Germany's Synthetic Fuel Industry 1927-45

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Abstract

Petroleum was clearly the fuel of the future, and to insure that Germany would never lack a plentiful supply, German scientists and engineers invented and developed two processes that enabled them to synthesize petroleum from their country's abundant coal supplies and to establish the world's first technologically successful synthetic liquid fuel industry. Friedrich Bergius (1884-1949) in Rheinau-Mannheim began the German drive for energy independence with his invention and early development of high-pressure coal hydrogenation or liquefaction in the years 1910-25. A decade after Bergius began his work Franz Fischer (1877-1947) and Hans Tropsch (1889-1935) at the Kaiser-Wilhelm Institute for Coal Research (KWI) in Mülheim, Ruhr, in 1923 invented a second process for the synthesis of liquid fuel from coal.

By the mid-1930s IG Farben, Ruhrchemie, and other chemical companies had started to industrialize synthetic liquid fuel production, resulting in the construction of twelve coal hydrogenation and nine Fischer-Tropsch (F-T) plants by the time World War II ended in 1945. Several breakthroughs contributed to the success of coal hydrogenation the most significant of which were the sulfur resistant catalysts and the two stage liquid-vapor phase hydrogenation that Matthias Pier (1882-1965) at BASF (IG Farben) developed in the late 1920s. For the F-T synthesis the cobalt catalysts that Fischer and his co-workers prepared in the 1920s-30s were crucial to its success.

Of the two processes hydrogenation was the more advanced and contributed much more significantly to Germany's liquid fuel supply than the F-T synthesis. Coal hydrogenation produced high quality aviation and motor gasoline, whereas the F-T synthesis gave high quality diesel and lubricating oil, waxes, and some lower quality motor gasoline. The two processes actually were complementary rather than competitive, but because only coal hydrogenation produced high quality gasoline it experienced much greater expansion in the late 1930s and war years than the F-T synthesis, which hardly grew at all. F-T products were mainly the raw materials for further chemical syntheses with little upgrading of its low quality gasoline by cracking because of unfavorable economics. This paper examines the industrialization of the F-T process from the 1930s to the end of World War II.