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by Col. E. H. Graham.

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**PRODUCTION OF FATTY ACIDS FROM
BY-PRODUCTS OF THE FISCHER-TROPSCH
PROCESS**

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**COMBINED INTELLIGENCE OBJECTIVES
SUB-COMMITTEE**

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Report on

PRODUCTION OF FATTY ACIDS FROM BY-PRODUCTS OF THE
FISCHER-TROPSCH PROCESS

Reported by:

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I.G. FARBENINDUSTRIE, LEUNA. FATTY ACID
PRODUCTION BY FISCHER-TROPSCH PROCESS.

Dr. Paul Herold, Director of Research, indicated that Dr. Müller-Cunradi or his assistant Dr. Wietzel at the I.G. Farbenindustrie in Oppau (Ludwigshafen) were directly concerned with the production of synthetic fatty acids from by-products of the Fischer-Tropsch process. This process, for the catalytic synthesis of hydrocarbons produces paraffins as a by-product. These paraffins have a m.p. of 50-55°C. and consist of C₂₀-C₂₆ hydrocarbons (average chain length is C₂₂).

The paraffins are oxidized with air @ 130-150°C. using KMnO₄ as catalyst in aluminium towers. The oxidation is not complete and the Manganese salts of the fatty acids must be separated from the unreacted paraffin. This is accomplished by use of Alcohol and Benzene.

The crude fatty acids are neutralized with NaOH or Na₂CO₃. The crude soaps are then subjected to steam distillation at 250°C. (Pressure). The lower fatty acids such as formic, acetic, propionic and butyric acid, come off immediately and the hydroxy acids are converted to unsaturated acids. Keto acids are also removed at this point. (Hader process.)

The olefinic and saturated acids, which remain as the sodium salts from the above distillation, are liberated with HNO₃ and the NaNO₃ removed. The free acids are steam distilled by the "Wecker" method of forcing water into the hot fat. This method avoids polymerization and keto acid formation and high grade fatty acids are obtained.

The fatty acids are esterified with glycerol to form soaps or edible tri-glycerides. Polymerized residue is used in pitching beer barrels by the brewing industry.

Glycerol is made at the I.G. Farben plant in Heydebreck of which a pilot plant is available in Oppau. Propylene is used as the starting material and the usual steps of alcohol → chlorhydrin → glycerol are employed. Glycerol can also be made by direct hydrogenation (nickel catalyst) of glucose or "Invert" sugar. A mixture of glycols results by this procedure.

20,000 tons annually of paraffin are utilized at the Oppau plant and at Witten the Märkische Seifenindustrie uses even larger quantities. The overall yield of fatty acids is of the order of 50%.

The C₆-C₁₀ alcohols obtained as by products from the above process are not found in nature and when esterified with phthalic anhydride form excellent plasticisers.

"Tylose" is a detergent made from cellulose which because of its high molecular weight has similar properties to the natural soaps, i.e. high affinity for organic dyes and will produce a "white" yarn as contrasted to yellow or graying observed when sulfonated oils are used.