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THE BUFFALO MEETING OF THE AMERICAN CHEMICAL SOCIETY

CHEMISTRY'S contributions to the American war effort was the keynote of the annual fall meeting of the American Chemical Society which opened last Monday, with 4,000 of the country's leading chemists gathered to hear and discuss something over 400 papers setting forth the gist of the year's progress.

"National Survival Through Science" was the subject of the presidential address, delivered Monday evening by Professor Harry N. Holmes, veteran of the Oberlin College faculty. More particular treatment of special topics at the daily sessions included papers on such war-important subjects as synthetic rubber, gasoline and oil, alloy steels, dehydrated foods, synthetic plastics, potash and the newer chemical drugs.

There were many men well known in industry and public affairs as well as in the field of chemistry among the participants in the program. The list included Lieutenant General William S. Knudsen; Dr. Charles M. A. Stine, vice-president of E. I du Pont de Nemours and Company; Dr. Willard H. Dow, president of the Dow Chemical Company; Dr. Edward R. Weidlein, director of the Mellon Institute in Pittsburgh, and many others.

Chemistry's equivalents of Distinguished Service Medals were awarded at the meeting. The Francis P. Garvan Gold Medal, honoring women in chemistry, was presented to Dr. Florence B. Seibert, of the Henry Phipps Institute of the University of Pennsylvania, for her distinguished work on the chemistry of tuberculosis. For contributions in the field of protein chemistry, Dr. John L. Oncley, of the Harvard Medical School, will receive the $1,000 American Chemical Society Prize in Pure Chemistry, given annually for outstanding research by a man or woman less than thirty-six years old.

One feature that usually marks meetings of the American Chemical Society was this year conspicuously absent: there were no inspection trips to industrial plants where chemical methods are in use. This year, and for the duration, such visits are impossible because of wartime restrictions that bar even scientists from factories where production is being pushed to the utmost and even the visits of colleagues would be a time-losing distraction. Instead, parties of the chemists and their wives made trips to nearby Niagara Falls.

VANADIUM, strengthener of steel for war, is now being extracted by a new process from Idaho phosphate rock used in fertilizer manufacture. It is estimated that half a million tons of vanadium can be recovered from the 5,700,000,000 tons of phosphate rock in sight in this deposit. The extraction process was described before the meeting of the society by Dr. J. Perry Morgan, chemical engineer of the Standard Oil Company of New Jersey, who developed it under the direction of Professor Arthur W. Hixson, of Columbia University.

The phosphate rock is first treated with sulfuric acid, the solution concentrated by evaporation, and then treated with nitric acid. The vanadium is precipitated as vanadyl phosphate, and the phosphoric acid is filtered off to be used in the making of fertilizer. The vanadyl phosphate is subjected first to live steam, then treated with ammonia gas and ammonium nitrate, which converts it into ammonium vanadate. The ammonium is driven off as ammonia gas by heat, leaving a residue of vanadium pentoxide, which is the form in which vanadium is supplied to the steel industry.

Vanadium is a prime toughener of steel. It is a requisite in the manufacture of armor plate, crankshafts, axles and piston rods, and other steels needed where heavy punishment will be encountered. About four pounds are added to each ton of steel, as a rule.

American steel makers have depended mainly on one mine in Peru for their vanadium supply, with certain additional amounts from Africa. However, war demands for steel have so greatly increased the quantity of vanadium needed that new sources had to be sought. There are other deposits of vanadium-containing minerals in the United States, but unfortunately they are badly scattered. However, the total supply of the vital alloy metal in this country will probably amount to several million tons, if emergency requires complete exploitation.

DEHYDRATING vegetables is not simply a matter of peeling and slicing them and tossing them into the drier. There are a lot of tricks to the trade, and ignorance or neglect of them will produce the inferior products that gave dehydration such a black eye during World War I and delayed its progress by a decade or more. Dr. W. V. Cruess, of the University of California, told of some of the things that must be done if dehydrated vegetables are to be really good.

First of all, the vegetables must be garden-fresh. Keeping them for any length of time results in a loss of vitamin C, he said. Then they must be blanched, that is, thoroughly scalded in hot steam, to stop the action of their own enzymes which will spoil both quality and color if they are allowed to continue their activities within the cells. The practical dehydrator has to know certain necessary facts about plant physiology, and apply them. Dehydration temperatures can be high at the beginning, while the vegetables still have full moisture content, because the water absorbs the heat. But near the end, the temperatures must be kept to a safe, low level.

Even after the job is finished, there are still troubles to contend with, Dr. Cruess told his listeners. Insects love dehydrated foods, and will chew through anything but metal or glass to get at them. They are highly absorbent toward atmospheric moisture, and likely to spoil in contact with oxygen; which again calls for special protective measures.

WHILE food dehydration is attracting great attention because the products can be so compactly shipped for

overseas use, quick-freezing of fish, meat, fruits and vegetables for home consumption is not being neglected. Frozen fish is in such great demand, according to Domenic DeFelice, of the New York State Agricultural Experiment Station, that hitherto unused species have had to be added to haddock, flounder and other first favorites for filleting. The frozen berry industry in the Pacific Northwest has about reached its limit, but is expanding elsewhere in the country. Boned and packaged meats are being frozen in large quantities for Army use.

THE canning industry took a body blow when Jap aggression cut off hitherto abundant tin supplies, but canners are putting up a good fight to do their share toward national food conservation, was stated by E. J. Cameron of the National Canners Association. Electrolytic tinplate, which requires far less tin than the old method, and pretreated steel plate, which requires no tin at all, are coming into increasing use. Low-tin and tinless solders also are winning their way.

DRINKS as well as foods came in for attention. Dr. A. J. Liebmann and M. Rosenblatt, of the Schenley Distillers Corporation, told of researches on the chemistry of aging whiskey which they have been carrying on for five years, with an array of about 560 barrels of liquor as experimental material. All whiskey is colorless when it is first run into the barrel, they stated. It gains color, aroma and most of the other qualities prized by the proverbial "judge of good liquor" through long contact with the wood. Three things happen: (1) Extraction of substances from the wood; (2) oxidation of some of the original substances in the liquor and also the material extracted from the wood, and (3) reaction between the original substances and those from the wood.

THE postwar automobile will burn gasoline of 150 octane rating, and it will never be necessary for the filling station attendant to put more water in the radiator because the cooling system will be permanently sealed. When you get home from your ride, you'll put the car in a garage with plastic-and-plywood walls and a stainless steel roof.

Your house will be built of the same materials, strong yet so light that two men will be able to lift the whole wall of a room as they put it up.

These are items from a vision of the future presented in an address by Dr. Charles M. A. Stine, vice-president of E. I. du Pont de Nemours and Company. They aren't just dreams, he explained; the things actually exist now, at least on an experimental basis, but are at present absorbed into the war effort.

Other new accomplishments in scientific technology were listed by Dr. Stine: glass that is unbreakable, glass that will float, wood that won't burn, shoes that contain no leather, window screens without wire, machinery bearings not made of metal. Post-victory production of consumer's goods will reach heights undreamed of in prewar days, the speaker predicted. We have built an immense industry that turns out more light metal in a year than was formerly produced in a decade, with corresponding volumes in such things as special steels, plastics, synthetic fabrics, fuels.

Having seen how abundantly we can produce for war, the American people will insist on abundance in time of peace, Dr. Stine forecast. Slums must be cleared away, he declared; the space they leave should not be filled with other buildings, but put to use as close-in airfields. Better nutrition for everyone, based on recent researches in food chemistry, is imperative for the maintenance of a population of high industrial productivity.

No doubt, some will become alarmed over the possible displacement of old materials and old industries. Changes of a drastic nature are inevitable, but they seldom result in the hardships that the timid predict. . . . Let our swords be mighty, and mighty indeed will be our plowshares.

MEATLESS days, even whole meatless months in an emergency, need have no nutritional terrors, if a supply of soybean, cottonseed or peanut flour is available, the American Chemical Society heard in a report by Theodore F. Zucker and Dr. Lois Zucker, of Columbia University. These flours, which are made from the seeds after the oil has been extracted, are very rich in protein and certain vitamins, so that they should prove highly valuable as additions to ordinary wheat flour, making bread a more nearly balanced diet. It is possible to make a meatless sandwich just by buttering two pieces of this mixed-flour bread and slapping them together. The "meat" is invisibly present, incorporated in the bread itself. Both soybean and cottonseed flours have distinctive tastes to which the eater needs to become accustomed. Cottonseed flour makes a yellower loaf than most of us are used to. On the other hand, it is very cheap—five cents a pound on the current market. Peanut flour offers less difficulty so far as taste is concerned, but its price is considerably higher.

Test batches of bread were made up out of various mixes of these seed flours with wheat flour and tried out on rats, which throve very well on them, needing no other source of proteins. They also got sufficient quantities of two necessary vitamins, thiamin and riboflavin, from the seed flours.

ANOTHER by-product of agricultural industry that may find profitable use through chemical handling is bagasse, the woody waste left after the sugary sap has been crushed out of sugarcane. Professor Donald F. Othmer and George A. Fenstrom, of the Polytechnic Institute of Brooklyn, described their experiments with this material. From a ton of dry bagasse, heated in a dry still, they obtained 35 pounds of acetic acid, one and a third gallons of crude methanol (wood alcohol) and 750 pounds of charcoal. The acetic acid and methanol are in large demand as industrial solvents, and charcoal is a familiar domestic fuel in the warm lands where sugarcane is grown. The experimenters pressed it into briquets for marketing.

WORLD WAR I caught us short on potash, necessary alike for farm fertilizer and chemical manufactures. It isn't happening this time. That the pre-1914 German monopoly

of this important mineral has been broken by the development of an American potash industry, was pointed out by Dr. George R. Mansfield of the U. S. Geological Survey. At present, only the highest grade potash deposits in the West are being worked, but these alone would be enough to supply American needs for 200 years, at present rates of use. In addition there are large quantities of other potash minerals that are not profitable to exploit at present, but may be made so by future technical advances. How potash is helping the United States to win the war was outlined at the same symposium by Dr. J. W. Turrentine, of the American Potash Institute. With plenty of this highly important fertilizer element now available, farmers need not stint their fields as they had to during the first World War, but can use all they need. This means bigger crops from the same acreage, which in turn means more bread, more meat, more vegetable oils for ourselves and our allies.

IF Nazis or Nips resort to polecat warfare and spray poison gases on the commissary stores, that doesn't necessarily mean that the troops will have to go hungry. Of course, mustard gas instead of mustard on your meat would make it unfit to eat—but if it is wrapped or packaged as well as most commodities are now-a-days it will still be good to eat after the covering has been decontaminated and removed. Do's and don't's or anti-gas protection for foods were reviewed by Dr. Sidney H. Katz, of the U. S. Chemical Warfare Service's main arsenal at Edgewood, Md. The most dangerous of so-called poison gases, from the food-contamination viewpoint, are not really gases at all but finely atomized liquid sprays. These cling to anything they touch, and unless recontaminated will remain dangerous for days. Decontamination is not a job for just any one; it must be carried on under the direction of an officer trained for this particular job. The best protection against chemical contamination, the speaker stated, is afforded by the most conventional of food packaging—tin cans and glass jars. Cellophane is very good for excluding the insidious poisons, especially when the package seams are well sealed. Tin foil and aluminum foil wrappings also are effective, but only if tightly applied. Simple paper or cloth bags are bad, but several layers of either paper or cloth give fair protection. Corrugated cardboard is good, especially if it has been given a glazed coating. Natural rubber is not as effective against war chemicals as some of the synthetic rubbers.

CHEAPER riboflavin (vitamin B_2) for bread enrichment is the prospect held forth by Dr. Jonas Kamlet, of Miles Laboratories, Inc., New York City. Ribose, a special sugar which is the only raw material from which riboflavin can be elaborated, is produced by a strain of yeast that is fed on waste sulfite liquor from paper-pulp mills, one of the most troublesome of all industrial wastes. The process was developed first at the National Bureau of Standards, Dr. Kamlet stated, and the first commercial installations are two plants set up in Canada by a Swedish engineer, G. Heijkenskjold. Similar plants will be built in the United States after the war.

DYES made directly from soft coal, instead of the time-honored coal tar, were described before the meeting by Dr. H. B. Charmbury, of the Pennsylvania State College. The coal is first treated with nitric acid, to obtain a foundation material which is then treated with organic acids and inorganic alkalis to produce the dyes themselves. These direct-from-coal dyes were tried by Dr. Charmbury on animal fibers like silk and wool, vegetable fibers like cotton and linen, and synthetics like rayon and nylon, with successful results.

PHYSICS supplemented chemistry in a search for causes of the stretchy, bouncy behavior of rubber when a group of physicists from Notre Dame University presented three papers before their chemical colleagues. The chemists remembered the classic contributions of a former colleague from the same university, the late Father Nieuwland, pioneer in the creation of synthetic rubber, as they listened to the presentations of Dr. Eugene Guth, Dr. S. L. Dart, Dr. R. L. Anthony and Dr. L. E. Peterson, together with Dr. H. M. James, of Purdue University. The picture they gave was one of a curious substance that has some of the behavior features of a solid, some of a liquid, and some even of a gas. Explanation is to be found, the speakers suggested, in the shape of the individual rubber molecules, which are long, spiral, wormlike affairs that hook their coils together like tangled springs. One of the gas-like properties of rubber is its curious sudden rise in temperature when it is stretched, and its cooling when it contracts. This can be tested by any one, merely by touching the lips to a quickly stretched rubber band. The Notre Dame scientists have made a quantitative study of this strange temperature effect in rubber, with sensitive scientific instruments. Their data are expected to be of value in the future development of both natural and synthetic rubbers.

COAL is commonly thought of primarily as food for the mouths of factory furnaces, rather than as a material of great benefit to farmers—beyond keeping their houses warm, perhaps. But that farmers are beneficiaries of the mining and coal-processing industries in a number of ways, was pointed out by Dr. Hubert G. Guy, of the Koppers Company, Pittsburgh. Ammonia compounds, by-products of the coke industry, have become one of the principal sources of fertilizer nitrogen. Naphthalene, a by-product of coal carbonization, is widely used to combat several kinds of insect pests, as well as in preserving stored hides. Synthetic plant hormones, also originating from coal, hasten the formation of roots on cuttings and are sprayed on orchard trees to prevent premature dropping fruit. Other coal products are used as food colorings, wood preservatives, disinfectants and parasite killers.

ANTHRACITE coal is coming into wide-spread use for filtering city water supplies, replacing the long-used sand beds, according to Dr. Homer G. Turner, of the Anthracite Equipment Corporation, New York. During the past seven years anthracite for filter use has been shipped to every state in the Union and to Alaska, Canada, South America, England, Australia and Iran.