

CHEMISTRY

Chemists Changing World

Meeting of American Chemical Society notes how advances in the science has brought vast new industries into existence in a comparatively few years.

► CHEMISTS ARE creating more major changes for the world, sessions of the American Chemical Society in Cincinnati revealed.

Within the lifetimes of those still in school, chemical science has brought atomic energy, antibiotics, new plastics, more riches from petroleum, and a thousand other things.

Advances were reported at this meeting in the following fields:

Chemicals which feed cancerous cells, and chemicals which damage them, thereby helping the patient. Irritating chemicals which start cancers, and the body's response.

How bones grow, and how much of the living bone is rock-like crystal. What role phosphorus plays in the chemical processes of life.

Relief for patients with high blood pressure, and methods for testing new drugs which will show the doctor the difference between effect of the drug and reaction of the patient.

Chemical pattern of drugs found helpful in treatment of disease symptoms, in both man and animals.

What can be learned about the cellulose molecule by taking it apart a little at a time. Application of this knowledge to improvement of wood, paper and photographic film made from cellulose esters.

How chemicals can change the make-up of soil, either to make farming better or to make firmer roadbeds and safer airstrips.

Aromatic chemicals, of the type made from coal tar and heavy petroleum residues, and how they can be used in industry.

Molybdenum, a metal coming more and more into use both alloyed with steel and compounded to form pigments and lubricants.

Many elements long known are proving capable of forming new kinds of useful compounds, making them exciting substances to chemists. Silicon, boron, titanium, zirconium and the so-called rare earths are among these. A symposium was held to describe these and especially their compounds with hydrogen.

Better Gas With Urea

► IMPROVED GASOLINE, jet fuels, fuels for diesel engines and lubricating oils may be taken out of crude petroleum by a process almost as simple as filtration. Extensions of this new process, which uses the chemical urea to trap "straight chain" molecules, were reported to the society.

Urea, when added to a mixture of liquid

hydrocarbons, such as ordinary petroleum, forms crystals in which gasoline fractions of simple chemical structure are trapped. These can be filtered from the crude oil, leaving the so-called "branched" hydrocarbons, which are desired in gasoline for their anti-knock properties.

New information on how the urea "host" crystals trap their hydrocarbon "guest" molecules in this process was given by Dr. Hermann Schlenk of the Hormel Institute of the University of Minnesota. Using the same process to separate fatty acids, Dr. Schlenk found forces of attractions in the crystals which line up the fatty acids in pairs with the acid and non-acid parts of the molecules alternating in direction.

Heating the urea crystals allows the guest molecules to escape as oily drops.

Cyclic processes to separate petroleum fractions and recover the urea and the solvent alcohol used with it were reported by Dr. L. C. Fetterly of the Shell Development Co., Emeryville, Calif. Instead of the alcohol, water with suitable additives may be used in the continuous process, Dr. Fetterly said.

Study Artery Hardening

► THAT A person is as old as his arteries has new meaning in the present day of replaceable spare parts for the human body. Leaks where artery splices have been made may be started by strains due to the continuous pulsing of the blood. Changes in aging artery walls can increase the hazard of such leaks.

At the University of Southern California in Los Angeles, Drs. H. H. Zinsser, Leslie Kaeburn and John Leonard have studied three tissues in artery walls to find what changes take place in them as the body ages.

Smooth muscle, collagen and elastic fibers make up the walls. They change in structure independently, the Los Angeles scientists find, with muscle and collagen showing their age the least. They reported the results of their studies with electron microscope and X-ray diffraction apparatus to the meeting.

Progressive crystallization in the walls of the arteries, of a type not previously recognized, may make the walls more brittle, the California team stated, while the relaxing chemical, hyaluronidase, when injected into the tissues seems to loosen the gel-like material in which the muscle fibers are embedded without harming the fibers themselves. The elastic fibers are believed to draw on the gel-like material to form the crystals which increase with age, pointing

the way toward further study of the relationship between these structures.

Tar From Plants

► DUPLICATING NATURE'S secret process for making bituminous material from decaying plant remains was the aim of researchers whose results were reported at the meeting.

Action of alkaline solutions on cellulose, the plant's structural material, and on carbohydrate compounds known to be formed when cellulose breaks down, yielded oily products similar to bitumen, in researches carried on at the Johns Hopkins University by Dr. Walter G. Berl of the Applied Physics Laboratory of that university and Dr. Charles E. Feazel of the Southern Research Institute, Birmingham, Ala.

As an intermediate product, a "humic acid" was formed after the treatment had been carried on for only a short time. Further action of the alkaline solution changed this material to the bituminous oil.

Acid products of cellulose decomposition gave very little of the oil when treated in the same way. Acetol is believed to be the intermediate product between cellulose and humic acid.

Rays Toughen Plastics

► WARNING THAT chemical effects produced in plastic film by exposure to the reactions going on in a nuclear reactor are not the same as those produced by radiations from a fission product source, such as cobalt 60, was given by Drs. Milton Burton and M. P. Reddy of Notre Dame University.

Cross-linking increases strength and toughness in plastic film which has been irradiated.

The question in exploring effects of irradiation on plastics, these scientists stated, is not "why does cross-linking of polymers occur" but rather "why does it not always occur."

Partial breakdown of fluorine-containing polymers, resulting in corrosive materials which take part in the cross-linking reaction, was reported by Drs. Allan R. Shultz and Frank A. Bovey of the Minnesota Mining and Manufacturing Co., St. Paul, Minn.

Anti-Arthritis Drug

► A NATURAL sweetener that missed saccharin's role as a non-nutritional flavoring substance may prove to be the source of a new anti-arthritis drug.

Known as stevioside, its complex chemical formula containing three units of ordinary sugar plus other structures was described by Dr. Hewitt G. Fletcher of the National Institutes of Health.

The non-sugar component of stevioside is partly responsible for the extreme sweetness, as great as saccharin, or 300 times as great as sugar. Found in leaves and twigs of the "sweet herb of Paraguay," the sweeten-

ing agent amounts to seven percent of the wild plant. It was once cultivated in South America in the hope of finding a market, but although it is plentiful the cost of harvesting keeps it from competing with saccharin and other synthetic sweeteners.

Now the cyclic component attached to the sugar-like stevioside offers hope that the plant may become a raw material for cortisone-like compounds. Chemically, stevioside is interesting as the only sweetening substance of any power that contains no nitrogen. No chemical structure common to sweetening materials has been discovered.

Inks Need Stickiness

► WHAT makes things stick together, especially things like paint, plastics and printing ink?

Printing ink especially should stick to the surface it is printed on. Its ability to do so is affected by conditions for its solid rupture vs. those for its viscous flow, stated Dr. A. C. Zettlemoyer and his associates of the National Printing Ink Research Institute at Lehigh University, Bethlehem, Pa.

High speed photography helped these scientists learn about these conditions and how they are affected by added pigments and other factors.

Adhesives for bonding two pieces of glass together are best made of polyvinyl-butyl resin mixed with modified phenol, Dr. Frank Moser of the Pittsburgh Plate Glass Company told the meeting. Other new types of adhesives for glass were listed by him, including epoxy resins.

Dr. E. W. McGuinness of the General Electric Company praised epoxy resins for stability at the boiling point of water, naming many catalysts which improve these new resins.

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TECHNOLOGY

Milk Vending Machines Possible With New Pump

► VENDING MACHINES dispensing milk into paper cups like soda pop may soon be popping up in theater lobbies and office corridors.

A splash-proof pump has been developed at the Armour Research Foundation of the Illinois Institute of Technology, Chicago, that meets with "strict health requirements that milk dispensed from a machine must not splash or touch moving parts."

The new pump is described as the first device ever perfected to meter and pump a liquid continuously without splashing and without the use of a pressurized tank. In operation, the milk remains inside rubber tubing connected to a milk tank. The milk is trapped in the tubing between two rollers.

In ordinary pumps, the Armour scientists said, splashing is prevented by reducing the pulsation, much like the action of the shock absorber on a car. In the new pump, an especially-designed cam that lifts each roller completely eliminates the pulsation.

Science News Letter, April 16, 1955

GENERAL SCIENCE

Study Lighthouse Horizon

► AFTER WATCHING over the Sandy Hook, N. J., horizon for 93 years, the historic Navesink Lighthouse has been retired. But not until scientists had spent nine months in its tower taking nearly 3,000 pictures of that horizon.

Lenses were focused on that thin, sometimes imperceptible line between sea and sky to perfect techniques of shooting the boundary as an air-navigation aid.

If photographed accurately enough, the horizon could provide a reference line to determine pitch and roll of aircraft. The accuracy called for in the experiments allowed an error in angle of roll not greater than 1/240th of a degree.

The scientists, from the research division of the New York University College of Engineering, are now studying the slides to find the best combination of film, filter and exposure to record the horizon from an airplane. The results will be turned over to the Sperry Gyroscope Co., which sponsored the research.

Flight tests are scheduled to try out the system which is expected to help check aircraft stability.

The NYU researchers report that water vapor in the air was the greatest single obstacle to clear horizon shots. To increase contrast, they experimented with sky-colored filters.

Smoke from industrial areas of New York, New Jersey and Philadelphia hampered the photographic work considerably, they said. But it also provided a screen that might well be encountered by aircraft in flight.

The group began taking pictures with a standard 35mm camera and later used a 400mm long range lens.

MEDICINE

Length of Smoke Important

► HOW SHORT you smoke your cigarette is found to be important by the chemical laboratory of the American Medical Association.

The latest of a series of reports on cigarettes, cigarette smoke and filters appears in the *Journal of the American Medical Association* (April 9). It is summarized by the American Medical Association as follows:

"If you are concerned about how much nicotine and tar gets to your mouth when you smoke, you almost have to have a chart in your hand. If you want the least amount, you would do well to smoke a king-size laminated asbestos-paper filter cigarette, but only if you put it out while the butt is about an inch and a half long. If you smoke it any shorter, you get more nicotine and tar than from a regular size.

"Other filtered king-size cigarettes let a little more nicotine and tar through. A



SHOOTING HORIZON—NYU researchers prepare to take picture from Navesink Lighthouse tower. Darrell Hill, left, takes light reading while Fred Bengston sets camera mount.

As the scientists moved their gear away, caretaker William Kennebeck took charge of the house, made obsolete by radar and sea-based lights. But unlike most Government-owned lighthouses which have been scrapped or made over into motels or restaurants, this lighthouse will become a historical monument and marine museum with a surrounding park.

Science News Letter, April 16, 1955

regular length no-filter brand screens out still less, but you can smoke it down to about an inch and get less nicotine and tar than if you smoke a king-size right down to the filter. You would be better off if you smoked even a non-filter king-size and threw it away when it got to the inch-and-a-half stage. This means, the laboratory said, that you cannot get more protection and a longer smoke at the same time, in spite of what the advertisements say.

"It does not seem to make much difference whether you smoke a regular cigarette or some filter tip kind, since tobacco itself is as good a filter as some of the tips. But a length of filter made from cellulose acetate fiber, asbestos-paper, or activated charcoal with paper is a more efficient screener than the same length of tobacco at the end of a regular brand."

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