Petroleum Chemistry

The Gordon Research Conference on Petroleum last summer drew as many people from chemical as from petroleum companies. L. H. Flett was chairman of the conference on synthetic detergents, most of which are now coming from petroleum. W. K. Griesinger showed, by using radioactive sulfur in alkylaryl sulfonates, that complete removal of this type of synthetic detergent from hair is more difficult than anticipated. The first measurements with the hydrophyl balance on these sulfonates, described by A. H. Batchelder, were carried on a substrate of 95 per cent sodium nitrate, and the effect of the hydrocarbon chain type was analogous to the carboxylic soaps. N. B. Tucker, reporting on sodium-sulfated detergents derived from alcohols, indicated that the C_{15} chain gave optimum properties.

In the conference on synthesis with higher olefins, organized by C. L. Brown, E. Arundale reported making a rich variety of metadioxanes, glycols, and unsaturated alcohols, using the Prinz reaction of formaldehyde with C_3—C_8 olefins. The metadioxanes and 1,3 glycols are formed in the presence of dilute acid catalysts, whereas unsaturated alcohols are produced when tertiary olefins are condensed with anhydrous formaldehyde in the presence of certain metallic halides or in the absence of catalysts at elevated temperatures. High yield of ketones can be obtained by reacting the higher aldehydes and olefins in the presence of peroxides.

C. M. Fontana reported on the synthesis of higher molecular weight polymers from l-olefins using promoted $AlBr_3$ catalyst; a carbonium ion mechanism accounts for the product molecular weight distribution. J. N. Wilson showed that butene reacting with C_2 over Ni, even at $-78°$, yielded $C_4H_8D_2$ and all the possible deuterated species of butane.

W. A. Zisman was chairman of the session on lubricants. R. C. Morris reported on the lubricant properties of organophosphorus compounds, which have $-65°$ viscosities, much lower than predicted. 1,5-Pentanediol-bis-dibutylphosphate, with a VI of 150 and a viscosity of 3.43 cs at 210° F, is a promising synthetic lubricant. The "surprising" reaction whereby several mols more than the neutralization equivalent of barium hydroxide with sulfonic acids make many motor oils alkaline was discussed by T. W. Mastin. A micelle of barium sulfonates enclosing the excess base was postulated as the mechanism.

G. W. Kennerly showed how the thiophosphoric acid derivatives and phenothiazine used for inhibiting motor oils cause the destruction of peroxides in an action more truly catalytic than that of the oxygen-accepting type commonly used as antioxidants, in that they survived. W. J. Toussaint said that mechanism of the formation of polyether synthetic lubricants is ionic. Temperature-viscosity properties are best when the molecule is doubly terminated with an alkyl and is made from propylene and ethylene oxides together. L. L. Withrow led a session on detonation and autoignition in internal-combustion engines. The adverse effects of combustion zone deposits, fuel additives, and blending hydrocarbons on tube oxidation reactions of the preflame type were brought out by P. L. Cramer. From engine studies Walter Cornelius developed the two-stage nature of preflame reactions, and E. M. Rifkin demonstrated the two-stage reaction by running an engine on the exhaust from a motored engine; B. M. Sturgis observed substantial and unexpected amounts of hydrogen peroxide in the products of preflame reactions in a combustion zone.

D. R. Stevens presided over the session on antioxidants. J. A. Chenicek discussed the relation of structure of antioxidants to their effectiveness in gasoline and the differences found between various phenols. E. C. Knowles pointed out that preflame reactions in engines lead to reactive intermediates, causing sludge that the motor oil must disperse. C. M. Murphy and W. A. Zisman showed that the diesters of pinic acid are as valuable for synthetic lubricants as the sebacates.

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