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SOME PAPERS READ BEFORE THE PITTSBURGH MEETING OF THE AMERICAN CHEMICAL SOCIETY

DR. PER K. FROLICH, of the Standard Oil Development Company, in his presidential address before the American Chemical Society, stated that the danger of oil famine is not immediate. Taking a temperately optimistic view, and not trying to dodge present or anticipated difficulties, he still accepted an estimate of 300 years before the earth runs out of oil. This is assuming consumption at present rate, discovery of new reserves where they can reasonably be expected, and unhindered production and distribution.

The United States is especially favored as an oil-producing country, Dr. Frolich pointed out. While its boundaries enclose only 5 per cent. of the land area of the earth, it contains 15 per cent. of the area of the structures most favorable for the occurrence of oil fields. He estimated that the forty-six billion barrels thus far discovered and partly extracted in this country represent less than half of the oil we shall eventually contribute before the last American pool has been pumped out. A round hundred billion barrels was his estimate of America's share of the ultimate 600 billion barrels that all the world's oil fields, existing and yet to be found, should produce. Back of our oil reserves stand our coal beds, which contain an estimated three trillion tons. Coal accounts for more than 98 per cent. of our country's known energy resources, exclusive of water power. Methods for converting solid coal into liquid oil are already known and in use, and we can turn to them as our supplies of oil and natural gas run low and the cost of gasoline rises accordingly. Such gasoline from coal is not likely to be cheap, however. As compared with a cost of eight and a half cents a gallon from crude oil at two dollars a barrel, gasoline from coal has a cost ranging around twenty cents a gallon. Whether new processes could cut that cost is in the realm of prophecy rather than that of scientific estimate. The better part of wisdom would seem to be not to expect too much until you see it.

CHEMICAL research laboratories, often thought of as a luxury that only big businesses can afford, will operate for the benefit of small and middle-sized businesses as well, in the post-war era. At a symposium on this subject, the speakers told how the needs for research will be met by privately managed consulting laboratories and by government research workers as well as by laboratories owned and operated by the corporations themselves. Small businessmen were promised a share in the rapidly developing field of industries based on farm products, in the address of Dr. O. E. May, research coordinator of the U. S. Agricultural Research Administration. "These include," he said, "the dry and wet milling of cereal grains, processing of fruits and vegetables, production and processing of vegetable oils, meat packing, dairy products, feeds, fertilizers, insecticides and fungicides, pharmaceuticals, naval stores, fermentation products, rubber, leather, fibers and textiles." On all these materials, and many besides, the U. S. Department of Agriculture was conducting very active research in its four great regional laboratories when the war interrupted all programs. The laboratories are concentrating on war problems now, but as soon as victory has been won they will return to their normal activities. Conversion, Dr. May stated, will not be a difficult or lengthy process for most parts of the program. Small businesses will of course not be dependent entirely on what government scientists do for them. Charles H. Egan, of the Dewey and Almy Chemical Company, outlined some of the other research resources of the manager of a small business. Even a modestly financed plant can often afford to hire two or three research men, he pointed out, and it can also obtain more information by small research grants to be used in college and university laboratories. The resources and scope of activity of a professional consulting firm with a large laboratory were described by Raymond Stevens and Earl P. Stevenson, of Arthur D. Little, Inc. They pointed out that research is sometimes needed in the most surprising spots: for instance, anthropologists had to be called in when transport planes for paratroopers were being designed, to make sure the seats would fit the anatomies destined to sit in them.

ULTRASONIC waves, which are sound waves far too high-pitched for any ears to hear, have strange effects on mixtures and solutions, and may some day become a useful chemical tool, was stated by Professor Karl Sollner, of the University of Minnesota. Audible sound waves come at rates of a few hundreds or thousands per second; ultrasonics, which are started by crystals set into rapid pulsation by high-frequency electric currents, have rates up to a million or more per second. Their effects were first studied some years ago by Professor R. W. Wood, of the Johns Hopkins University, and Dr. A. L. Loomis, in the latter's private laboratory at Tuxedo Park, N. Y.; since then also by a number of other workers. The waves have been used to make permanent emulsions of such "unmixable" things as oil and water and even water and mercury. Acting on this hint, one investigator used them to homogenize milk so that the cream will not separate out. This use has not yet been commercialized. The waves also disperse exceedingly fine metallic particles through a suspending medium; Professor Sollner suggested their use in this way to produce special, ultra-fine-grained photographic emulsions.

HEATING plastic objects all the way through at the same time, by the same radio-wave treatment used in producing artificial fever in modern medicine, is the newest device to speed up the production of airplane instrument panels and steering wheels, radio housings and knobs, and all the ten thousand other plastic gadgets used in present-day war equipment. It has been given the convenience-name of "heatronic molding." It was described by V. E. Meharg, of the Bakelite Corporation. Use of high-frequency waves to produce heat in metal objects is not new, but it

has not been practical until lately to heat up non-conductors of electricity in this way. Now that means have been devised to make it work, it is being used to produce a more uniform, even heat throughout plastic objects of the thermosetting variety, in which one heating forms and hardens the plastic, which will not soften or change for any number of subsequent heatings. Hitherto it has been the practice to heat the die, which has meant that the heat flowed from the outside inward, and was not uniformly applied throughout the mass at the same time.

STEEL for war, with many of the properties of expensive alloy steels, can be made without the necessity of adding such hard-to-get elements as chromium and vanadium, according to Dr. Merle Randall, of the University of California. It is made by a special heat treatment of ordinary low-carbon steel. The process, which was originated by Dr. Randall's colleague, George F. Nelson, of Berkeley, Calif., consists in heating the steel very hot—up to 1,700 degrees Fahrenheit, and then suddenly quenching it in a 35 per cent. solution of either caustic potash or caustic soda. The metal can then be cold-rolled into sheets or bars without difficulty. Tests show it to possess an extraordinarily high strength.

WAR-NECESSARY sulfur can be salvaged from choking gas now wasted up the chimneys of factories, oil refineries and smelters, and turned from an irritating nuisance into hard cash. The process whereby this is accomplished was described by T. F. Doumani, R. F. Deery and W. E. Bradley, of the Union Oil Company of California. The waste gas is sulfur dioxide, the same suffocating fumes you smell when a sulfur candle is burned. It is an inevitable by-product of the refining of many types of crude oil, the burning of certain kinds of soft coal and the roasting of ores. In the new process this gas is passed over a catalyst at moderately high temperatures with the addition of hydrogen. The hydrogen takes the oxygen away from the sulfur dioxide to form water which comes off as steam. The sulfur comes off in pure form ready for use in vulcanizing rubber or for any of its other thousandfold industrial tasks.

KEYED to the wartime need for quicker answers to research questions is a method for testing the rust-preventing properties of paints, on which a report was given by Dr. G. D. Patterson and Dr. C. K. Sloan, of E. I. du Pont de Nemours and Company. Instead of painting a thick slab of steel and then waiting for the paint to begin peeling, a testing method requiring a year or more, a film only a thousandth of an inch thick is applied to small sheets of iron foil rolled to a uniform thickness of one two thousandth of an inch—about one eighth as thick as common newsprint paper. The foil is first cemented to small slips of glass, then the paint is sprayed on and the whole set-up is exposed to rust-provoking atmospheric conditions. With metal so thin, it does not take long for holes to be eaten clear through it, once rust gets started at all. The length of time a sample holds out before you can see through it in spots is a measure of the success of the paint under test.

LOOKING to a day when gasoline will be a permanent rarity in the United States and probably in the whole world, Dr. Gustav Egloff and Prudence Van Arsdell, of the Universal Oil Products Company, described progress already made in the development of motor vehicles that will run without gasoline. These are the producer-gas units, mostly trucks and buses but including many motor cars as well, that already ply the streets and roads in oil-less lands. They convert wood chips, charcoal, and a number of other solid fuels into gas, which is then fed into internal combustion engines. Dr. Egloff estimated that even now there are more than 800,000 such vehicles in operation.

THE possible existence of a new food factor necessary for reproduction, believed to be different from the already-known vitamin E, was suggested by H. W. Schultz, R. E. Gray and H. E. Robinson, of Swift and Company. The new vitamin (if that is what it is) appears to be present in meat, but is made useless by heating. Cats were used in the experiments. Some were fed on raw meat, others exclusively on meat that had been highly heated. Tomcats fed on the heated meat sired no kittens during a period of three and four years. Female cats similarly fed either had no kittens, or had very few, and those unhealthy.

COMMON white sugar is the purest chemical substance that most of us ever get to see; it is nearer absolute chemical purity than most of the laboratory compounds bearing the mark, "C.P." This very purity becomes a handicap for some purposes; one of the complaints sometimes heard against refined sugar is that it supplies energy without accompanying vitamins. That vitamins are not lacking in the source of sugar is indicated by results of analyses presented by William R. Jackson, of the research laboratory of Merck and Company. He worked both on whole cane from Cuba and Louisiana, and on raw sugarcane juice. His report: "Whole mature sugarcane is a fair source of thiamin and riboflavin, rich in pantothenic acid, and a good source of niacin."

IF you want to get all the sugar in some of our common vegetables, you'll have to eat them raw. This would seem to be one conclusion to be drawn from studies of E. Whitman Rice and Louis Lang, of the National Sugar Refining Company. They found that although onions, cabbage and carrots contain considerable percentages of sugar, they lose them in various steps involved in preparing them for the table. Carrots especially "bleed" sugar very freely. "A preliminary experiment with fresh carrots showed that 50 per cent. of the total solids were lost when the carrot was subjected to the common steps of precooking (blanching) before dehydrating and reconstituting before the final cooking. Losses in cooking will be additional to these mentioned. Further experiments seem to indicate that the losses of valuable food components of vegetables in certain methods of processing warrant a re-evaluation of some products. This is especially true during the present food shortage."