Keeps Artificial Rubber Secret

Chemistry

Following are additional reports on the Second International Conference on Bituminous Coal at Pittsburgh.

Coal experts who went to the coal conference sessions at Pittsburgh in the hope of hearing how coal could be converted into rubber did not get their curiosity gratified by Dr. Fritz Hofmann of the Coal Research Institute of the Kaiser Wilhelm Association of Breslau who was announced to speak on the enticing topic of "From Coal to Rubber" on the program of the Second International Conference on Bituminous Coal. Dr. Hofmann gave an eloquent address in German on the history of the investigation and its difficulties but conveyed a minimum of information as to the present status of the problem and the most recent steps toward its achievement. He frankly admitted that he did not intend to give away any trade secrets for, as he said:

"In the case of a technically usable rubber synthesis it is not merely a question of general unselfish scientific knowledge. Here values are at stake which force the speaker to weigh every word which he says about these things, for such work involves a risk of millions, and many worries for those who have taken the risk."

For twenty-two years Dr. Hofmann and his corps of collaborators have been engaged in the pursuit of artificial rubber with the liberal backing of the I. G. Dye Industry, the great chemical combine whose initials Americans are apt to translate as the "Industrial Giant." As early as 1909 a successful process was discovered in the laboratory of the Elberfeld Dye Works and before the war five hundred patents had been taken in this field. During the war when Germany was cut off from natural rubber an artificial substitute was manufactured to the extent of 2,500 tons. This product proved satisfactory for hard rubber articles but not for soft, so the German automobiles had to take to tires of steel springs in the later years of the war. But when the price of raw rubber dropped from $3.40 a pound to 16 cents the synthetic could not compete with the plantation product.

Those of the audience who were incredulous of the possibility of producing rubber from coal were invited by Dr. Hofmann to come up on the platform after the lecture where he unpacked from a small box samples of synthetic rubber in thin sheets, thick slabs and rings. These looked like ordinary brown rubber and smelled as bad. The pure product, however, is white and translucent, looking like lumps of camphor. A strip of yellow rubber-covered cloth had been made twelve years ago but was as elastic as a new waterproof coat.

The synthetic rubber is made by condensation and solidification of a light colorless liquid of the same composition called by the chemists "isoprene". This may be made by means of a long series of compounds from the familiar acetylene gas which is prepared from calcium carbide, which is produced by the electrical heating of coke and lime.

Nothing was said in the lecture to substantiate the statement made last year by an official of the I. G. Dye Industry, arousing a sensation in the American press, that their process could produce rubber cheaper than it could be grown on the plantation.

Motor Fuel from Lignite

A new method of making motor fuel and a great variety of other useful carbon compounds was explained at the conference by Director Andre Kling and Subdirector Daniel Florentin of the Paris Municipal Laboratory. By employing high pressures and high temperatures in tight steel retorts, tars from coal and lignite, now mostly burned as fuel for lack of a profitable market, can be converted into salable gasoline and lubricating oil by the addition of hydrogen. By the employment of a suitable catalytic agent such as alumina it is possible to break up molecules or combine them at will to form profitable products. These experiments have been carried out in the laboratory, but have now been transferred to an industrial stage.

Artificial Coal From Wood

Cellulose and lignin, the two principal constituents of wood, have been converted into artificial coals practically identical with natural coal found ready-made in the ground, Dr. Friedrich Bergius of Heidelberg, Germany, announced. In 1926 Dr. Bergius at the first Coal Conference told how he had made synthetic gasoline, oil and other products out of coal and since then the German Dye Trust has utilized his process for producing commercially thousands of tons of synthetic motor fuel.

During theoretical researches upon the constitution of coal conducted from 1910 to 1913, Dr. Bergius first transformed cellulose into coal on a laboratory scale. This accomplishment led to the hydrogenation of coal under high pressure and during the fifteen years of developmental work upon this process further theoretical work on coal formation was not undertaken. In the past year, however, Dr. Karl Schoenemann of the Bergius laboratory has manufactured several pounds of the artificial coal from cellulose and smaller quantities from lignin. Chemical analysis and conversion of the artificial coal into products similar to those produced from natural coal have convinced Dr. Bergius that the substance made from the wood elements is a real coal.

Making of coal from wood and the production of oil from coal provide hints of the processes leading to the formation of these substances in nature.

Converts Petroleum to Coal

Converting petroleum partly into coal as a means of converting it completely into gasoline was the process proposed by Dr. Walter F. Rittman of the Carnegie Institute of Technology in one of the most sensational papers.

This project is not purely theoretical, for Dr. Rittman stated that one important American oil refinery is now manufacturing such synthetic coal at a rate of fifty tons a day and is planning to increase this output to a hundred tons and more. The process pays because of the increasing demand for motor fuel. Next year more than fifteen billion gallons of gasoline will be needed by the thirty million automobiles of America, so every effort will be made to push the cracking process further to increase the yield.

Formerly the fraction of gasoline distilled off was less than a fifth of the crude oil. Nowadays the best refineries get out four-fifths of the oil as gasoline. The residue, consisting of heavy oils contaminated with the lime used in the purification, will only bring from a half cent to a cent and a half as fuel. But in the plant referred to the distillation is carried further and the residue is dumped directly while still very hot and fluid into gondola (*Turn to next page*)

Coal Conference—*Cont'd*

cars, where it solidifies into a sort of artificial bituminous coal. This can be converted into coke by the ordinary ovens, or into gasoline by one of the hydrogenation processes that have been described at this conference by German chemists, Dr. Freidrich Bergius of Heidelberg and Dr. Carl Krauch of Ludwigshafen on the Rhine. Bergius began his attempts to make petroleum artificially in 1910 at what an American would consider the wrong end, that is, by trying to convert wood to coal, which is the geological process. Having by this learned something of how coal is constructed then he was ready to reverse the process and decompose coal in the hope of getting liquid fuel. The success of these efforts is attested by Dr. Krauch, who stated that the Leuna works in Germany are now producing 70,000 tons of synthetic gasoline and plan to produce 250,000 tons next year.

Where to Find Petroleum

Where may we expect to find in the future the petroleum to meet our constantly increasing demand was the vital question tackled by Dr. David White of the U. S. Geological Survey.

He exhibited a map of many colors in which he outlined the areas known to contain oil fields, those regarded as promising in varying degrees and those composed of strata from which no petroleum can be expected. About two-fifths of the area of the United States was classed as Producing, Proved, Promising or Possible. This included, among others, such regions as Kansas, Western Nebraska, Oklahoma, Montana, eastern Colorado, Indiana, Illinois, Mississippi, Louisiana and Texas, extending into the Gulf of Mexico. The black or unpromising portion of the map comprised the ancient igneous, pre-cambrian and metamorphic rocks, such as granite, gneisses and schists, which underlie a wide belt stretching from Maine to Florida, a large area about the Great Lakes and the main Rocky Mountain region between Wyoming and California. This map has been worked out in great detail on the basis of many years study by the Survey and should serve as a good guide to the oil prospector or to the investor in oil prospects.

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Since the earthquake of 1923, buildings in Tokyo are limited to three stories in height.