outlines. An effective author index at the end of the book cites all references used throughout the text, but I feel that it would also be helpful to have a more detailed subject index.

The contributors to this volume have excelled in reporting major developments and trends without sacrificing the details necessary for depth of understanding. In addition, the editors have successfully encouraged the authors to show their pertinent data in the form of figures and tables and to present their opinions of the specific status of developments, with the result that this volume represents much more than a mere cataloging of information already in the literature. This distinguishes the *Advances in Chromatographic* series from *Chromatographic Reviews,* a series initiated in 1959 strictly for the purpose of presenting review articles. The purpose of *Advances in Chromatography,* to critically evaluate major developments and to specifically summarize and focus the authors' own research efforts, has been successfully attained in Volume 2. It is highly recommended for researchers attempting to keep abreast of progress in the many diverse areas of chromatography. The wide variety of topics included in the series also makes it an excellent reference and survey source for those workers in other fields who must use chromatography.

FRED L. SNYDER, PHD
Oak Ridge Institute of Nuclear Studies, Medical Division
Oak Ridge Associated Universities
Oak Ridge, Tennessee

TECHNIQUES AND METHODS OF POLYMER EVALUATION, VOL. 1, THERMAL ANALYSIS, edited by P. E. Slade, Jr., and L. T. Jenkins (MARCEL DEKKER, INC., New York, p. 253, 1966).

Only in recent years have the well-known techniques of differential thermal analysis (DTA) and thermogravimetric analysis (TGA) been utilized to any significant extent by polymer scientists. The editors' objective in this book, Volume 1 of *Techniques and Methods of Polymer Evaluation,* is to present a thorough review of the fields of DTA and TGA as applied to polymers. The objective has been met admirably, offering the first book reviewing recent instrumental techniques and representative applications of thermal analysis to polymers.

The book consists of five chapters, contributions from government and industrial laboratories, and a 650-word or term index that holds up well to test. The first two chapters more than adequately describe the instrumentation, techniques and some representative applications of DTA to polymer research and development. The information here is not found in older books, for heats involved in polymeric transitions and reactions are small by inorganic standards, and entirely new instruments and techniques have been required. The third and fourth chapters on TGA review instrumentation and analyses of data, although more examples of applications to actual research problems would be welcome. The last chapter is limited to analyses of volatile products of thermal degradation, and includes keys to the literature.

The book is well written, contains a minimum of errors, and is to be recommended both to workers in the field and to those interested in the applications of thermal analyses to polymer chemistry and physics.

C. L. SMART
Celanese Research Company
Summit, New Jersey

J. F. Kincaid (left), Assistant Secretary of Commerce for Science and Technology, main speaker at the Society of Cosmetic Chemists seminar banquet September 22 at Chicago's Ambassador West Hotel, is shown discussing his address with seminar chairman M. J. Root (right), vice-president for research and development with the Barr-Stalfort Company, Chicago-based aerosol custom packaging firm.

Dr. Kincaid discussed reforms being initiated by the Department of Commerce to modernize the U. S. Patent system to keep pace with the vast number of applications being submitted as a result of the world technological explosion. Kincaid said that the reforms would bring US systems more closely into harmony with those of other nations.

(Continued from page 566A)

diphosphatidylglycerol and lipoamino acids. Phylogenetic relationships of bacterial groups are discussed and a rough relationship is set up among the Eubacteria based on Gram staining reaction, spore forming ability, ability to grow without oxygen and presence of phosphatidyl-choline and -ethanolamine.

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removed from the heart by a prior perfusion with heparin, ^{14}C-labelled chyle lipid perfused subsequently is oxidized at only half the normal rate.

• Drying Oils and Paints

POLYMERIZATION OF HALOGENATED FATTY ACIDS AND ESTERS THEREOF USING CLAY CATALYSTS. R. F. Paschke (General Mills, Inc.). *U.S. 3,328,438.* A method is described for polymerizing fatty materials the carbon chain of which is saturated, selected from the group consisting of chlorinated or brominated fatty acids with 4–32 C atoms and the C_1 to C_8 alkyl esters of said halogenated acids, the chlorine or bromine contents of these materials being 1–2 atoms per mole of fatty material. A reaction mixture comprising the fatty material and 1–25% by wt. of an acid activated mineral montmorillonite clay catalyst is heated at 180–270C for a period sufficient to effect polymerization of the fatty material.

ALKYD RESINS PREPARED FROM MONOGLYCERIDES OF OLEFINICALLY UNSATURATED MONOCARBOXYLIC ACIDS AND GLYCIDYL ESTERS OF SATURATED ALIPHATIC MONOCARBOXYL ACIDS AND PROCESS FOR THE PRODUCTION OF SAME. N. Kloos (Shell Oil Co.). *U.S. 3,332,898.* A polyhydric alcohol-polybasic acid alkyd resin is described, resulting from the reaction of (1) phthalic anhydride, (2) a monoglyceride of an olefinically unsaturated aliphatic monocarboxylic acid with 12–20 C atoms, and (3) a glycidyl ester of an alpha-branched saturated aliphatic monocarboxylic acid containing 9–19 C atoms per molecule and prepared by reacting an alkene with carbon monoxide and water in the presence of an acid catalyst.

COATING COMPOSITIONS COMPRISING FATTY OILS AND POLYMER LATICES. L. O. Cummings, J. W. Sjoquist and J. A. Kneeland (Pacific Vegetable Oil Corp.). *U.S. 3,332,899.* A clear coating composition is described, consisting of: (1) water, (2) an oil having an I.V. of at least 100 and chosen from the group consisting of: (a) the triglycerides of C_{10} to C_{26} fatty acids, (b) the maleic acid or fumaric acid treated, pentaerythritol-modified triglycerides of (a) with an acid-to-glyceride ratio no greater than about 7, (c) the polymerized derivatives of (a), and (d) the bodied tall oil fatty acid esters of aliphatic polyols; and (3) a synthetic latex of a material chosen from the group consisting of (a) vinyl acetate homopolymer with about 55% solids, (b) the copolymers of vinyl acetate and aliphatic alcohol esters of either maleic or fumaric acid, the alcohol containing 1-10 C atoms, about 55% solids, (c) the homopolymers of acrylic and methacrylic acids and their mutual copolymers, about 47% solids, (d) the copolymers of vinyl acetate and the acrylic and methacrylic esters of alcohols with 1-10 C atoms, about 55% solids, (e) the copolymers of styrene, acrylonitrile, 2-ethyl hexyl acrylate, and methacrylic acid, about 47% solids, and (f) the butadiene-styrene resins, about 47% solids. The relative proportions of oil and latex are from 25 to 75% oil and from 75 to 25% latex.

EMULSIFIED SUPERBODIED OILS. C. E. Penoyer (The Sherwin-Williams Co.). *U.S. 3,333,975* and *3,333,976.* A process for the manufacture of stable oil-in-water emulsions comprises the steps of: (1) heating a thermally polymerizable unsaturated fatty oil under vacuum to the temperature of incipient polymerization; (2) contacting the oil with water vapor at the said temperatures, (3) increasing the oil temperature to a maximum not higher than 615F to initiate and sustain thermal polymerization of the oil while always in contact with water vapor; (4) adding during polymerization 0.1–2% by wt. of an oil-soluble alkali metal soap to increase the hydroxyl content of the final bodied oil; (5) maintaining the oil under thermal polymerization conditions until the viscosity of the oil reaches a maximum of 20 to 75 minutes, Gardner-Holt; (6) rapidly dropping the temperature of the oil to below that required to sustain thermal polymerization; (7) dropping the oil into a volatile solvent consisting of a mixture of 3 parts of a monoalkyl ether of an alkylene glycol and 7 parts of a volatile hydrocarbon; (8) cooling the oil in the said solvent to below 100F; (9) admixing with the resultant oil-solvent mixture from 5.0 to 18.7% of an ether having the general formula $H-(OCH_2CH_2)_x-X-R$, where R is a C_{12} to C_{18} aliphatic radical, x ranges from 12 to 50, and X is either –O–, –CO–, or –COO–; or, alternately: (9) admixing with the resultant oil-solvent mixture from 10% to 14% of a tertiary amine surface active agent having the general formula $H(OCH_2CH_2)_yN(R)-(CH_2CH_2O)_xH$, where R is a C_6 to C_{18} aliphatic radical and the sum of x and y is about 15; and, finally (10) adding to the resultant oil-solvent-surfactant mixture an amount of water sufficient to form, by inversion, an oil-in-water emulsion.

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• Detergents

PREPARATION OF DICHLOROCYANURATE, SODIUM TRIPOLYPHOSPHATE AND SODIUM SULFATE CONTAINING BLEACHING, STERILIZING AND DISINFECTING COMPOSITION. A. G. Brown, W. W. Lee and K. M. Sancier (Procter & Gamble Co.). *U.S. 3,293,188.* A method of preparing a sterilizing and disinfecting powder that is homogeneous throughout consists in mixing a dichlorocyanurate with a synergistic carrier agent mixture of sodium tripolyphosphate and sodium sulfate decahydrate, the dichlorocyanurate being present in an amount sufficient to provide the powder with from 0.5% to 50% available chlorine. The solid mixture is subsequently heated until water is liberated from the sodium sulfate decahydrate and allowed to cool until a solid homogeneous mass is formed, which is finally pulverized into the desired powdered form.

SYNTHESIS AND SOME SURFACE ACTIVE PROPERTIES OF FATTY DERIVATIVES OF PROPANE SULTONE. IV. NONYLPHENOL AND POLYOXYETHYLATED NONYLPHENOL DERIVATIVES. Hisao Hirai, Yozo Ishikawa, Kyoichi Suga and Shoji Watanabe. *Yukagaku* **16**, 413–19 (1967). Propane sultone derivatives showed excellent solubility, foaming power and hard water resistance but showed lower surface tension than polyoxyethylene nonylphenol ether and dodecylbenzenesulfonate. Favorable foaming power, penetrating power and surface tension were shown by propane sultone containing 0–6 moles ethylene oxide; superior emulsifying power was shown by propane sultone derivative containing 10–13 moles. All propane sultone derivatives having ethylene oxide group showed good resistance against hard water.

STUDIES ON EMULSIFICATION. I. RELATION BETWEEN INTERFACIAL VISCOSITY AND PHENOMENA RELATING TO EMULSIFICATION. Soichi Hayashi and Noriko Sasaki (Asahi Electrochemical Co., Tokyo). *Yukagaku* **16**, 467–73 (1967). The most important factor affecting substantial emulsion stability seems to be mechanical strength (rheological property) of the interfacial film when nonionics, especially polyoxypropylene-polyoxyethylene block polyester of high molecular weight, are used as emulsifier. Nonionic Pluronic P-104 emulsifier required 4 hours to complete the adsorbed film at benzene-water interface. Good correlation was found between emulsion stability and activation energy and between interfacial viscosity and coalescent rate of drops in case of benzene-water system. No correlation was found between activation energy and interfacial viscosity.

NOTES ON REACTIONS WITH ALUMINUM ALKYLS. VIII. THE PREPARATION OF ALIPHATIC KETONES FROM MONOCARBOXYLIC ACID CHLORIDES AND ALKYL ALUMINUM COMPOUNDS. H. Reinheckel and K. Haage (German Sci. Acad., Berlin, Germany). *Tenside* **4**, 167–71 (1967). By reacting monocarboxylic acid chlorides with alkyl aluminum compounds it is possible to obtain aliphatic ketones with any desired position of the carbonyl group, by varying the carbon chain of both components. Research into the differential mode of reaction of alkyl aluminum dichlorides, dialkyl aluminum chlorides and trialkyl aluminum compounds has led to a method which utilizes the alkyl group of the aluminum compound for ketone formation (70–80% yield). This applies to all three types of compounds. Ketones which are easily reduced to secondary alcohols have thus become readily accessible starting materials for surfactant model compounds.

THE PART PLAYED BY THE ASSOCIATION OF NON-POLAR GROUPS IN THE ADSORPTION OF IONIC SURFACTANTS ON OXIDE SURFACES. H. Schubert and H. Baldauf (Bergakademie Freiberg, Germany). *Tenside* **4**, 172–6 (1967). The influence of the energy of association of non-polar groups of ionic surfactants (collectors) on the energy of adsorption of the collectors on a mineral oxide mineral surface has been studied. The adsorption isotherms obtained with various alkyl ammonium chlorides on quartz do not indicate the existence of so-called 'hemimicelle concentrations.' The degree of association calculated from adsorption isotherms is found to decrease with increasing chain length of the collector molecule, the degree of surface coverage being the same. The effect of the structure of the non-polar group is shown with the help of cationic surfactants having different structures but the same basic chain length.

THE EFFECT OF SURFACE ACTIVE AGENTS ON THE BIOLOGICAL EFFECTIVENESS OF PHENOLIC MATERIALS AND DERIVATIVES. H. Bellinger (Henkel & Cie., Düsseldorf, Germany). *Riv. Ital. Sostanze Grasse* **44**, 231–42 (1967). While the chemical reaction mechanism between phenolic materials and bacterial cells is still insufficiently known, more is known about the influence of phenolic substitution on bacteriological effectiveness. Surfactants act on bacterial cells differently according to their constitution. Nonionic surfactants exhibit a very variable behavior, anionics are mostly inactive on gram negative bacteria but destroy gram positive bacteria to different degrees according to the type of bacteria. Many cationics are useful as disinfectants. A clear explanation of the effect of surfactants on phenolic disinfectants and preserving agents is still not available, but their action is mostly attributed to physical rather than chemical mechanisms.

THE CONTINUOUS DETERMINATION OF THE RELATION OF SURFACE TENSION TO TIME FOR SURFACTANT SOLUTIONS. A. W. Neumann and W. Tanner (Fraunhofer Gesellschaft, Marienthal, Germany). *Tenside* **4**, 220–5 (1967). A highly static method for the continuous determination of time-dependent surface tension of liquids has been developed and used for determining the time dependence of surface tension of aqueous solutions of sodium dodecyl sulfate at different concentrations. It is possible by this method to record continuously surface tension values from about 2 seconds after production of a new surface up to establishment of the relevant equilibrium value after minutes or hours. The results are discussed in relation to their compatibility with known semi-empiric relationships for the characterization of time dependence of the surface tension of detergent solutions.

CONDENSATION PRODUCTS OF POLYUNSATURATED ACIDS AND ETHANOLAMINES. R. Rigamonti and E. Spaccamela-Marchetti (Polytech. Inst., Turin, Italy). *Riv. Ital. Sostanze Grasse* **44**, 223–7 (1967). The condensation reaction of linoleic acid with mono-, di- and triethanolamine was studied with the purpose of obtaining a drying oil with better characteristics than natural linseed oil. Using stoichiometric quantities, the temperature at which condensation starts was first determined and the course of the reaction was then observed at constant temperature. Similar tests were carried out with linseed oil fatty acids. In both cases, the product of condensation with monoethanolamine was a solid, while those with di- and triethanolamine were viscous liquids. The chemical and technological specifications of the reaction products are reported.

CHANGES IN THE ANTISEPTIC PROPERTIES OF CATIONIC SURFACTANTS IN THE PRESENCE OF NON-IONIC SURFACTANTS. I. ALKYL DIMETHYL BENZYL AMMONIUM CHLORIDES AND NONYL PHENOL-ETHYLENE OXIDE ADDUCTS. A. Delmotte (Univ. Libre de Bruxelles, Bruxelles, Belgium). *Tenside* **4**, 217–20 (1967). Using the method developed by Bondi it is shown that the addition of nonyl phenolethylene oxide adducts to a solution of alkyl dimethyl benzyl ammonium chlorides under certain conditions increases the antiseptic action of the cationic surfactant, although the nonyl phenol-ethylene oxide adducts do not exhibit any antiseptic activity by themselves.

THE ANALYSIS OF DETERGENTS IN POTABLE WATERS. F. Amato. *Industrie Alimentari* **6**(29), 67–9 (1967). A colorimetric method for the quantitative analysis of sulfonated surfactants in potable water is proposed. The method is based on measuring the spectrophotometric extinction at 452 mμ and has a sensitivity of 0.1 ppm. It is considered to have advantages over the methylene blue method because the chloroform layer maintains an almost constant coloration over a longer period of time and because it is less subject to interferences by the ions normally present in potable waters.

DEFINITE ETHOXYLATES FROM PRIMARY AND SECONDARY ALCOHOLS. THE SYNTHESIS OF PURE POLYETHYLENE GLYCOL ETHERS FROM N-DODECANOL, TETRADECANOL-(2) AND TETRADECANOL-(6). S. Schüring and W. Ziegenbein (Chem. Werke Hüls AG, Marl, Germany). *Tenside* **4**, 161–7 (1967). A method for preparing pure nonionic surfactants having a definite number of ethylene oxide groups in the molecule is described. Both primary and secondary alcohols were ethoxylated and several physical properties (critical micelle concentration, cloud point, water solubility, extinction coefficient, melting point and refractive index) were measured for various chain lengths.

LITERATURE SURVEY OF THE EFFECT OF SURFACTANTS ON THE SKIN. E. Götte (Henkel & Cie., Düsseldorf, Germany). *Tenside* **4**, 209–17 (1967). A survey of recent results concerning the effect of surfactants on the skin is presented. The following subjects are included: function and structure of the skin lipids, effect of pure water on the skin, effect of modern surfactants in comparison to soap, pH changes due to external influences and return to pH normality, reciprocal action be-

tween epidermis and surfactants, effect of surfactants after elimination of the barrier, testing of skin cleansing preparations and experiences with various surfactants.

PROCESS FOR PROVIDING SODIUM TRIPHOSPHATE HEXAHYDRATE D. L. Sawhill (Olin Mathieson Chemical Corp.). *U.S. 3,325,246.* A process for providing sodium triphosphate hexahydrate comprises forming an aqueous solution of sodium triphosphate, treating it with ammonia to precipitate sodium triphosphate hexahydrate and isolating the precipitate from the aqueous reaction mixture.

PROCESS FOR THE PREPARATION OF SOLUTIONS OF PHOSPHATIDES IN EDIBLE OILS. H. Eikermann and H. Betzing (A. Natterman & Cie.). *U.S. 3,325,291.* A process for the preparation of a phosphatide-enriched edible oil as a clear and stable solution comprises the step of dissolving in the edible oil a small quantity of monoglyceride having at least 50% unsaturation as a solvent, and an enriching quantity of phosphatide, the added monoglyceride being present in the ratio of 1.5 to 3 parts of phosphatide per part of monoglyceride.

VICINAL ACYLAMIDO SULFONATES AS LIME SOAP DISPERSANTS. G. L. Broussalian (Monsanto Co.). *U.S. 3,325,412.* A soap composition is claimed, consisting essentially of, in addition to a detergent soap, from about 1 to 70% by wt. of a vicinal acylamido sulfo compound having one of the following two general formulas: R′—C(X)=C(R)—NH—CO—R″ and R′—C(X)(B)—C(A)(R)—NH—CO—R″ where R and R′ are hydrophobic radicals selected from the group consisting of hydrogen, hydrocarbyl and halogen-substituted hydrocarbyl radicals with 1–22 C atoms, R and R′ having a combined total of 8–22 C atoms and at most one of R and R′ being hydrogen; R″ is either hydrogen or an alkyl radical with up to 5 C atoms; A and B are selected from the group consisting of hydrogen, halogens, lower alkyl radicals and halogen-substituted lower alkyls; and X is selected from the group consisting of alkali metal, alkaline earth metal or ammonium sulfonate and sulfate radicals.

PROCESS OF PRODUCING DETERGENT COMPOSITIONS CONTAINING ALKALI METAL SILICATES. D. A. Novak, Jr. (Monsanto Co.). *U.S. 3,325,413.* An improvement is claimed in the process for manufacturing a detergent composition by reacting sodium trimetaphosphate in a fluid aqueous slurry at a temperature above 75C with a strong base such as sodium hydroxide or carbonate, to form sodium tripolyphosphate hexahydrate, the slurry having an initial content of at least 10% by wt. of sodium trimetaphosphate, 1.5 to 4 mols of base for each mol of sodium trimetaphosphate and sufficient water to maintain the slurry in a fluid condition prior to drying. The improvement consists in maintaining the level of water-soluble alkali metal silicates in the slurry below about 1% by wt. until at least about one-half of the sodium trimetaphosphate has reacted with the base, thereafter mixing the resulting slurry with 3–20% by wt. of a water-soluble alkali metal silicate.

HEAVY DUTY DETERGENT COMPOSITION CONTAINING A QUATERNARY AMMONIUM SALT. J. T. Inamorato (Colgate Palmolive Co.). *U.S. 3,325,414.* A controlled sudsing detergent composition consists essentially of 7.5–40% by wt. of an anionic non-soap detergent salt selected from the group consisting of sulfated and sulfonated salts with an alkyl group of 8–22 C atoms in their molecule; a water-soluble sodium or potassium salt of a C_8 to C_{18} fatty acid, with a wt. ratio of soap to synthetic detergent of 1/6 to 1/2; 0.3–3% by wt. of a quaternary ammonium salt having the formula $[N(R_1)(R_2)(R_3)(R_4)]^+X^-$, where R_1 is a C_{10} to C_{20} alkyl group, R_2 and R_3 are C_1 to C_3 alkyl groups, R_4 is either a C_1 to C_3 alkyl group or a benzyl group and X is chlorine or bromine; and 5–90% by wt. of a water-soluble inorganic builder salt selected from the group consisting of phosphates, silicates, carbonates, sulfates, borates and mixtures thereof.

LINEAR ALKYL ARYL SULFONATE DETERGENT COMPOSITIONS. D. M. Marquis (Chevron Research Co.). *U.S. 3,325,422.* A process for suppressing the caking tendencies of straight-chain sodium alkyl benzene sulfonate detergents containing 9 to 18 C atoms in the alkyl portion of the molecule consists in uniformly dispersing throughout the detergent 2 to 25% by wt. of an anticaking agent selected from the group consisting of the sodium and potassium salts of oxalic acid, sulfoacetic acid, maleic acid, fumaric acid and thiodisuccinic acid.

PROCESS FOR THE PREPARATION OF DETERGENT PHOSPHINE OXIDES. H. R. Hays (Procter & Gamble Co.). *U.S. 3,325,546.* A process for the production of a detergent tertiary phosphine oxide

(Continued on page 576A)

Cosmetic Chemists' Program Announced for December Meeting

Charles Fox of Warner-Lambert Research Institute, program chairman, has announced the following program for the Dec. 6, 1967, meeting of the Society of Cosmetic Chemists to be held at the Americana Hotel, New York, N. Y.

Morning Session

AM	
8:30	Registration
9:00	Introductory Remarks
9:10	"Residence of Antimicrobial Agent on the Skin," N. M. Molnar; Fine Organics, Inc.
9:35	"Thermoanalytical Techniques, Introductory Concepts, Methods and Application," Saul Gordon; Center for Professional Advancement
10:00	"Psychosensory Reactions and Product Development," R. E. Reed; Gillette Research Institute, Inc.
10:30	"Melanocytes and Melanin Pigmentation," Funan Hu; Oregon Regional Primate Research Center
11:00	"An Address," J. L. Goddard; Commissioner of Food and Drugs, Food and Drug Administration
PM	
12:30	Luncheon

Afternoon Session A

PM	
2:30	"Studies on Nonaqueous Emulsions," R. V. Petersen; University of Utah; R. D. Hamill; Baxter Laboratories
3:00	"'Liquid Crystals'—The Mesomorphic Phases of Surfactant Compositions," F. B. Rosevear; The Procter & Gamble Company
3:30	"Effect of Initial Surfactant Locations on the Viscosity of Emulsions," Tong Joe Lin; Max Factor and Company
4:00	"The Viscoelastic Properties of Some Commercial Lipsticks," R. A. Wall; Clairol, Inc., and R. L. Epstein; Clairol, Inc.
4:30	"Alpha Olefin Sulfonates—New Cosmetic Surfactants," E. A. Knaggs; J. A. Yeager; M. Nussbaun; E. J. Buerk; Stepan Chemical Company

Afternoon Session B

PM	
2:30	"The Biology of Dandruff," B. A. Ackerman, Massachusetts General Hospital; Albert M. Kligman, University of Pennsylvania School of Medicine
3:00	"Mechanical Hysteresis of Chemically Modified Hair," D. E. Deem; M. M. Rieger; Warner-Lambert Research Institute
3:30	"A Permanent Wave Neutralizer: Its Performance and Mechanism of Action," J. L. Lichtin; University of Cincinnati; A. William Forbriger, Jr; C. R. Reiss; The Realistic Company
4:00	"Sorption of Quaternary Ammonium Surfactants by Human Hair," G. V. Scott; C. R. Robbins; J. D. Barnhurst; Colgate-Palmolive Company
4:30	"Polymer Properties Influencing Curl Retention at Elevated Humidity." A. L. Micchelli; F. T. Koehler; National Starch & Chemical Corporation

Registration forms for the meeting are available from the Society of Cosmetic Chemists, 50 E. 41st Street, New York, N.Y.

Meat Packers' Conference in April

Meat Packers' and Processors' Conference will be held April 16 and 17, 1968, at the Sheraton-Pennpike Motor Inn, Fort Washington, Pa. This conference is sponsored jointly by the Agricultural Experiment Stations of New Jersey and Pennsylvania and the U. S. Department of Agriculture.

Skeist Laboratories Conduct Study on New Polymers

New polymers is the subject of a multi-client study to be conducted by Skeist Laboratories, Inc., 89 Lincoln Park, Newark, N. J. 07102. Polysulfones, PPO, and polyimides typify materials that have attained commercial significance within the past few years. New nylons, "ladder" polymers, polybutene-1, 4-methyl-pentene-1 polymers, thermoplastic rubbers, and high-strength composites are among the dozens of materials that are to be investigated by the polymer consulting firm, with the aid of associates in Europe and Japan.

The potential of high profit is spurring many chemical companies to devote increasing R & D effort to new materials. Through hundreds of interviews with polymer manufacturers and end users, the Skeist group will seek to delineate the markets and estimated growth of the various polymers, along with opportunities for licensing, mergers and acquisitions. The impact of novel techniques such as oxidative coupling, vapor phase polymerization and fluidized bed Ziegler-Natta polymerization will be assessed. Unfilled needs will be noted.

The study will be offered to initial subscribers at $5,000. A free 12-page prospectus is now available.

(Continued from page 571A)

comprises the steps of reacting with agitation a quaternary phosphonium salt of the formula $[P(R_1)(R_2)(R_3)(R_4)]^+X^-$ where R_1 is a C_{10} to C_{18} alkyl group, R_2, R_3 and R_4 are C_1 to C_3 alkyl groups at least one of which is a methyl group, and X is chloride, bromide, iodide, bicarbonate or methoxide, together with a basic substance in a reaction system in which the water is not more than about 20% by wt. and is insufficient to cause foaming of the reaction product. The reaction temperature is at least 68C when X is chloride, at least 140C when X is iodide, at least 80C when X is bromide, at least 115C when X is bicarbonate and at least 25C when X is methoxide, but in any case below the temperature of product decomposition.

PROCESS OF PREPARING ALKYL ARYL SULFONATES HAVING IMPROVED WATER SOLUBILITY AND FOAM PROPERTIES. W. K. Griesinger (Atlantic Refining Co.). *U.S. 3,326,971.* A method for producing an alkylbenzene sulfonate of improved water solubility having 10 to 12 C atoms in the alkyl group and an alkylbenzene sulfonate of improved foam properties having 12 to 14 C atoms in the alkyl group comprises: (1) separately monochlorinating a straight-chain C_{10}–C_{11} paraffin, a straight-chain C_{12} paraffin and a straight-chain C_{13}–C_{14} paraffin to produce the corresponding straight-chain alkyl monochlorides; (2) alkylating benzene with each of the separate alkyl monochloride fractions, using an aluminum chloride catalyst; (3) fractionating the monoalkylbenzene fraction having 12 C atoms in the alkyl group produced in (2) to produce a low-boiling overhead fraction having a low 2-phenyl isomer content and a high-boiling bottoms fraction having a high 2-phenyl isomer content; (4) adding the bottoms fraction from (3) to the monoalkylbenzene fraction having 10–11 C atoms in the alkyl group to produce a monoalkylbenzene fraction having 10 to 12 C atoms in the alkyl group and an increased 2-phenyl isomer content; (5) adding the overhead fraction from (3) to the monoalkylbenzene fraction having 13–14 C atoms in the alkyl group to produce a monoalkylbenzene fraction having 12–14 C atoms in the alkyl group and a decreased 2-phenyl content; (6) separately sulfonating the various monoalkylbenzene fractions to produce the corresponding sulfonic acids, and (7) neutralizing the sulfonic acid fractions to produce a monoalkylbenzene sulfonate having 10–12 C atoms in the alkyl group and characterized by an increased water solubility and a monoalkylbenzene sulfonate having 12–14 C atoms in the alkyl group and characterized by improved foam properties.

CHELATING AGENTS AND METHOD FOR THEIR MANUFACTURE. A. R. Globus (Guardian Chem. Corp.). *U.S. 3,328,304.* A process for the preparation of a calcium sequestering agent comprises forming an 8–10:1 mixture of citric and D-gluconic acids and a mildly alkaline magnesium hydroxycarbonate, in an amount of 15–48 parts by weight per 100 parts of acids. The mixture is heated to a temperature high enough to split the water off the acids but below their decomposition point, to form a mixture of anhydrous citric acid, D-gluconic acid, present substantially as the lactone, and magnesium acid citrate.

PROCESS FOR PREPARING DETERGENT COMPOSITIONS. V. Lamberti (Lever Bros. Co.). *U.S. 3,328,305.* An improvement is claimed in a process for preparing detergent formulations containing water and a cellulose ether, which consists in forming a cellulosic slurry by prewetting the cellulose ether with an effective amount of at least one fatty acid, having 10–22 C atoms, liquid at room temperature and immiscible and non-dispersible in water.

BUBBLE BATH PREPARATION. A. Schmitz (Th. Goldschmidt A. G.). *U.S. 3,328,307.* A bubble bath composition consists essentially of an inert carrier such as water, urea, sodium chloride and sodium bicarbonate, a scenting agent and, as active ingredient, a surface active compound of the general formula R_1–$CONH(CH_2)_x$–N^+–$(R_2)(R_3)$–$(CH_2)_yCOO^-$ where R_1 is the alkyl moiety of a fatty acid with 10–18 C atoms, R_2 and R_3 are either alkyl or hydroxyalkyl groups with 1–4 C atoms, x is 2 or 3 and y is 1, 2, 3 or 4.

NON-CAKING STRAIGHT-CHAIN ALKYL ARYL SULFONATE DETERGENT COMPOSITIONS. D. M. Marquis (Chevron Research Co.). *U.S. 3,328,314.* A process for suppressing the caking tendencies of straight-chain sodium alkyl benzene sulfonate detergent containing 9–18 C atoms in the alkyl portion of the molecule comprises uniformly dispersing throughout the detergent 2–25% by wt. of an anticaking agent selected from the group consisting of sodium sulfosuccinate and potassium sulfosuccinate.

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(Continued on page 576A)

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8:30	Registration
9:00	Introductory Remarks
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9:35	"Thermoanalytical Techniques, Introductory Concepts, Methods and Application," Saul Gordon; Center for Professional Advancement
10:00	"Psychosensory Reactions and Product Development," R. E. Reed; Gillette Research Institute, Inc.
10:30	"Melanocytes and Melanin Pigmentation," Funan Hu; Oregon Regional Primate Research Center
11:00	"An Address," J. L. Goddard; Commissioner of Food and Drugs, Food and Drug Administration
PM	
12:30	Luncheon

Afternoon Session A

PM	
2:30	"Studies on Nonaqueous Emulsions," R. V. Petersen; University of Utah; R. D. Hamill; Baxter Laboratories
3:00	"'Liquid Crystals'—The Mesomorphic Phases of Surfactant Compositions," F. B. Rosevear; The Procter & Gamble Company
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Afternoon Session B

PM	
2:30	"The Biology of Dandruff," B. A. Ackerman, Massachusetts General Hospital; Albert M. Kligman, University of Pennsylvania School of Medicine
3:00	"Mechanical Hysteresis of Chemically Modified Hair," D. E. Deem; M. M. Rieger; Warner-Lambert Research Institute
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• *Nomenclature*

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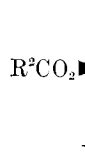
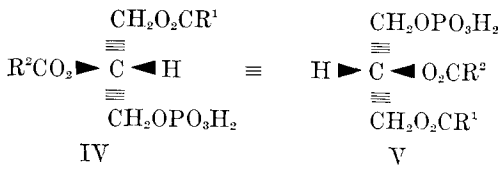
reactions in the field of glycerol derivatives involves the formation and cleavage of ester and ether linkages. Although these transformations do not affect any of the four bonds that extend from the C-2 of glycerol, the description of these processes under the rules of the *R/S* or D/L system requires frequent changes of the configurational prefixes. For example, the phosphorylation of (*S*)-1,2-diacylglycerol (III) gives an (*R*)-phosphatidic acid (IV). The corresponding transformation under the Baer-Fischer system is D-α,β-diacylglycerol (III) → diacyl-L-α-glycerophosphoric acid (IV). Under the conventional D/L system the precursor (III) is L-1,2-diacylglycerol and the product might be formulated and named as either L-1,2-diacylglycerol 3-phosphate (IV) or as D-2,3-diacylglycerol 1-phosphate (V) [III → (IV ≡ V)]. If the former is chosen, the formal inversion is avoided, but it would be required in describing the removal of the acyl groups since the product can be properly named only as D-glycerol 1-phosphate (II) [(IV ≡ V) → (I ≡ II)].

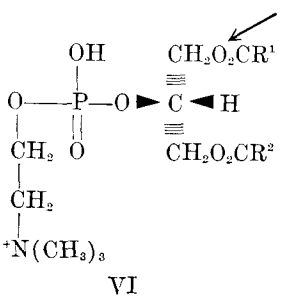


III



IV ≡ V

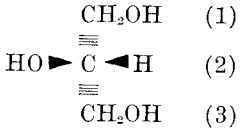
Furthermore, the enzyme phospholipase A (EC 3.1.1.4) differentiates between two ester linkages in optically active (and inactive) 1,3-diacylglycero-2-phosphorylcholines (VI) [G. H. De Haas and L. L. M. Van Deenen, *Biochim. Biophys. Acta, 84* (1964) 469], but this stereospecificity cannot be expressed by the configuration of the substrate in either D/L or *R/S* terms.



VI

Still another problem arises if one reports observations demonstrating that the distribution of fatty acids attached to the primary carbinol groups in triacylglycerols is not random. The use of the traditional configurational symbols (D/L or *R/S*) for the description of the asymmetry of such complex mixtures seems quite inappropriate.

These diverse matters present no problem if the stereochemistry of glycerol derivatives is expressed by a fourth system, "stereospecific numbering," [H. Hirschmann, *J. Biol. Chem. 235* (1960) 2762], which takes recognition of the fact that the two primary carbinol groups of the parent substance, glycerol, are not identical in their reactions with dissymmetric structures, which include nearly all biochemical processes [A. G. Ogston, *Nature, 162* (1948) 963] and that they therefore should be distinguished in nomenclature. On this basis, the numbers 1 and 3 should not be used interchangeably for the same primary carbinol group. The system proposed for deciding which carbinol group is to receive the lower number is a general one and is based on the priorities of the *R/S* system of Cahn *et al.* [*loc. cit.*]. Its application to glycerol (VII) is particularly simple: If the secondary hydroxyl group is shown to the



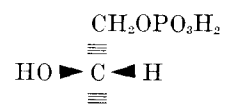
Glycerol (*sn*-numbering to right)

VII

left of C-2 in a Fischer projection, the carbon atom above C-2 is called C-1, the one below C-3; the use of this "stereospecific numbering" is indicated by the prefix "*sn*" before the stem-name of the compound. With such a terminology for distinguishing the two primary carbinol groups of free glycerol, it seemed a logical extension to describe the stereochemistry of derivatives by indicating the carbon atoms that are substituted. This additional step was first taken by R. Stjernholm and H. G. Wood [*J. Biol. Chem. 235* (1960) 2757], who spoke of glycerol 3-phosphate. (This would become "*sn*-glycerol 3-phosphate" in the nomenclature proposed here; cf. (I)). Under this system, there can be no formal inversions as long as the four bonds of C-2 remain intact; a given primary carbinol group will always have the same number no matter what the *O*-substituent on this or the other primary carbinol may be. Therefore, identity of configuration is obvious at a glance; *e.g.,* under the *sn* system, the phosphorylation mentioned above is the conversion of a 1,2-diacyl-*sn*-glycerol (III) to a 1,2-diacyl-*sn*-glycerol 3-phosphate (IV).

Similarly, the specificity of the action of phospholipase A can be expressed by stating that it acts on the ester linkage at C-1 (indicated by the arrow) of 2-*sn*-phosphatidylcholine (VI). The non-random distribution of fatty acid residues might conveniently be expressed by such statements as "the 1-position contained most of the saturated fatty acids in the triacyl-*sn*-glycerols of rat liver" [W. E. M. Lands, R. A. Pieringer, P. M. Slakey, and A. Zschocke, *Lipids 1* (1966) 444].

The main disadvantage of the *sn*-system of specifying configurations lies in the fact that it does not express "chirality" in the usual manner by configurational prefixes. This innovation is not altogether without precedent since L. Maquenne [*Les sucres et leurs principaux dérivés,* Gauthier-Villars (also G. Carré and C. Naud), Paris 1900] used numbering in a stereospecific sense to specify the configurations of the inositols. Although the use of D and L or of *R* and *S* shows more clearly an antipodal relationship, the fact that C-1 and C-3 lie across a plane of symmetry of glycerol should be sufficient to show that *sn*-glycero-1-phosphoric acid (VIII) and *sn*-glycero-3-phosphoric acid (I) are optical antipodes.



VIII

PROPOSED RULES

1. LIPIDS CONTAINING GLYCEROL

A. Individual Compounds

1.1 In designating esters, ethers, and other *O*-derivatives of glycerol, rules 10 and 11 of the Rules of Carbohydrate Nomenclature [*J. Org. Chem. 28* (1963) 281] are followed. These rules provide that: (a) if the hydrogen atom of an alcoholic hydroxyl group is replaced by another atom or group, the name of the parent compound may be retained as the root of the substituted compound and that, in such names, the prefix (denoting the substituent) is attached directly to the root; (b) an ester may be named by placing after the unchanged name of the parent compound, and separated therefrom by a space, the appropriate numeral

(indicating position) and a hyphen, as prefix to the name of the anionic group derived from an acid.

If the substitution is on the carbon atom, the compound is designated by its systematic name and not as a derivative of glycerol. It is permissible, therefore, to omit the symbol "*O*" if the substitution is on the oxygen atoms of glycerol.

Examples. Glycerol tristearate, or tristearoylglycerol, or tri-*O*-stearoylglycerol; 1,3-benzylideneglycerol or 1,3-*O*-benzylideneglycerol; glycerol 2-(dihydrogen phosphate) (a permissible alternative to this term is "glycero-2-phosphoric acid").

1.2 In order to designate the stereochemistry of glycerol derivatives, the carbon atoms of glycerol are numbered stereospecifically. The carbon atom that appears on top in that Fischer projection that shows a verticle carbon chain with the secondary hydroxyl group to the left is designated as C-1. To differentiate such numbering from conventional numbering conveying no steric information, the prefix "*sn*" (for stereospecifically numbered) is used. This term is printed in lower case italics, even at the beginning of a sentence, and it immediately precedes the term signifying glycerol and is separated from it by a hyphen. The prefix "*rac-*" (for racemo) precedes the full name if the product is an equal mixture of both antipodes, and the prefix "*X-*" if the configuration of the compound is either unknown or unspecified.

Examples. sn-Glycerol 3-(dihydrogen phosphate) or *sn*-glycero-3-phosphoric acid for the stereoisomer previously known as either L-α-glycerophosphoric acid [E. Baer and H. O. L. Fischer, *J. Biol. Chem. 128* (1939) 491] or as D-glycerol 1-phosphate [A. A. Benson and B. Maruo, *Biochim. Biophys. Acta, 27* (1958) 189]; *rac*-1-hexadecylglycerol; *X*-glycerol 1,2-dipalmitate 3-stearate.

B. Generic Terms

1.3 The term "phosphoglyceride" signifies any derivative of glycerophosphoric acid that contains at least one *O*-acyl, or *O*-alkyl, or *O*-alk-1′-en-1′-yl group attached to the glycerol residue. If the other ester component of a phosphoglyceride is known, it can be stated in a word that precedes the generic term.

Example. Choline phosphoglyceride.

1.4 The term "phosphatidic acid" signifies a derivative of glycerophosphoric acid in which both remaining hydroxyl groups of glycerol are esterified with fatty acids.

1.5 The term "lecithin" is permitted but not recommended to designate a 1,2-diacyl-*sn*-glycero-3-phosphorylcholine. The recommended generic term for such compounds is 3-*sn*-phosphatidylcholine.

1.6 Other generic terms may be coined as needed. These should be patterned after the names of individual compounds (see 1A) and should indicate the type of substituent of glycerol by such prefixes as acyl, alkyl or alkenyl (for alk-1′-en-1′-yl, *i.e.*, R—CH=CH—). If the nature of these substituents cannot be specified, the prefix "radyl" may be used.

Examples for rules 1.4 and 1.6: phosphatidic ester; 1-alkenyl-2-acyl-*sn*-glycerophosphoric ester; *O*-(diradylglycerophosphoryl)-L-serine; *O*-(1-acyl-*sn*-glycero-3-phosphoryl)-ethanolamine; triacylglycerol; diacyl-*sn*-glycero-3-phosphoryl-1′-*sn*-glycerol or 3-*sn*-phosphatidyl-1′-*sn*-glycerol for structure (IX).

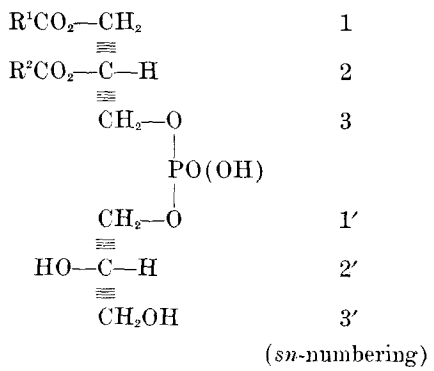
Comment. The terms triacylglycerol, diacylglycerol are preferred for neutral fats, not only for consistency, but mainly because strict interpretation of the traditional (optional) terms triglyceride, diglyceride does not convey the intended meaning.

2. SPHINGOLIPIDS

A. Individual Compounds

The discovery of many compounds structurally related to sphingosine makes it desirable to develop a semi-systematic nomenclature affording more concise names than the general rules of organic-chemical nomenclature.

2.1 The compound previously known as dihydrosphingosine [2*D*-aminoöctadecane-1,3*D*-diol or D-*erythro*-2-aminoöctadecane-1,3-diol or (2*S*,3*R*)-2-aminoöctadecane-1,3-diol] is called sphinganine.



3-*sn*-phosphatidyl-1′-*sn*-glycerol

IX

2.2 This name may be modified by prefixes to indicate additional substituents or higher or lower homologs. The prefixes to designate homologs should be derived by deleting the terminal "ne" from the systematic names of the hydrocarbons [IUPAC Nomenclature of Organic Chemistry 1957, *J. Am. Chem. Soc. 82* (1960) 5545, Rule A-1] that have the same number of carbon atoms as the long-chain bases.

2.3 The configuration of additional substituents should be specified by the prefixes "*D-*" or "*L-*" [italic capitals, cf. J. A. Mills and W. Klyne, *Progress in Stereochemistry, 1* (1954) 181] following the number that indicates the position of the substituted carbon atom. The configurations at C-2 and C-3 should be specified in the same manner, but only if they differ from those in sphinganine. In every case, the prefixes *D* or *L* refer to the orientation of the functional groups to the right or left, respectively, of the carbon chain written vertically in a Fischer projection with C-1 on top. If the configuration is unknown, the prefix "*X-*" should be used. In the case of racemic mixtures, the term "*rac-*" should be used as a prefix to the name.

Comment. The semisystematic nomenclature for the long-chain bases is significantly shorter than fully systematic names only if the terms chosen imply not only substituents but also their configurations. The configurations usually encountered have identical configurational prefixes only if a D/L but not if the *R/S* system is used; e.g., C-3 is *D* and *R* in sphingosine and *D* and *S* in the compound previously known as phytosphingosine. Therefore, the rule that configurations at C-2 and C-3 are to be specified only if they differ from those in sphinganine is unambiguous only if the D/L system is used. Whenever it is desired to use the *R/S* system [R. S. Cahn, C. K. Ingold and V. Prelog, *Angew. Chemie* (international edition), *5* (1966) 385] the fully systematic names should be used with specification of configuration at every center (and, when applicable, of the geometry at the double bond).

2.4 Names for partly unsaturated compounds are derived from the names of the corresponding saturated compounds by terminations denoting unsaturation, namely "ene," "diene," "yne," etc. A double bond is presumed to have the *trans* orientation of the carbon chain unless *cis* or unknown geometry is specified by the terms "cis-" or "*x-*" preceding the number that indicates the position of the double bond.

Examples for rules 2.1 to 2.4: 4*D*-hydroxysphinganine for phytosphingosine; 4*X*-hydroxy-2*X*,3*X*-eicosasphinganine for the cerebrin base described by M. Prostenik and N. Z. Stanačev [*Chem. Ber. 91* (1958) 961]; 4-sphingenin for sphingosine; *cis*-4-sphingenine for the geometric isomer of sphingosine; 2*L*-sphinganine for the C-2 epimer of sphinganine.

2.5 The trivial name "sphingosine" may be retained. If trivial names other than sphingosine are used, they should be defined in each paper in terms of this nomenclature, or of the general nomenclature of organic chemistry.

(Continued on page 575A)

(Continued from page 573A)

B. Generic Terms

Definition. The term "long-chain base" as used in section 2 refers to sphinganine, its homologs and stereoisomers, and to the hydroxy and unsaturated derivatives of these compounds.

2.6 The following generic terms may be used for the following groups of compounds:

—sphingolipid, for any lipid containing a long-chain base;
—glycosphingolipid, for any lipid containing a long-chain base and one or more sugars;
—ceramide, for an *N*-acyl long-chain base;
—cerebroside, for a monoglycosylceramide;
—ganglioside, for a glycosphingolipid containing neuraminic acid (see Section 3);
—sphingomyelin, for a ceramide 1-phosphorylcholine.

2.7 If further structural details can be specified, appropriate prefixes should be used. These prefixes signify substitution and not definition or modification of a component already implied in the root name.

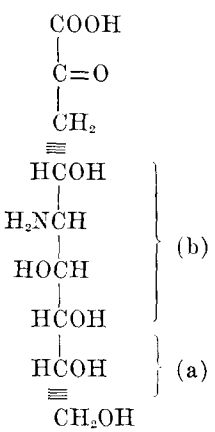
Examples. 1-*O*-D-galactosylceramide, but not galactosecerebroside; *N*-acyl-1-*O*-D-galactosyl-4-sphingenine, if the structure of the long-chain base can also be specified; 1-triglycosylceramide; oligoglycosylceramide.

3. NEURAMINIC ACID

3.1 The compound 5-amino-3,5-dideoxy-D-*glycero*-D-*galacto*-nonulosonic acid is neuraminic acid (X).

3.2 The term "sialic acid" signifies the *N*-acylneuraminic acids and their esters and other derivatives of the alcoholic hydroxyl groups.

3.3 The radicals resulting from the deletion of a hydroxyl group of neuraminic acid or sialic acid are designated as neuraminoyl or sialoyl, respectively, if the hydroxyl is deleted from the carboxyl group, and as neuraminosyl and sialosyl, respectively, if the hydroxyl group is removed from the anomeric carbon atom of the cyclic structure.



Neuraminic acid

5-Amino-3,5-dideoxy-D-*glycero*-D-*galacto*-nonulosonic acid

(a) (b)

X

4. OTHER COMPONENTS OF LIPIDS

4.1 Fatty acids and their radicals should be named according to the IUPAC rules for the Nomenclature of Organic Chemistry [*Pure and Applied Chem. 11* (1965) Nos. 1–2], Rule C-4. Fatty acids should always be numbered with the carboxyl group as C-1.

Comment. Regularities, such as the position of double bonds in some naturally occurring fatty acids, that are not apparent if numbering is done in this manner, can be indicated without violation of this principle of numbering if the position of the double bond is stated in the form (*n*-*x*) where n indicates the number of carbon atoms in the chain. The positions of the double bonds of linoleic acid, e.g., may be given as (*n*-9) and (*n*-6) but not as ω9, ω6.

4.2 Long-chain alcohols and the radicals derived from them should be designated according to systematic nomenclature [*loc. cit.* in 4.1, Rule C-201; also *J. Am. Chem. Soc. 82* (1960) 5545, Rule A-1 *et seq.*] but not by trivial names that are derived from those of fatty acids.

Example. 1-Hexadecanol and 1-hexadecyl, but not palmityl alcohol and palmityl.

4.3 Other components of lipids, such as amino acids and sugars, should be named according to the internationally adopted conventions for these groups of compounds.

4.4 All trivial names or abbreviations that are not defined in the rules of sections 1–4 or the other rules cited should be defined in each paper.

5. OTHER GENERIC TERMS

5.1 The term "phospholipid" may be used for any lipid containing a radical derived from phosphoric acid.

5.2 The term "phosphoinositide" may be used for any lipid containing radicals derived from inositol and phosphoric acid.

5.3 Synonyms for the generic terms defined in these rules should not be used, but other terms may be employed if they apply to different groups of lipids. Such non-official generic terms should be defined in each paper and should be so constructed that prefixes denote substituting groups rather than define components already implied in the root name.

Other Nomenclatural Rules for Biochemistry

The Tentative Rules of the IUPAC-IUB Commission on Biochemical Nomenclature (CBN) as they were first published in the *Journal of Biological Chemistry* [*241* (1966) 527, 2491 and 2987] and in *Biochemistry* [*6* (1967) 362] are available from Waldo E. Cohn, Director, NAS-NRC Office of Biochemical Nomenclature, Oak Ridge National Laboratory, P.O. Box Y, Oak Ridge, Tennessee, 37830, U.S.A.:

Abbreviations and Symbols for Chemical Names of Special Interest in Biological Chemistry.

Abbreviated Designation of Amino Acid Derivatives and Peptides.

Rules for Naming Synthetic Modifications of Natural Peptides.

Nomenclature of Vitamins, Coenzymes and Related Compounds: Trivial Names of Miscellaneous Compounds of Importance in Biochemistry, Nomenclature of Quinones with Isoprenoid Side Chains, Nomenclature and Symbols for Folic Acid and Related Compounds, Nomenclature of Corrinoids.

A document, OBN-5, describing the (American) NAS-NRC Office of Biochemical Nomenclature, and listing other rules affecting biochemical nomenclature is available from its Director, Dr. Waldo E. Cohn. [J. Chem. Documentation 7 (1967) 72].

The above Rules also appear in

	1[a,b]	2[a]	3[a]	4[a]
Arch. Biochem. Biophys.	115 (1966) 1	121 (1967) 1	121 (1967) 6	118 (1967) 505
Biochem. J.	101 (1966) 1	102 (1967) 23	104 (1967) 17	102 (1967) 15
Biochemistry	5 (1966) 1445	5 (1966) 2485	6 (1967) 362	.....
Biochim. Biophys. Acta	108 (1965) 1[c]	121 (1966) 1	133 (1967) 1	107 (1965) 1 117 (1966) 285
Bull. Soc. Chim. Biol.[d]	in press	49 (1967) 121	49 (1967) 325	49 (1967) 331
European J. Biochem.	1 (1967) 259	1 (1967) 375	1 (1967) 379	2 (1967) 1
J. Biol. Chem.	241 (1966) 527	241 (1966) 2491	242 (1967) 555	241 (1966) 2987
Virology	29 (1966) 480	.....	.....	.....
Z. Physiol. Chem.[e]	348 (1967) 245	348 (1967) 256	348 (1967) 262	348 (1967) 266

[a] In press in Russian
[b] In press in Japanese
[c] Section 5 (Nucleic Acids) only
[d] In French
The Lipid rules are in press in many of the above and in other journals.

Meat Packers' Conference in April

Meat Packers' and Processors' Conference will be held April 16 and 17, 1968, at the Sheraton-Pennpike Motor Inn, Fort Washington, Pa. This conference is sponsored jointly by the Agricultural Experiment Stations of New Jersey and Pennsylvania and the U. S. Department of Agriculture.

Skeist Laboratories Conduct Study on New Polymers

New polymers is the subject of a multi-client study to be conducted by Skeist Laboratories, Inc., 89 Lincoln Park, Newark, N. J. 07102. Polysulfones, PPO, and polyimides typify materials that have attained commercial significance within the past few years. New nylons, "ladder" polymers, polybutene-1, 4-methyl-pentene-1 polymers, thermoplastic rubbers, and high-strength composites are among the dozens of materials that are to be investigated by the polymer consulting firm, with the aid of associates in Europe and Japan.

The potential of high profit is spurring many chemical companies to devote increasing R & D effort to new materials. Through hundreds of interviews with polymer manufacturers and end users, the Skeist group will seek to delineate the markets and estimated growth of the various polymers, along with opportunities for licensing, mergers and acquisitions. The impact of novel techniques such as oxidative coupling, vapor phase polymerization and fluidized bed Ziegler-Natta polymerization will be assessed. Unfilled needs will be noted.

The study will be offered to initial subscribers at $5,000. A free 12-page prospectus is now available.

(Continued from page 571A)

comprises the steps of reacting with agitation a quaternary phosphonium salt of the formula $[P(R_1)(R_2)(R_3)(R_4)]^+X^-$ where R_1 is a C_{10} to C_{18} alkyl group, R_2, R_3 and R_4 are C_1 to C_3 alkyl groups at least one of which is a methyl group, and X is chloride, bromide, iodide, bicarbonate or methoxide, together with a basic substance in a reaction system in which the water is not more than about 20% by wt. and is insufficient to cause foaming of the reaction product. The reaction temperature is at least 68C when X is chloride, at least 140C when X is iodide, at least 80C when X is bromide, at least 115C when X is bicarbonate and at least 25C when X is methoxide, but in any case below the temperature of product decomposition.

PROCESS OF PREPARING ALKYL ARYL SULFONATES HAVING IMPROVED WATER SOLUBILITY AND FOAM PROPERTIES. W. K. Griesinger (Atlantic Refining Co.). *U.S. 3,326,971.* A method for producing an alkylbenzene sulfonate of improved water solubility having 10 to 12 C atoms in the alkyl group and an alkylbenzene sulfonate of improved foam properties having 12 to 14 C atoms in the alkyl group comprises: (1) separately monochlorinating a straight-chain C_{10}–C_{11} paraffin, a straight-chain C_{12} paraffin and a straight-chain C_{13}–C_{14} paraffin to produce the corresponding straight-chain alkyl monochlorides; (2) alkylating benzene with each of the separate alkyl monochloride fractions, using an aluminum chloride catalyst; (3) fractionating the monoalkylbenzene fraction having 12 C atoms in the alkyl group produced in (2) to produce a low-boiling overhead fraction having a low 2-phenyl isomer content and a high-boiling bottoms fraction having a high 2-phenyl isomer content; (4) adding the bottoms fraction from (3) to the monoalkylbenzene fraction having 10–11 C atoms in the alkyl group to produce a monoalkylbenzene fraction having 10 to 12 C atoms in the alkyl group and an increased 2-phenyl isomer content; (5) adding the overhead fraction from (3) to the monoalkylbenzene fraction having 13–14 C atoms in the alkyl group to produce a monoalkylbenzene fraction having 12–14 C atoms in the alkyl group and a decreased 2-phenyl content; (6) separately sulfonating the various monoalkylbenzene fractions to produce the corresponding sulfonic acids, and (7) neutralizing the sulfonic acid fractions to produce a monoalkylbenzene sulfonate having 10–12 C atoms in the alkyl group and characterized by an increased water solubility and a monoalkylbenzene sulfonate having 12–14 C atoms in the alkyl group and characterized by improved foam properties.

CHELATING AGENTS AND METHOD FOR THEIR MANUFACTURE. A. R. Globus (Guardian Chem. Corp.). *U.S. 3,328,304.* A process for the preparation of a calcium sequestering agent comprises forming an 8–10:1 mixture of citric and D-gluconic acids and a mildly alkaline magnesium hydroxycarbonate, in an amount of 15–48 parts by weight per 100 parts of acids. The mixture is heated to a temperature high enough to split the water off the acids but below their decomposition point, to form a mixture of anhydrous citric acid, D-gluconic acid, present substantially as the lactone, and magnesium acid citrate.

PROCESS FOR PREPARING DETERGENT COMPOSITIONS. V. Lamberti (Lever Bros. Co.). *U.S. 3,328,305.* An improvement is claimed in a process for preparing detergent formulations containing water and a cellulose ether, which consists in forming a cellulosic slurry by prewetting the cellulose ether with an effective amount of at least one fatty acid, having 10–22 C atoms, liquid at room temperature and immiscible and non-dispersible in water.

BUBBLE BATH PREPARATION. A. Schmitz (Th. Goldschmidt A. G.). *U.S. 3,328,307.* A bubble bath composition consists essentially of an inert carrier such as water, urea, sodium chloride and sodium bicarbonate, a scenting agent and, as active ingredient, a surface active compound of the general formula R_1–$CONH(CH_2)_x$–N^+–$(R_2)(R_3)$–$(CH_2)_yCOO^-$ where R_1 is the alkyl moiety of a fatty acid with 10–18 C atoms, R_2 and R_3 are either alkyl or hydroxyalkyl groups with 1–4 C atoms, x is 2 or 3 and y is 1, 2, 3 or 4.

NON-CAKING STRAIGHT-CHAIN ALKYL ARYL SULFONATE DETERGENT COMPOSITIONS. D. M. Marquis (Chevron Research Co.). *U.S. 3,328,314.* A process for suppressing the caking tendencies of straight-chain sodium alkyl benzene sulfonate detergent containing 9–18 C atoms in the alkyl portion of the molecule comprises uniformly dispersing throughout the detergent 2–25% by wt. of an anticaking agent selected from the group consisting of sodium sulfosuccinate and potassium sulfosuccinate.