

Coal Research Frees World

Chemistry

By WATSON DAVIS

The elemental independence of modern man and his freedom from the accidental limitations of nature's distribution of natural resources under, on and above the surface of the earth was demonstrated at the Second International Conference on Bituminous Coal held last week under the guidance of the Carnegie Institute of Technology at Pittsburgh.

Oil from coal, coal from oil, coal from wood, edible fats from coal, rubber from coal, burnable gas from water, wood alcohol from coal, lubricants from coal, soap from coal were a few of the possibilities, many of them practical commercial realities, that the coal conference reports added to the more familiar chemical processes of modern industry which now derive perfumes more fragrant than flowers, colors more varied than the rainbow, coke more useful than raw coal, gas more calorific than natural gas and a multitude of other everyday utilities from coal, wood, oil, air and water.

So rapidly is science discovering the secrets of the raw natural materials and their elements that these coal conferences might well be broadened into CHON conferences. Why not a synthetic name for the congresses that contribute so much new knowledge to the present era of the industrial transformations based on chemistry? The chemical symbol, C, for carbon contained in coal, wood and oil, H for hydrogen in hydrocarbons and water as well, O for oxygen most prevalent in the air, and N for nitrogen, four-fifths of air, which is present in all living things and one of the principal constituents of fertilizer. These four chemical elements are the essentials of the vast fuel, coal, oil, wood, organic chemical, agricultural and food industries of the world as well as all forms of life. They exist the whole world over in some form or other. Every country has air and water, certain countries like the United States are blessed with bountiful supplies of easily available C as coal and oil.

From Europe, to this year's coal conference as to the first one in 1926, came the most ingenious and promising methods of converting coal into other things. Dr. Carl Krauch, German Dye Trust chemist, told how through the magic of catalysis and hydrogenation coal is made into gaso-

line, lubricating oil, kerosene, paraffin, alcohol, fats and nearly any other hydrocarbon that the market may desire. Dr. Friedrich Bergius, the Heidelberg chemist, whose hydrogenation process, first reported to the 1926 coal conference, is now used and controlled by the German Dye Trust, announced the conversion of the cellulose and lignin of wood into artificial coal, the process used by nature millions of years ago in the manufacture of coal. Dr. Fritz Hofmann, veteran German chemist, affirmed but did not explain the production of real rubber from coal. From France and other laboratories in Germany there came papers telling of intensive researching upon the vital problem of making from coal, which Europe has, the gasoline, lubricants, and other products that must at present be imported. Necessity is the reason why this sort of research is more intense in Europe than in America. Our country, richer in natural ready-made products, has devoted its brains and energy to better methods of cracking its petroleum or burning its plentiful oil and coal.

It is significant and encouraging that much of the pure scientific research, the romantic delving into molecular and atomic love affairs, that formed the foundation of European industrial applications was done here in America. Prof. Hugh S. Taylor of Princeton did much pioneer work on catalysis, in which one substance eggs on others to do something without being itself altered.

England has been more interested in the process of coal treatment known as low temperature carbonization. Instead of coking the coal at a high heat, as is done in the familiar by-product coke ovens of America, the volatile matter in the coal is driven off at a much milder temperature, preserving and producing more of the valuable liquid and gaseous products of coal. Low temperature processes are of great interest to America and, in fact, the largest low temperature carbonization plant in the world is now being erected in New Jersey.

Coal production in America has actually decreased in recent years due to the increased use of oil as fuel, F. G. Tryon of the U. S. Bureau of Mines, reported to the conference. And the oil industry is borrowing the latest coal research developments

to make its production more efficient. The German methods of liquefying coal have been brought to America and set to work getting a larger percentage of gasoline out of crude oil. A paradoxical development reported to the conference by Prof. Walter F. Rittman of the Carnegie Institute of Technology was the actual commercial production of artificial bituminous coal from crude oil residues as a by-product of the production of gasoline.

Since large amounts of raw coal will still be burned despite the new treatments and transmutations that are possible, new combustion methods are being developed. Pulverized coal has propelled its first sea-going vessel, the *S. S. Mercer*, C. J. Jefferson of the U. S. Shipping Board, and Commander J. J. Broshek of the U. S. Navy told the conference. In Germany an internal combustion engine of the Diesel type has been built to feed on powdered coal. Abroad locomotives fired by coal dust draw trains. Great power plants are being built here and abroad to use the finely divided state of coal.

For power production coal or other combustibles are not a necessity as hydroelectric plants have demonstrated. To the coal conference was reported a power production method that promises to be another fuel competitor. Georges Claude, the French scientist, whose name and genius is associated with ammonia synthesis, liquid air and neon lights, proposes to tap energy of the sea, the temperature falls of the ocean. In Belgium a power plant of sixty kilowatts runs on the temperature drop of thirty-three degrees Fahrenheit. In the warm tropical waters of Cuba, whose depths are always cold, he proposes to build a larger power plant utilizing the free power of the sea's temperature difference. Eventually he foresees Florida and Southern California benefiting from his new invention.

The two years since the first Carnegie coal conference, as summarized in the papers presented this year, exceeded in achievement even the prevision of Dr. T. S. Baker, president of the Carnegie Institute of Technology, whose planning and energy made possible the international conferences. The effects of such vigorous world congresses upon world industry can not be properly appreciated contemporaneously but the (*Turn to next page*)

Once upon a time there was a busy person who, discovering that Thanksgiving was past, began to worry and make out a Christmas list. He was in what the novels call a dilemma. So many figurative stockings to fill! And handkerchiefs, neckties, and the doodads of the department stores seemed so trite and futile.

And then the busy person, leafing over the pages of his favorite magazine for relief and relaxation, came upon this life-saving suggestion:

"Make a year's subscription to the SCIENCE NEWS-LETTER your standard Christmas gift, a 52 time blessing to the recipient. Notification card will be sent to you or directly to your lucky friend. Science Service as its Christmas gift to you offers a reduced price (good until January 1, 1929 only, as they say in the bargain advertisements) of only \$8.00 for two gift subscriptions, \$12.00 for three gift subscriptions, etc."

Realizing that this was the happy solution of his difficulty and that he would actually save money, the busy person jotted down the names and addresses in a space like this:

He wrote out his check, mailed it and the list to Science Service, 21st and B Sts., Washington, D. C., and stopped worrying until next December 1.

P. S.—You are invited to do likewise. In spite of the beginning, this is not a fairy story.

Coal Research—Cont'd

800 representatives of twenty nations attending will take back to their plants and laboratories new ideas and enthusiasms. Those attending the conferences can not help but feel that the prosperity of CHON industries are fully as dependent on science as on economics, if not more so.

An important by-product of the coal conference should be a growing realization that rampant nationalism is as obsolete as the open coal grate. Wars, always wasteful, need not be fought for raw materials. All nations have them in some form. Scientific conquests are more lasting than military successes. At the coal conference Germans, French, English and Americans worked together. The genius of discovery and research in any part of the world in these accelerating days soon conquers the whole globe.

Science News-Letter, December 1, 1928

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

A pneumatic rubber raft for use in flood relief work has been tested by German firemen.

Crocodiles and hippopotamuses were sometimes set to fighting each other in the Roman circus.

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