high prices and technical improvements making possible the utilization of many low-grade ores. In many cases the limit of profitable exploitation was lowered considerably. The smelters of ferrochrome now work up ores containing as little as 24 per cent. of Cr₂O₃, whereas in former times only ores with 48 or 50 per cent. could be worked profitably. In the working of pimelite, a nickel ore, the limit of profitable exploitation was reduced from 2.5 to 1.5 per cent. The Geological Institute is reported to have succeeded in extracting nickel and cobalt from mine springs containing these metals. Bauxite containing but 40 per cent. of Al₂O₃ is now utilized for the extraction of aluminum. Experiments have been made with the extraction of aluminum from clay. In the exploitations of wolframite the limit has been reduced from 1 to 0.06 per cent., chiefly, however, under the stimulus of high prices. For copper schist the limit has been lowered from 2.5 to 1 or even 0.7 per cent. The high prices of silver have made possible the exploitation of certain abandoned silver mines.

Substitute Materials

Iron and zinc have largely replaced the other metals. By extensive experiments the Germans are said to have succeeded in refining zinc so that it can be used as a substitute for brass for certain purposes, such as shell fuses. It has been employed in the manufacture of electric cables. Various zinc and lead alloys have also been utilized. One of the Breslau tin-foil factories is reported to have succeeded in producing zinc foil. Cardboard boxes have largely replaced tin cans.

Germany produces only a little over one-sixth of the copper needed by its industries. When importation was stopped by the war it became necessary to construct electric conductors of other materials. Iron and zinc are employed for that purpose with success, according to a report presented to the Society of German Machinery Engineers at Berlin.

Zinc has to be refined by a special spraying process, giving it the proper flexibility before it can be used for the manufacture of wire. The zinc wire must be protected against heat exceeding 130° C., and against air currents; hence it cannot be used as a free conductor. In other respects the behavior of fixed zinc wires and zinc cables is said to be satisfactory. Zinc conductors also can be safely wound on dynamos or transformers. On a suburban line of the Berlin electric railway, zinc has been used to effect rail bond connections. Instead of employing special copper bonds, the surfaces of contact between the fishplates and the rails are sprinkled with liquid zinc, which is said to give a better electric connection than has been obtained by the old method.

According to the Neue Zürcher Zeitung, systematic investigations into the properties of coal have been carried on by the Kaiser Wilhelm Institut für Kohlenforschung and have yielded important industrial results. The treatment of coal with liquid sulphurous acid at ordinary temperatures has produced ½ per cent., by weight, of viscous, golden-yellow mineral oils. A process has also been elaborated by which through heating naphthalene under pressure, in the presence of aluminum chloride, an oil is produced that can be used for illuminating purposes in the same manner as petroleum. Benzol and mixtures of benzol with alcohol are employed as substitutes for gasoline as automobile fuel.

FOURTH NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES

The fourth National Exposition of Chemical Industries will be held in the Grand Central Palace, New York, during the week of Sept. 23, 1918. Dr. Bacon, of the advisory committee, is now head of the Chemical Warfare Section of the National Army, and a member of General Pershing's staff. The coming Exposition will be the largest ever held, and it will be necessary to use four floors of the Grand Central Palace. The exposition is a war-time necessity, and regarding it as such, each exhibitor is planning his exhibit so that it will be of the greatest benefit to the country.
The South is again sending exhibits from some sections, and Canada is taking the opportunity of presenting the materials it has available for development by the chemist and financier. A section for the glass and ceramic industry has been added, with which the American Ceramic Society is coöperating.

The program for the exposition is in active preparation and will be a series of symposiums on the "Development of Chemical Industries in the United States, notably since July, 1914."

STANDARDIZATION OF COMPRESSED-AIR TERMS

Upon the recommendation of its Technical Committee, The Compressed Air Society has adopted the following definitions of certain terms.

Displacement.—The displacement of an air compressor is the volume displaced by the net area of the compressor piston.

Capacity.—The capacity should be expressed in cubic feet per minute, and is the actual amount of air compressed and delivered, expressed in terms of free air at intake temperature and at the pressure of dry air at the suction.

Volumetric Efficiency.—Volumetric efficiency is the ratio of the capacity to the displacement of the compressor, all as defined above.

Compression Efficiency.—Compression efficiency is the ratio of the work required to compress isothermally all the air delivered by an air compressor to the work actually done within the compressor cylinder, as shown by indicator cards, and may be expressed as the product of the volumetric efficiency (the intake pressure and the hyperbolic logarithm of the ratio of compression), all divided by the indicated mean effective pressure within the air cylinder or cylinders.

Mechanical Efficiency.—Mechanical efficiency is the ratio of the air indicated horse-power to the steam indicated horse-power in the case of a steam-driven, and to the brake horse-power in the case of a power-driven machine.

Overall Efficiency.—Overall efficiency is the product of the compression efficiency and the mechanical efficiency.

The Society further recommends that the use of other expressions of efficiency be discontinued.

Nerve Specialists in the Institute

As a means of lending weight to the activities of its Committee on Industrial Organization, with particular reference to the work on mental hygiene and the prevention of illness, the Institute has recently invited a number of members of the medical profession to become Associates of the Institute. We are glad to observe that the wisdom and utility of this departure have been appreciated by the gold mining industry, in testimony whereof we are pleased to publish the accompanying sketch from the pen of Mr. P. A. Robins, Managing Director of the Hollinger