

## CHEMISTRY

# New Plastics Foreseen

PLASTICS that may surpass polyethylene, now the leading material of the growing family of polymers or long-chain molecule substances, promise to result from basic research done principally in Germany and Italy. In addition, straight chain alcohols and cyclic compounds with up to 16 carbon atoms can be produced.

Substances that promote chemical reactions between oil chemicals and remain unchanged are the keys to the new chemical possibilities. These are called catalysts of an organo-metallic sort, principally combinations of aluminum, carbon and hydrogen containing compounds, and titanium and chlorine.

The center for the development of these catalysts for the new petrochemicals is the Max Planck Institute for Coal Research at Mulheim-Ruhr of which Dr. Karl Ziegler is director.

Dr. G. Natta of Milan has used such catalysts in the production of new polymers including polypropylene and polybutylene, resulting in promising new industrial products now being experimented with in Europe and America.

Newest development in the rush of petroleum chemical advances is the making of a circle of molecules, instead of a chain, from butadiene, a familiar starting chemical obtained in cracking of oil fractions. Cyclo-dodecatriene is formed instead of a high polymer by a small change in the proportions of the titanium tetrachloride and aluminum triethyl. This simple and easy reaction was discovered at the Mulheim institute by Dr. G. Wilke. The new material is considered to be of great promise.

The cyclic process produces dibasic acids with 12 carbon atoms and lactame with 13

carbon atoms, the possible starting points of quite new plastics whose industrial uses may be as broad as the present plastics.

The chemical reactions that the new catalysts make possible are in variety called "almost unbelievable." Ethylene is polymerized into substances of 200,000 to several million molecular weight with atmospheric pressure whereas less dense materials have heretofore required high pressure. This new polyethylene is in quantity production in Germany, Japan and the United States.

Synthetic rubber production will feel the effect of the new organo-metallic catalysts, since copolymers of ethylene and propylene are being developed in the United States by both the Goodrich Gulf Co. as Ameripol SN and by the Firestone Company as Coral rubber. The new rubbers will be used in tires as well as for other purposes.

Extraordinary mileages for such tires, running up to 120,000 miles, are rumored as likely.

A new method of making tetraethyl lead, the chemical added to gasoline to prevent auto engine knock, has also been made possible by use of the catalysts. An American invention in 1920, tetraethyl lead production now is 300,000 tons a year in the United States alone. The new process using Ziegler catalysts reduces the need of so much sodium and chlorine as in the old process. It uses boiling water temperature instead of heat six to seven times as much, and it uses about half as much electrical energy. If the new tetraethyl lead process proves practical, costs should be reduced.

Dr. Ziegler summarized some of the current research and developments in one of the principal papers of the Fifth World Petroleum Congress held at New York recently.

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## ELECTRONICS

# "Brain" Translates Russian

AN ELECTRONIC computer at Harvard University is learning to translate Russian into English.

It is having as much difficulty as a language student, V. E. Giuliano and A. G. Oettinger indicated at the International Conference on Information Processing meeting in Paris, France.

Using a limited dictionary, the machine has learned to produce word-by-word translations simply by substituting English words directly for Russian words.

The final step in polishing a manuscript, however, is left to a human "post-editor." He often must choose the exact English word from a group of possibilities, and he must put in the prepositions, articles, prefixes and suffixes.

The information specialists, both of Harvard's Computation Laboratory at Cambridge, Mass., said several Russian technical translations have been run. Graduate stu-

dents, having special interests in the translations, served as post-editors.

Although the polished translations have not been fully evaluated, preliminary observations indicate that the machine translation is "more useful to some post-editors than to others, depending largely on their backgrounds and abilities," the investigators said.

The experimental translations also indicate that: 1. Mechanical translation can be "very useful" to a person who wants to read Russian technical articles in his own field, 2. Capable, technically qualified persons can produce passable translations in their own fields though totally ignorant of Russian, 3. The machine's technical vocabulary will be "marginally useful" to persons who know literary Russian well, and, 4. The post-editor must be alert to technical mistakes the machine occasionally makes.

In turning Russian into English, the Rus-

sian text is first recorded on magnetic tape via a Unityper. This tape, plus reels of tape containing a Russian-English dictionary, and a reel containing the machine's instructions, are fed into a Univac I computer.

The machine takes apart the text to arrange words for quick look-up on the dictionary tape. It breaks up the words into their stems and affixes. Univac then runs through the dictionary alphabetically and gets all the English equivalents. These then are arranged in the sequence of the original Russian text. The results resemble a gibberish of English, transliterated Russian, and numbered code. A subsequent machine-editing produces a text ready for the human post-editor to polish.

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## PUBLIC HEALTH

# Many Americans Have Physical Impairments

AMERICANS suffer from "impairments" deafness, blindness, speech defect, cerebral palsy, and loss or absence of hands and feet—at a rate of some 141 per 1,000. This is a total of 24,000,000 impairments.

Almost six Americans in 1,000 cannot read a story in an ordinary newspaper, even with the help of glasses.

Another 2,000,000 Americans, more than 12 per 1,000, have visual impairments less severe than blindness. About one person in 2,000 is totally deaf, while other hearing impairments affect many more, some 33.9 Americans in 1,000.

This latest report, in a series on the nation's health published by the Public Health Service, points to the increasing number of older persons with impairments of some kind. In those persons 75 years old or older these defects were about 12 times greater than the number found in persons under 25 years of age.

Servicemen and persons in mental and other long-term institutions were not included in the survey which covered the period July 1957 through June 1958.

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## ASTRONOMY

# Find Meteorite in China That Fell About 1915

A LARGE chunk of hard iron rock found in China about 1915 has now been definitely identified as a meteorite.

Two Chinese scientists analyzed the chemical make-up of this 832-pound boulder. They found it contained 88% iron and 10% silicon, the other two percent being such elements as manganese, tin and aluminum.

The meteorite has an iron black and steel gray surface, and a specific gravity more than six and a half times that of water. Its specific gravity is "quite different from all other iron ores of the earth's crust," Hu Chi-chin and Hwang Tak-min report in *Science Abstracts of China*, published by the Chinese Academy of Sciences in Peking.

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