FIAT FINAL REPORT NO. 90

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UNCLASSIFIED

INTERROGATION OF

PROFESSOR FRANZ FISCHER

Horne, W.A.

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INTERROGATION OF PROFESSOR FRANZ FISCHER

BY

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Technical Industrial Intelligence Committee

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INTERROGATION OF PROFESSOR FRANZ FISCHER AT MUNICH, GERMANY 8 AUGUST 1945.

Introduction.

Professor Franz Fischer, former director of the Kaiser Wilhelm Institute, Mülheim, was located and interrogated at the home of his daughter at Possartstrasse 27, Munich. He was only generally familiar with the recent work of the Institute, having been inactive since March 1943. The following information was given from memory, since his reports, reprints and library were destroyed in the bombing raid of 11 July 1944 which demolished his home.

Isosynthesis.

The production of predominantly isobutane and isopentane from carbon monoxide and hydrogen is known as "isosynthesis". The process is carried out at 300-600 atm. and 400-500°C. in the presence of a thoria catalyst, preferably activated with 10-20% Al_2O_3. The isobutane can be dehydrogenated readily to isobutylene and used for polymerization or alkylation, yielding isooctanes. This latter is considered the product of isosynthesis and had led to the erroneous conclusion that isooctanes are prepared directly by the process.

The product contains higher -boiling products consisting of naphthenes, aromatics, ethers and alcohols. The proportionate amounts of low-boiling isoparaffins, and naphthenes and aromatics can be varied by changing operating conditions and by proper promotion of the thoria. The addition of zinc oxide favors the formation of naphthenes and aromatics; the addition of alumina favors the formation of isoparaffins.

The pressure is normally 300-600 atm. At lower pressures, the reaction of CO with hydrogen is too slow, and at higher pressures, the formation of methane and dimethyl ether becomes excessive. The temperature is maintained between 400 and 500°C., varying to some extent, inversely with the pressure. Further operating details were not known.

The method of preparing the thoria catalyst is critical; for example, a thoria-zinc oxide catalyst prepared by pouring the nitrate into the soda solution (the reverse of normal precipitation) resulted in a catalyst of almost double the activity of a normally precipitated catalyst with respect to liquid hydrocarbons. No further details were known. Dr. Pichler and Dr. Ziesecke, at the Kaiser Wilhelm Institute, have carried out numerous experiments in an attempt to replace the thoria with other elements, but without success. A part of the thoria, at most 25%, can be replaced by either alumina, zinc oxide or a mixture of both.

Experimental investigations are still being carried out in small laboratory-scale equipment at the Institute. A pilot plant was planned for construction at Ruhrchemie, Sterkrade, but Prof. Fischer did not know whether the construction had been carried out, due to the war.

It was pointed out that there is no marked distinction between "isosynthesis" and "naphthene" synthesis. The two processes are concurrent, the products being influenced by the method of operation and the nature of the catalyst.

Iron Synthesis.

The middle-pressure synthesis of hydrocarbons from carbon monoxide and hydrogen over an iron catalyst was initiated at the Institute by Dr. Pichler and Prof. Fischer but was taken over by industry which considered it highly important, largely due to the cost and scarcity of cobalt.

The comparative experiments conducted at Ruhland demonstrated that iron catalysts at medium pressures and 220°C. were satisfactory. The hydrocarbons obtained were more unsaturated than those obtained by cobalt normal-pressure synthesis, and have a better anti-knock rating. There is also produced an appreciable amount of alcohol. Further results and developments were unknown.

Nickel Catalysts.

Nickel catalysts are unsuitable for middle pressure synthesis, due to formation of nickel carbonyl. At normal pressure, nickel can be used but is not very satisfactory since its strong hydrogenation activity leads to the undesirable formation of methane.

Suspended Catalysts.

No further experiments have been conducted on oil or water suspensions since publication about ten years ago. Synthesis can be carried out in this way, but there is no technical advantage.

Isomerization.

With Dr. Herbert Koch and other co-workers, Prof. Fischer initiated experiments on the isomerization of Fischer-Tropsch products. The best results were obtained with aluminum chloride for pure isomerization and for so-called cracking isomerization. Hydrogen chloride was used as a promoter in both types, hydrogen being used as well for cracking isomerization. Details were not known.