

## ENGINEERING

**British Refinery Makes Gasoline and Oil From Coal**

GERMANY is not the only warring nation that is making oil and gasoline, for airplanes and war machines as well as autos and trucks, from coal. Information received by the technical journal, *Power*, tells of a new British oil-from-coal refinery. Coal from the mine is converted into gasoline and heavy oil practically on the spot. Each ton of coal produces 21 gallons of crude oil, convertible into an equal volume of gasoline (petrol to Britishers) or almost equal volume of heavy oil. In addition, 1400 pounds of coalite useful as a solid fuel are obtained from each coal ton, plus by-products such as tar acids, creosote and disinfectants useful in chemical industries. The refinery handles 3400 tons of coal weekly, over 70,000 gallons of gasoline.

*Science News Letter, October 14, 1939*

## PHYSIOLOGY

**Body Fights Germ Invasion Better When It's Cold**

INVASION of such dangerous germs as the streptococcus can be fought better at cool temperatures than at hot ones, Drs. Joseph W. Colvin and Clarence A. Mills, of the University of Cincinnati, found in experiments with mice. (*Science*, Sept. 22)

Even the slight difference between 65 degrees Fahrenheit and 70 degrees made a 40% difference in the ability of the animals to withstand doses of streptococci. With all other conditions such as diet, ventilation and lighting the same, 100% of mice kept in the "hot room," with a temperature of 90 degrees Fahrenheit, were dead 26 hours after injection of the germs, but only 30% of those kept at 65 degrees died in the same length of time. Of the animals kept in the control room at a temperature of 70 degrees, 60% were dead after 26 hours.

At high temperatures, the Cincinnati investigators explain, the body has trouble getting rid of heat, and the tissue combustion rate is also lowered. This results in "a sharply reduced ability to fight infectious invasion."

Energy for most physiologic functions, in man and other animals, can come only from internal combustion, but body efficiency is not high, it is pointed out, so that a large part of the combustion energy must be dissipated as waste heat.

"It is the ease or difficulty with which

this waste heat can be dissipated that causes internal combustion rate to be dominated by external temperature levels," Drs. Colvin and Mills state.

Undernutrition has been known to make animals less resistant to disease germs. Drs. Colvin and Mills believe that difficulty in getting rid of body heat works in a similar fashion by making it impossible for the body to use adequately even the most perfect diet when offered in unlimited amounts.

*Science News Letter, October 14, 1939*

## CHEMISTRY—EDUCATION

**Chemical Color Reaction Used to Self-Grade Papers**

THE right color note means more in examinations than in fall clothes at Kansas State College where a new system of examination grading is in vogue. If the student's answer is wrong it turns red (and so does his face). If it is correct the answer turns blue.

This method of grading, known as the Chemo-Score, was invented by two brothers, Dr. H. J. Peterson of State Teachers College, Hattiesburg, Miss., and Dr. J. C. Peterson of Kansas State College. Printed with two moisture-sensitive black inks, the correct and incorrect answer spots are initially indistinguishable, but when moistened they change color immediately. The student records his choice of answers by touching with a fountain pen which contains water instead of ink, or with a moistened paper clip, the spot which represents his chosen answer to each question. If his choice is correct the answer spot turns blue, if incorrect, it turns red.

A transparent answer sheet is used in correspondence work. To develop the answer spots on such a sheet the student dips a roughened pin in water, thrusts it through the sheet at the desired location, and works it up and down a few times. The pin is removed and the perforated spot pressed between the thumb and forefinger. This causes the color to spread.

A "Play Your Way Reader" utilizing the same principle, has also been prepared by the Peterson brothers. With practically no assistance the child eagerly "plays his way" into a reading acquaintance with 120 common words. Each line in the book contains a problem and consists of a picture and four words, one of which names the pictured object. The word in each line which names the pictured object turns red and the others turn blue. Thus, the child can test his own solution to each problem.

*Science News Letter, October 14, 1939*

**IN SCIENCE**

## MEDICINE

**Discover Medicinal Value Of Fresh Pineapple Juice**

FRESH pineapple juice has a specific medicinal value, two University of Wisconsin scientists, Julius Berger and Conrado F. Asenjo, have discovered. It contains an enzyme, bromelin, which like other enzymes, such as ficin from the sap of the fig tree, is not poisonous to man but can destroy certain types of parasitic, disease-causing worms.

Reporting their experiments (*Science*, Sept. 29) the Wisconsin investigators say that their results give a scientific basis for the use of fresh pineapple juice as an anthelmintic or worm medicine. No directions for the use of this new remedy are given, but the test-tube experiments show that fresh juice must be used as heating destroys the anti-worm activity.

*Science News Letter, October 14, 1939*

## METALLURGY

**Aluminum Finds Use Outside of Airplanes**

ALUMINUM alloys are finding many structural uses outside the field of aviation, best known construction use of this light-weight, strong material.

There are now in use aluminum alloy cofferdams employed by the Corps of Engineers, U. S. Army, for emergency construction. There are aluminum bridges, giant aluminum railroad cars and even a section of an aluminum boat hull which has survived the ravages of salt water successfully for more than four years.

In a report to the American Society of Civil Engineers, D. J. Bleifuss and B. J. Fletcher of the Aluminum Company of America explain that emergency bulkheads 127 feet long and weighing 28 tons are successfully in use. On the Great Lakes is a coal bucket of aluminum with a 12.5 ton capacity. At Newport News, Va., is the prize exhibit of all, the great test section of aluminum marine hull which has withstood the ravages of feared salt water corrosion since 1935. It has received only regular marine painting.

*Science News Letter, October 14, 1939*

# E FIELDS

## CHEMISTRY

## Synthetic Camphor Breaks Japan's Near Monopoly

FOR over three decades the Japanese have produced around 90% of the world's natural camphor from camphor trees in Formosa and Japan proper, important to Japan's treasury because camphor is one of few surplus commodities yielding essential foreign exchange.

Synthetic camphor, made from turpentine, has broken the monopoly. Du Pont's plant, beginning production in 1932, is now capable in an emergency of supplying all we need for celluloid, disinfectants, drugs and explosives. Significant angle on this chemical parade: Japan, to keep up, last year began manufacture of synthetic camphor on small scale.

*Science News Letter, October 14, 1939*

## METALLURGY

## Scientists Develop New Ideas About Metals

MAN'S lack of understanding of the nature of metals is one of the high points of human ignorance. Empirically the metallurgist has learned how to make a whole host of valuable alloys out of mixtures of metals, and by adding traces of one metal to another. But why metals have the properties they do—conducting electricity, elastic, ductile, rigid, hard, soft, expansible with temperature—is virtually a complete blank in the world of knowledge.

Because it is impossible at present to develop theories for the complex metals such as carbon-iron alloys which we know as steel, the physicist now studies simple metals, like sodium, and is building up a new picture of the metallic state quite unlike the old one of the textbooks.

Ten years ago it was the fashion to "explain" the ability of most metals to conduct electricity as caused by "free" electrons of metallic atoms. Under electrical pressure (voltage) the free electrons moved through the metal and carried the current. The "free" electrons were supposed to be partially bound near the "parent" atoms.

Today, says Dr. William Shockley of the Bell Telephone Laboratories in sum-

marizing new knowledge for the *Journal of Applied Physics*, this picture is gone. Instead the free electrons are considered truly free, wandering around in the metal until the whole metallic lattice is filled with a rather uniform "smear" of negative electricity having the properties of a gas.

The metallic ions left behind are then considered to be "floating" in this electron gas. This idealized structure may seem too flimsy to account for the known rigidity of metals but calculations based on this concept check rather well with known experimental tests.

Prize interpretation of this new theory is the explanation of the rigidity of metals and their resistance to a shearing action. Under this twisted kind of stress the ions, mutually repellent from one another, are pushed closer together. This means raising the energy, says Dr. Shockley, and "hence we should have to do work and consequently exert forces in order to strain the metal elastically. Therefore the metal will exhibit rigidity."

*Science News Letter, October 14, 1939*

## MILITARY SCIENCE—VOLCANOLOGY

## Aerial Bombing Operation Can Prevent Destruction

AN AERIAL bombing operation that prevented destruction: 20 bombs dropped in 1935 by Army aviators on the erupting lava from Mauna Loa volcano, Hawaii. They slowed the flow and saved the town of Hilo.

Italy has told Volcanologist T. A. Jagger his protective bombing will be used on Vesuvius when and if it erupts.

Prediction: Mauna Loa should be ready for another outburst any year after this one.

*Science News Letter, October 14, 1939*

## GENERAL SCIENCE

## Universities Split Up In Fear of Air Bombardment

SOME realization of what the fear of bombs from the air is doing to science and intellectual pursuits in Europe can be gathered from the geographical scattering of various units of the University of London to other parts of the British Isles. To Wales, Cambridge, Nottingham, Oxford, Cornwall, Bristol, Sheffield, Manchester, Aberdeen, Glasgow, Edinburgh, the various colleges are moving with the students they still have. For instance, the Imperial College of Science and Technology should be addressed at Edinburgh.

*Science News Letter, October 14, 1939*

## EDUCATION

## New Kind of Invasion Is Planned by United States

A NEW KIND of invasion is being planned—a cultural expeditionary force—that will take college professors, school teachers and graduate students of various American republics into the educational citadels of sister nations of the New World.

This peaceful interchange of intellectual workers, so different from the mass invasions of war-torn Europe, is being arranged on the U.S.A. side by the Department of State and the U. S. Office of Education as the result of the Convention of Inter-American Cultural Relations, signed Dec. 23, 1936, by the United States and 20 other American republics, and ratified so far by Brazil, Chile, Costa Rica, the Dominican Republic, Guatemala, Haiti, Honduras, Nicaragua, Panama, Peru, Venezuela and the United States.

The exchange posts will be filled not only by college professors and graduate students, who are commonly eligible for such international swapping of intellectuals, but also by teachers of grade schools and high schools, who do not often get chances to participate in international educational exchange arrangements. The fields of learning covered include the humanities, natural sciences, social sciences, law, medicine, pharmacy, journalism, technology, and engineering.

*Science News Letter, October 14, 1939*

## CHEMISTRY

## Plastic Gunstocks Found Stronger Than Wood

GUNSTOCKS made of synthetic plastic material have been shown to be stronger and more durable than stocks made of the usual black walnut, in tests involving the firing of thousands of shots with the weapons kicking back against a solid block. Rubber butt plates were hammered to pieces, but the plastic stocks showed they could "take it."

The tests were made on sporting arms, but the results are considered applicable to military rifles as well. The new material thus assumes potential military importance, when it is remembered how much difficulty was experienced in getting enough seasoned black walnut for rifles in 1917-18.

The plastic tested is known as Tenite, and is a product of the Tennessee Eastman Corporation.

*Science News Letter, October 14, 1939*