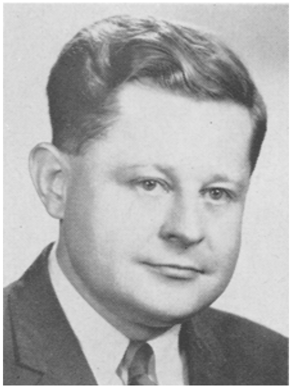
Biodegradable Detergents Symposium Feature of New Orleans Meeting

Eric Jungermann, chairman of the AOCS Symposium of Biodegradable Detergents, announced completion of the program scheduled for Monday, April 20, 1964, as part of the Annual Spring Meeting in New Orleans.

The scope and timing of the symposium re-emphasizes the interest of the AOCS in this area of technology and science and promises to be one of the highlights of the Spring Session.



Eric Jungermann

Due to the great interest generated by the Symposium, there will be both a morning and afternoon session. "We were particularly fortunate," Dr. Jungermann stated, "in being able to bring together representatives of government and all segments of industry."

The morning session will be devoted to the general problems of biodegradability. Current government approach will be presented by L. W. Weinberger and T. P. Towers, Department of Health, Education and Welfare, Washington, who will discuss the topic of "Detergents and Water Quality Standards." A representative from the Soap and Detergent Association will discuss "Detergent Pollution as a Public Issue." The tremendous progress made by all of the industry toward achieving the anticipated switch to biodegradable detergents by December 1965 will be detailed. P. J. Weaver and F. J. Coughlin, The Procter & Gamble Co., will discuss "The Measurement of Biodegradability," describing various methods used in evaluating biodegradability, including a discussion of regulations enacted into law in Germany. Whenever possible, the authors will attempt to correlate laboratory tests with practical experience. The last paper of the morning session will be presented by R. D. Swisher, Monsanto Chemical Co., and will deal with some very recent data on the toxicity of straight chain alkylbenzenes and their degradation products. His talk is entitled "Fish Bioassay of Straight Chain ABS and Intermediate Biodegradation Products."

The afternoon session will deal with more specific aspects of the new biodegradable detergents, their chemistry, properites and evaluation methodology. Two papers will be presented on evaluation techniques: R. L. Huddleston and R. C. Allred, Continental Oil Co., will discuss "The Evaluation of Detergent Biodegradation Using Activated Sludge," while L. J. Garrison and R. D. Matson, Jefferson Chemical Co., will compare the results obtained using different testing techniques with selected nonionic surface-active agents. Also part of the afternoon session are three papers dealing with a correlation of structural modification of new biodegradable surface-active molecules with their performance characteristics. B. C. Steinle, R. C. Myerle, and C. A. Bass from Union Carbide Chemical Co., will discuss "Surfactants Containing Ethylene Oxide: Relationship of Structure to Biodegradability." This will be followed by J. H. McFarland and P. R. Kinkel discussing the performance and physical properties of biogradable surfactants prepared from straight chain secondary alcohols. Another paper by W. A. Sweeney, California Research Corp., will discuss "Performance Characteristics of Straight Chain Alkylbenzene Sulfonates." The last talk of this session will be presented by C. A. Brunner of the Advanced Waste Treatment Research DHEW, R. A. Taft Engineering Center of Cincinnati, Ohio, who will discuss "Methods for Removing Detergents from Waste Water."

The session will conclude with a panel discussion. All members of the Symposium will participate and Dr. Jungermann will act as moderator. Questions from the audience will be welcome. Full details of the complete Technical Program and abstracts of papers start on page 4.

Incorporation of an ion chamber permits radioactive isotope experiments. Nonradioactive isotopes (such as deuterium and O^{18}) are monitored by attaching the apparatus to a mass spectrometer. Automatic recording of gas volume and radioactivity establishes a permanent record and allows unattended operation. Use of a servo-motor driven syringe eliminates all mercury, including mercury leveling bulbs. The flow-through construction of the syringe permits circulation of the gas phase and obviates, as required in isotopic experiments, the dead space inherent in classical manometers. Simplified electronics and readily available components enhance operation and construction. Typical hydrogenations with accompanying graphs showing gas uptake, reaction time, and radioactivity concn illustrate the utility of the apparatus and the ease with which data are obtained.

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QUANTITATIVE MEASURE OF THE SELECTIVITY OF HYDROGENATION OF TRIGLYCERIDES

L. F. Albright

Graphs have been prepared which are useful in quantitatively determining the degree of selectivity for hydrogenation of cottonseed, corn, peanut, soybean, and linseed oils. Use of these graphs requires a knowledge only of the compositions of the initial (unhydrogenated) and of the final (hydrogenated) oils. In most cases, a typical composition can be assumed for the initial oil if the specific composition is unknown.

The graphs were prepared using analytical equations similar to those initially proposed by Bailey. The various unsaturated fatty acid groups are assumed to hydrogenate in an irreversible first-order manner. This model has been found by several investigators to give a good fit of experimental data. The equations (involving reaction rate constants for linoleic, oleic, and other unsaturated acid groups) were programmed and solved on an IBM 7090 digital computer. The selectivity ratio defined as the ratio of the rate constant for the linoleic acid group divided by that for the oleic acid group can be easily determined from the graphs.

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EFFECT OF RE-USED NICKEL CATALYST ON THE HYDROGENATION OF COTTONSEED OIL

L. F. Albright, M. M. Win and J. M. Woods

Refined and bleached cottonseed oil was hydrogenated in a dead-end reactor using both new (Rufert catalyst flakes) and reused (up to 5 uses) catalyst at a concn of 0.10% nickel (by wt). Hydrogenation runs were made at temp from 130–169C, at a pressure of 45 psig, and with sufficient agitation to minimize resistances of mass transfer of the reactants to the catalyst surface.

A comparison of the hydrogenation results for runs with new and re-used catalysts indicate the following effects:

1) The activity of the catalyst increased initially with use, but with continued use the activity decreased. This effect was especially pronounced at 130C where third-use catalyst resulted in the most rapid rate of hydrogenation.

2) Selectivity and isomerization changed somewhat as the catalyst was re-used. Selectivity, especially at 130C, decreased with re-use of the catalyst. At 130C, isomerization was not significantly affected with catalyst re-use, but at 169C, however, it decreased slightly.

3) The induction period found with fresh catalyst at 130C was eliminated in runs with second- and third-use catalyst. A small induction period was noted with fifth-use catalyst.

Once-use catalyst was treated in a series of runs in different manners. Air-treatment severely reduced the catalyst activity. Steam- and vacuum-treatment of the catalyst resulted in a slightly less active catalyst than a comparable run in which the catalyst was maintained for a longer period of time in a hydrogen atmosphere. None of these treatments significantly affected the selectivity or isomerization of the subsequent run.

Results of this investigation can be explained in large part by the concn of hydrogen adsorbed on the catalyst surface.

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A COMPARISON OF ALCOHOLS AS PARTICIPATING SOLVENTS DURING OZONIZATION

D. J. Moore, E. H. Pryde and J. C. Cowan

According to the Criegee mechanism for ozonization of olefins, a zwitterion intermediate can competitively react with itself, with carbonyl compounds, or with a participating solvent. Of the solvents reported, apparently only methanol gives exclusive formation of alkoxy hydroperoxides to permit a high yield of aldehyde upon reduction; however, methanol has certain disadvantages, including volatility and poor solvent properties. Accordingly, we undertook a search for a participating solvent more generally useful. With ionization constants as a guide to nucleophilic properties, a number of solvents were selected for testing: 2-methoxyethyl, 2-(2-methoxyethoxy)ethyl, and benzyl alcohols; ethylene and diethylene glycols; and α-hydroxyethyl acetate. Both chemical and catalytic reduction were investigated along with volatility, solubility, ozone uptake, by-product formation, and total carbonyl yield.

Carbonyl yields for chemically reduced samples were 80–96%; those with benzyl alcohol and 2-methoxyethanol were comparable to those with methanol. Yields by catalytic reduction (10% Pd/C or Lindlar catalysts) were 75–85%. Side reactions with catalytic reduction gave the esters expected as well as free acids. When pyridine was used with 10% Pd/C and 2-methoxyethanol, the yield of carbonyl was less than 70% and free acids were formed, in contrast to the higher yields reported with pyridine in methanol. The difference suggests that a neighboring group, the ether oxygen, is participating in decomposition of the hydroperoxides.

With the solvents tested, volatility losses were low and ozone uptake was about the same as that for methanol. The heterogeneity of the reaction medium probably accounts for the poorer yields of aldehydes with both glycols and α-hydroxyethyl acetate.