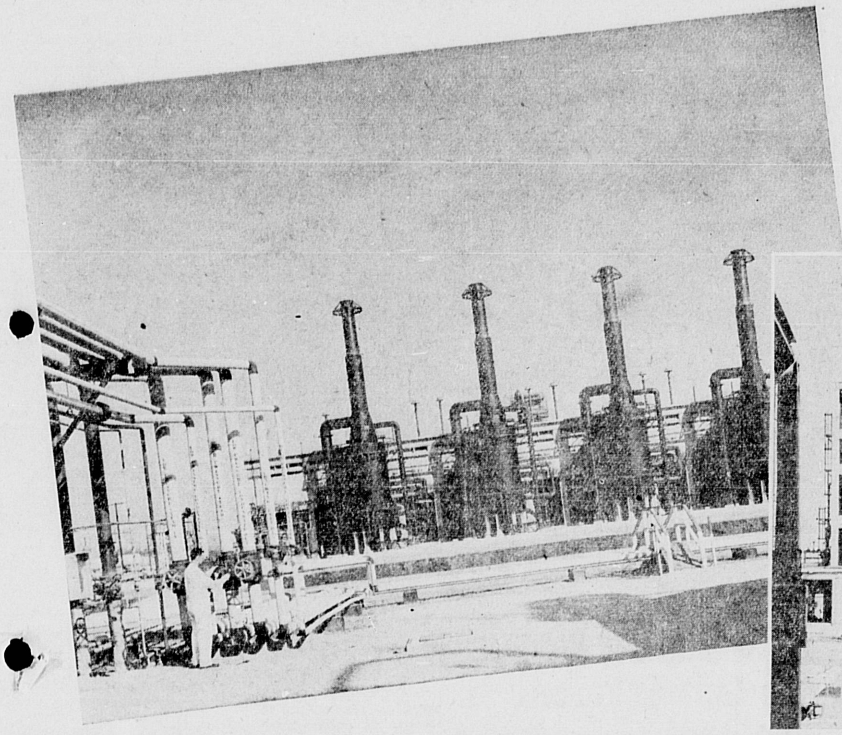
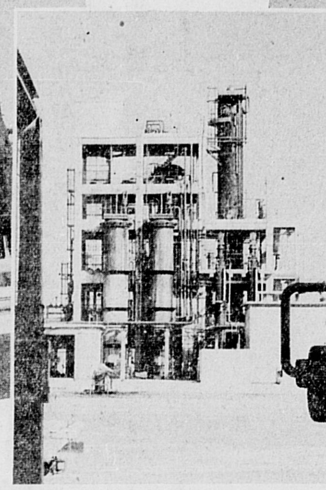
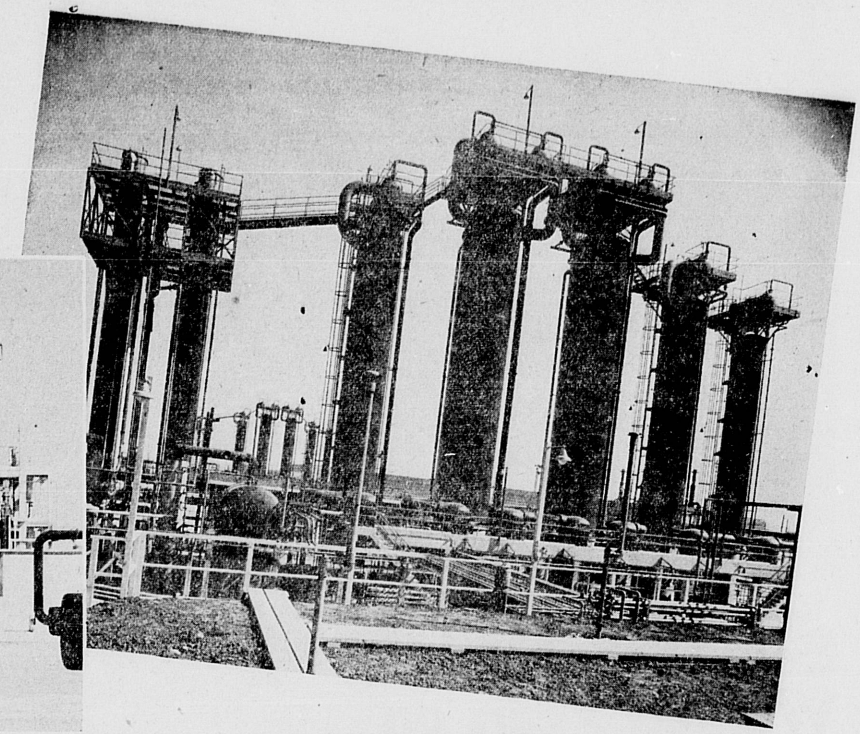
Dow Chemical Has Benefit of 90 Years' Experimentation



ETHYL BENZENE DEHYDROGENATION . . . unit of Dow Chemical Company at Torrance. Ethyl benzene is passed through these huge furnaces where part of it is decomposed into styrene. The part that is not decomposed is sent through the furnace again.



MAKES ETHYL BENZENE . . . In this Torrance unit of Dow Chemical, ethyl benzene is made from benzol and ethylene. Later, ethyl benzene is piped to another Dow unit where it is converted into styrene, one of the ingredients from which synthetic rubber is made.



STYRENE FINISHING UNIT . . . at the Dow Chemical plant at Torrance. These towers separate the finished styrene from a liquid mixture of styrene, tars and other hydrocarbons. The styrene is piped to the rubber companies nearby—most of the remaining hydrocarbons are piped back to earlier stages in the process ultimately to make more styrene.

Plant Here Was First to Turn Out Styrene

[illegible] Dow Chemical Company's Styrene Plant at Torrance was the first [illegible] California synthetic rubber units to go into production. Construction of this plant was begun in September of 1942 and in less than nine months, in June of 1943, the first styrene was produced. A month later, the plant was stepped up to full production with a capacity sufficient to provide enough styrene to make 54,000 ordinary automobile tires daily.

Since the California synthetic rubber units could not at the time utilize this production, for many months most of the Dow Chemical Company's sytrene was shipped to other synthetic plants in the east.

Years of Experiments

The Dow California plant is actually a mammoth series of pipes and tanks in which chemical reactions take place, and is the climax of years of styrene experimentation and commercial production by that firm. From the time of its discovery nearly a [illegible]tury ago, scientists thought [illegible] styrene, if made in quantity, could be made inexpensive. But for 90 years, extensive manufacture of this material was prohibited by sky high cost.

Then the Dow Chemical Company made a startling discovery and began producing less costly and higher quality styrene. This discovery resulted first in a pilot plant to produce small quantities of styrene under conditions similar to those to be encountered in a large scale plant, and later resulted in a large plant sufficient to manufacture styrene in quantities which before were considered impossible.

In 1889 the little town of Midland, Mich., was enjoying a much needed rest after the lumber boom had stripped the coun[illegible] of its big trees. Then Dr. [illegible]ert H. Dow brought a big idea to the town—a new and cheap process to extract bromine from the brine that was so plentiful in central Michigan. The plan was successful and the Dow Chemical Company was born.

Later, this process was further adapted to the extraction of chlorine from brine, and a process to produce carbon tetrachloride, a wonderful non-inflammable cleaning fluid, was developed.

Other By-Products

In the meantime, insecticides and magnesium chloride, a building material, were produced. After the first world war a new process was devised for the production of phenol, and soon a vast new array of [illegible] derivatives and by1products [illegible] such as aspirin, artificial flavors and perfumes were being manufactured in this coun-

of the earnings of the company
Always a substantial amount
try. Many had never before
been made here.
was devoted to research, and this has led to development in the fields of chemistry, metallurgy, plastics, lubrication, dye and X-ray. Of particular interest to the nation at the outbreak of World War II was Dow's knowledge of plastic and magnesium metals. Government contracts have resulted in increasing Dow's magnesium production so that now about 60 percent of the country's magnesium is produced by Dow. Although all of Dow's plastics are much in demand by the armed services, only styrene was demanded in quantities almost astronomical—for synthetic rubber.

Today Dow is producing about half of the country's styrene.

Plastic Uses

Dow's early work on styrene was accentuated by the idea that it, if manufactured on a large scale, could be used for the plastic, polystyrene. This material has many desirable characteristics and is rated high among all the known plastics. Polystyrene (styron) has the highest electrical resistance and lowest water absorption of any known resin. It can be used to preserve insects, plants and similar fragile objects, in the same way that insects have been preserved in the past geological ages in natural amber. Poystyrene can be colored for use in the manufacture of art objects and it can be made into gadgets for the automobile and the home, the variety of which are limited only by the ingenuity of the designer. Light will shine through this type of styrene from one end of a bar of it to the other, even turning corners without escaping from the sides.

At this time, all of the qualities mentioned above are incidental. The Dow discovery is being put to use in a big way to assist the nation in its war effort—to make synthetic rubber. As a component of Buna-S synthetic rubber, styrene stands a good chance of becoming a common article of world commerce.

Series of Units

The styrene at the Dow Chemical plant at Torrance is made in a group of small units, each an integral operating section designed to manufacture certain chemicals independently of the other units. From the wine industry of California, the Dow Chemical Company receives 15,000 gallons of pure alcohol per day. This is used in the manufacture of ethylene, a gas, and this gas is piped to another plant called the ethyl benzene plant. In the ethyl benzene plant, 15,000 gallons of pure benzol are used daily. Much of this benzol comes from the Kaiser Fontana, California, coke ovens. Ethyl benzene, a liquid, is piped to a third plant and the material is processed in the presence of catalysts and crude styrene is produced. Thus, by joining two raw materials and passing them through 35 miles of pipe line, and through white hot roaring gas furnaces, crude styrene emerges.

The styrene is then passed to a fourth plant and is purified by distillation in a series of towering cylinders, and is finally precooled to prevent polymerization or solidification. The final products is more than 99 percent pure styrene. It is then piped to the co-polymer units nearby operated by Goodyear and U. S. Rubber, to be combined with butadiene to form the Buna-S synthetic rubber.

Within the plant area is a steam plant which supplies heat and power to the entire styrene production area and to the rubber companies. A large modern chemical laboratory and instrument shop is maintained on the grounds, to control production.

Low in Manpower

Only about 35 operators are needed on each of three shifts to control by delicate instruments this entire process. These men produce sufficient styrene to make approximately 90,000 tons of synthetic rubber annually. This means that each operator will produce about 2,500 tons of synthetic rubber each year, as compared with one plantation worker required for every ton of natural rubber produced annually. Another way to look at it is that this styrene, when combined with butadiene, will manufacture as much rubber as that normally produced from 20,000,000 Hevea trees covering 250,000 acres. The styrene plant covers less than 100 acres of ground.

All of the styrene produced in the Torrance plant will go into synthetic rubber as long as the country is at war. Dow engineers, however, are looking to the day when part of the material can be diverted to plastics, bases for varnish and lacquer, insulating materials and other products for better living.

LONG EXPERIMENTATION

As long ago as 90 years, engineers of the Dow Chemical Company were experimenting with butadiene processes and ingredients which today are foundations in the production of latex, synthetic rubber.

Enmities In Chemistry World Are Dissolved

This making of synthetic rubber is an extremely complicated process—rather, series of processes, as the newspaper men who were escorted through the Los Angeles area plants the other day discovered.

Chemists and engineers ran into innumerable problems before they accomplished the impossible—uniting chemical compounds which refused to be united.

They found the "kewpie of the chemicals," known as catalyst. Kewpie Catalyst joined the two important but recalcitrant chemicals. Having done his bit, he was then removed by the chemistry wizards and put back in his receptacle.

One newspaper scribe asked the guide: "Well, ah, what is this miraculous kewpie, anyhow?"

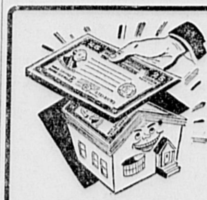
"Aha!" aha-ed the guide, forefinger beside his nose. "That, my friend, is the $64 question."

NO TIME LOST

It was only a matter of months after the attack on Pearl Harbor that synthetic rubber plants in this country were operating, due to previous years of experiments conducted by petroleum engineers and other scientists.

54,000 TIRES DAILY

Synthetic rubber plants in the Torrance area will produce material for 54,000 passenger car tires a day at capacity.



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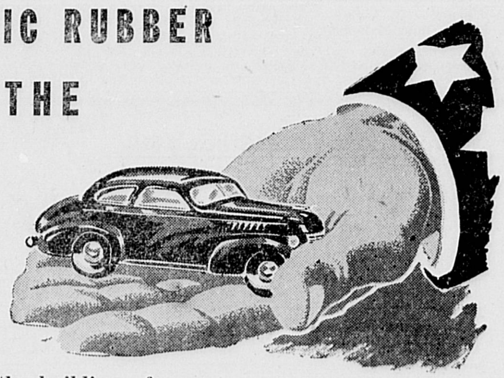

In the midst of war and the building of things of war in Torrance . . . the coming of this great, new industry to Torrance was not properly evaluated.

But now it can be told! We people of Torrance can picture for the first time just what this great Synthetic Rubber Industry means to this city . . . and to this industry and every worker in it, we say: "WELCOME!"

We welcome you not only as fellow citizens . . . but as vitally important soldiers of victory . . . for we needed, we had to have rubber, and plenty of it to carry our fight to the enemy!

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