METALLURGY

Steel Tests Rushed

Pearl Harbor Navy Yard completes tests on samples at speed of one hundred a minute to fill immediate need for high-speed alloy from stock.

➤ HOW STEEL SAMPLES were tested as fast as one hundred per minute during work at the Pearl Harbor Navy Yard was reported to the Hawaiian Academy of Science meeting by W. Haskins Hammond, head of the Testing Laboratory at Pearl Harbor, and Lawrence Boggs, junior chemist.

Some months ago there was an immediate need at Pearl Harbor for some high-speed alloy steel. It was thought that this could be found among a large stock of rivet rods in a local storage yard. The Pearl Harbor Testing Laboratory was asked to make a rapid test of each piece of steel in the stock without disturbing its place in the pile. The time limit set for testing these thousands of pieces precluded use of ordinary chemical methods.

The speed with which the job was completed was attained by combining spark tests—sometimes used by mechanics and stockmen as a shop wrinkle—and a spot test for manganese adapted from a standard volumetric technique.

When steel is placed against a rapidly revolving grinding wheel a stream of sparks is given off whose form and color are dependent upon the type of steel.

Pure iron, or a steel with carbon below 0.2%, gives a spark picture of straight, unmodified carrier lines. At 0.2% carbon the lines begin to develop a few forks or primary bursts. With more carbon present, sufficient carbon dioxide is formed by oxidation of the incandescent particles to form increasingly brilliant bursts of typical forms.

Molybdenum in such a steel causes the formation of a detached orange-colored spear-point to the line. Nickel gives tiny blocks of brilliant white light; nickel and molybdenum together partly suppress the carbon bursts. Silicon, tungsten, and chromium give characteristic modifications. Plain low carbon steel gives a characterless stream with a minimum of bursts.

For the tests a field kit was made containing a portable grinder with an alundum wheel, spot test equipment, and samples of Bureau of Standards analyzed alloy steels to use as test controls.

During the tests one or more laborers moved ahead in order to shift the rods in the stock piles into a position so that the chemist could touch one end with his rapidly revolving grinding wheel.

When a spark stream was found that in any way looked unusual, the bar of steel was given a spot test. Drillings were taken from those bars which showed evidence of being high-speed steels, and full spectrographic analysis of these were made later in the laboratory.

"Success of these methods," Mr. Hammond stated, "is largely dependent on the judgment of the operator and his skill in matching the spark patterns of the unknown samples with those of the controls."

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PSYCHOLOGY-PHYSIOLOGY

Preventing Airsickness Problem in Air Transport

➤ PREVENTING airsickness is one of the problems of air transport of troops, it appears from a report by Comdr. Leon D. Carson, U. S. Navy, Dr. Walter R. Miles of Yale University School of Medicine and Dr. S. S. Stevens of Harvard to the Federation of American Societies for Experimental Biology.

"To arrive at the scene of battle with a load of thoroughly ill troops contributes nothing to fighting morale and effectiveness," they comment.

This unfortunate situation can to some extent be prevented, they believe, by giving the troops a chance to look out of the transport plane or glider.

Factors contributing to airsickness are the unavoidable motion stimulation of the vestibular mechanism of the ear, rapidly changing forces of gravity acting on internal organs, muscles and joints, and apprehension and past experience.

"All of these upsetting stimuli are as a rule less disturbing," the scientists declare, "if those affected can see out and establish visual contact with the horizon, with cloud formations and with the ground scene below."

Many troop-carrying glider crafts, the scientists state, give virtually no opportunity for this.

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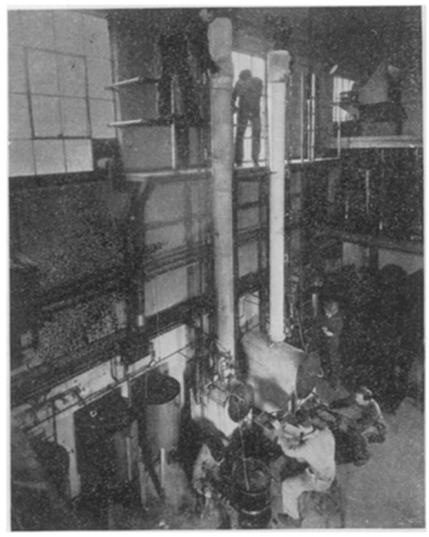

"CRACKING" PLANT—Here the medium oil obtained in the first stage of coal liquefaction is "fractionated" or distilled to produce more gasoline, Diesel oil and other products. The photographs on this and the facing page and the front cover are of the U. S. Bureau of Mines coal hydrogenation plant at Pittsburgh.

CHEMISTRY

Gasoline Made From Coal In Bureau of Mines Plant

See Front Cover

➤ CRACK APART the molecules of ordinary coal, take out some of the atoms, add some hydrogen—and out comes gasoline and oil. It's not such an easy chemical job as it sounds but the Bureau of Mines has set up a small hydrogenation plant at Pittsburgh for the purpose and it is now in experimental operation as a pilot for future possible commercial use.

The control room of the plant is shown on the front cover of this week's SCIENCE NEWS LETTER. The valves and gauges control the process which takes place in a concrete chamber. In the first stage, coal yields about 20% gasoline and 80% medium oil. The oil can also be converted to gasoline by further treatment.

Experiments have indicated to the Bureau of Mines experts that the nation can develop enormous amounts of gasoline and oil from its coal reserves. If hydrogenation could be applied to our entire coal reserve, enough oil would be produced to supply the nation's needs for almost 3,000 years.

Germany and other European countries have been experimenting with the process for many years. It has been reported that Germany produces several million tons of gasoline a year from coal. England is operating a similar plant.

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ENGINEERING

More Oil From Old Wells

After primary oil has been pumped out, electric pilot is used to locate areas likely to contain secondary deposits and then places chemicals in right spots.

➤ MORE OIL from the nation's oil fields by less labor are the twin benefits of the electric pilot described by Dana G. Hefley and P. E. Fitzgerald of Dowell Incorporated, Tulsa, Okla., in a report to the American Institute of Mining and Metallurgical Engineers (*Petroleum Technology,* July). After primary oil has been pumped from a well by ordinary methods, the instrument is used to locate areas that are likely to contain secondary oil deposits, then puts acidizing chemicals into the right place where they help to get out additional oil.

Using acid to increase production of an oil well and to shorten the time needed for recovering oil has often been successful. But most of the acidizing methods used depend upon data about the well supplied by the geologist and engineer. In many cases, the zones specified were inaccurately located or the data were too meager for successful oil recovery.

The electric pilot, however, can quickly locate the areas containing oil, and then chemicals can be introduced through the device into the desired zones. Much time and quantities of acid are thereby saved in getting the secondary oil from the wells.

An electric circuit is completed and registers on an ammeter when contact of one or both electrodes of the electric pilot has been made with a conductor such as acid or salt water in the well; no current registers if the instrument contacts a non-conductor such as oil.

Thus in actual well application, the amount of fluid injection can be controlled by maintaining the proper acid-oil level through reading the changing fluid-interfaces.

The use of the locator is valuable in acidizing many wells with high gas-oil ratios, high water-oil ratios, two or more 'pay' zones, sands exposed above or below limestone, leaky casings and deepened wells.

Better oil recovery and improved operating technique has resulted from use of the electric pilot, the scientists report.

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MAKING HYDROGEN—To make oil from coal in the Bureau of Mines Pittsburgh plant, hydrogen must first be made. This plant produces the necessary chemical element in gaseous form from fuel gas. The hydrogen is compressed and then fed under high pressure to a mixture of pulverized coal and oil which has been heated to a fairly high temperature.

PUBLIC HEALTH

First Detailed Study Of Major Sicknesses

➤ FACTS which should prove useful to communities planning general health and medical care programs appear in a report, Hospitalized Illness in New York City, published by the city's Welfare Council.

"Never before has so much detailed information regarding illness in a large city been made available," Dr. Charles F. Bolduan, former director of health education in the New York City Health Department, states.

The report, said to be the first detailed study ever undertaken in the United States or any other country to ascertain the occurrence of major diseases among the residents of a large city, was prepared by Dr. Neva R. Deardorff and Dr. Marta Fraenkel, of the Welfare Council's Research Bureau.

The most frequent operation in the year of the study was tonsil removal, performed on nearly 69,000 patients, mostly children. Accidental injuries, poisoning and broken bones made up the next group of conditions, other than obstetrical, for which hospital care was most frequently given. Obstetrical services accounted for almost one-fourth of the total number of hospital discharges.

The amount of specialized service given in general hospitals, and the reverse; the differences between the services given in municipal and voluntary hospitals; the number of times the same patient went to the hospital for the same condition in one year; and the length of each stay in a hospital are among the facts in the report which will provide practical suggestions for hospital and medical care planners.

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