

- Sugar is not only for coffee and cakes but also for industrial uses.

SUGAR!

You're old-fashioned if you use sugar only to sweeten your coffee and grapefruit. Try varnishing your old porch chairs with sugar. Sugar makes an excellent varnish. Can you turn sugar into gasoline? Do you smoke sugar in your cigarettes? Can you make rubber heels out of sugar? All this and much more is being done with this everyday flavoring.

The sugar varnish is a new product called allyl sucrose. Two chemists at the Eastern Regional Research Laboratory of the U.S. Department of Agriculture, P. L. Nichols, Jr., and E. Yanovsky, succeeded in preparing allyl sucrose after long research.

Allyl sucrose is a heavy, light yellow liquid which hardens into an insoluble transparent resin when exposed to air and heated. It makes a splendid finish for floors, wall coverings, fur-

niture and woodwork. It is extremely hard, shatter-proof on impact, very glossy — yet flexible enough to be useful where a stiff plastic would crack. For good measure, it resists water, heat, acids, grease and alcohol. Allyl sucrose is so tough that when welders' goggles are coated with it, the goggles last 400 hours or 100 times as long as ordinary welders' goggles.

If your cigarette is a sweet smoke, the reason is simple. Between 10 to 25 percent of the dry weight of the popular mild cigarette is native or added sugar. In 1948, tobacco manufacturers used 26 million pounds of refined cane and beet sugar. Here's why. The burning tip of your cigarette is alkaline. A sugarless cigarette would give a bitter smoke. The cigarette sugar breaks down into organic acids that neutralize the ammonia and alkalies re-

leased by burning and so give a mild smoke.

Among other things, sugar is a medicine. Sleeping-sickness symptoms such as convulsions and delirium have been relieved by administering intravenous injections of glucose. In diseases of the liver a high sugar diet is a standard treatment since sugar prevents damage to the liver by converting certain poisonous substances into harmless ones. High sugar diets also save the liver some of the labor of converting other foods to glycogen. Sugar is useful in gastric ulcer cases for it quiets the hunger contractions of the stomach almost immediately after it is taken. Since violent stomach contractions are often agonizing to the patient, sugar actually relieves pain.

The same sugar that serves as food and medicine may some day yield an inexhaustible ocean of gasoline. The Carnegie Institute of Technology has stated that by imitating nature in the laboratory we shall be able to obtain a perpetual supply of gasoline and coal from the

sugars and starches of plants. Sugar cane and sugar beet would then replace coal mines and oil wells.

One hundred tons of dry sugar cane will, if suitably processed, yield 2,980 gallons of gasoline, 3,430 gallons of medium grade oil and 1,210 gallons of lubricating oil besides 8.45 long tons of raw sugar. And there's plenty of raw material. In 1946, the plant waste in the United States ran to 260 million tons, which was enough to supply every car and truck in the country with gasoline for a year.

Which points up one fact that has deeply impressed industrial chemists — sugar is far and away the most abundant of the pure organic chemicals. About 14 billion pounds of sugar are produced every year in the United States. For comparison's sake, in 1947 about 850 million pounds of plastics were manufactured. Moreover, over 250,000 derivatives of sugar are possible. Considering the extreme cheapness of sugar as a raw material, it is no wonder that in the last 20 years many industrial and government laboratories

have been intensively investigating the industrial possibilities of common table sugar.

Since 1929 more than 200 patents have been taken out on the conversion of sugar and its derivatives into plastics and other products. Most of these substances are still in the laboratory stage but some are being manufactured and many more are on the way. Lactic acid, produced in sugar refining, is the base of alkyd resins which are made into automobile finishes. The "paint" on your car is an alkyd resin.

From lactic acid the chemists of the Eastern Regional Research Laboratory have prepared a new synthetic rubber named "lactoprene." Gaskets, rubber heels, bottle stoppers, rubber cement and hundreds of other goods can be made from lactoprene. Lactoprene will take its place as one of the synthetic rubbers that will free the United States from dependence on the rubber of war-threatened Malaya.

The conversion of sugar into substitutes for proteins like meat has actually been

achieved. British scientists are keenly interested in this sort of research, for the British West Indies combine surplus sugar crops with tremendous overpopulation. Barbados, for example, has 996 people per square mile.

The British are making excellent progress, not through intricate chemical manipulations, but by biological means. Sugar is used as a medium for growing yeasts related to the common brewer's yeast. This yeast, *Torula utilis*, multiplies 64 times in 9 hours. In other words, a single yeast cell will divide into about one billion new yeast cells in 10 hours!

At the experimental pilot plant in Jamaica, supported by the British Department of Scientific and Industrial Research, nitrogen is added to a solution of molasses. Molasses, as everyone knows, is a by-product of the extraction of sugar from sugar cane. The yeast converts the molasses into a food containing about 50 percent protein which is rich in vitamin B. This food is a cream-colored powder with a meaty flavor that can be

used in bread, soups and vegetable dishes. Six ounces will supply the average man with his daily requirements for protein and the B-vitamins.

Plants turning out more than 500 pounds per day of the new yeast food are now in operation in the British West Indies, and other plants are being built in Porto Rico, South America and South Africa. Estimates indicate that the new food will cost less than 10 cents a pound. Taste is the main obstacle to its widespread consumption but that diffi-

culty will be overcome. Hundreds of species of yeast are known and, doubtless, thousands of strains can be created by X-ray mutations. We may have dozens of yeast flavors from roast beef to vanilla! Sugar-grown yeasts would then become a household staple the world over and the menace of world starvation would be ended.

Transforming sugar into rubber, plastics, gasoline, varnish, meat substitutes and a host of other useful commodities is a sample of the creative powers of modern science. — *From Science Digest.*

PEACE

What kind of peace do I mean and what kind of peace do we seek? Not a Pax Americana enforced in the world by American weapons of war. Not the peace of the grave or the security of the slave . . . but genuine peace . . . that makes life on earth worth living—the kind that enables men and nations to grow and to hope and to build a better life for their children—not merely peace for Americans but peace for all men and women—not merely peace in our time but peace for all time.
— *John F. Kennedy*