

### THE ACETYLENE GAS EXHIBIT AT THE ATLANTA EXPOSITION.

The word carbide is used in chemistry to designate the combination of an element with carbon, and in cast iron and steel examples of such compounds may be found. The first production of a combination of carbon with an alkaline metal is due to Sir Humphry Davy, and since his time various carbides of this type have been produced experimentally. The alkaline and alkali earth carbides, such as calcium carbide, have a distinguishing characteristic in being decomposed by water with the evolution of acetylene gas, itself a hydrocarbon of extraordinarily high value as an illuminant. The production on the large scale of calcium carbide to be used for the manufacture of acetylene gas is now being carried out at the works of the Wilson Aluminum Company, of Spray, N. C. By heating in an electric furnace a mixture of lime and carbon a combination of the two substances ensues, and a stone like material, the calcium carbide, is produced. When water comes in contact with it, part of the hydrogen of the water combines with the carbon, forming acetylene; the rest of the hydrogen, with the oxygen of the water, combines with the calcium, forming calcium hydrate.

The subject has been already treated in considerable detail in our SUPPLEMENT, and no recent achievement in the technical world has attracted as much attention from the public as this one. The practical synthesis of carbon and hydrogen has long been a dream with the chemist, and its accomplishment on the small scale in the laboratory has represented one of the triumphs of chemistry.

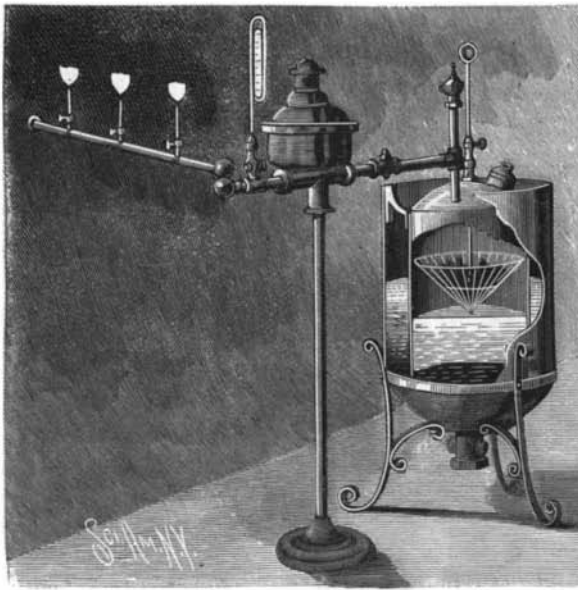
The commercial synthesis of carbon and hydrogen as exemplified by acetylene gas formed one of the most striking exhibits at the Atlanta Exposition and is illustrated by us. For there not only was the calcium carbide and products of the electric furnaces at Spray, N. C., to be seen, but the gas was shown in practical shape, produced from a portable and compact evolution apparatus and also as burned directly from compression cylinders in which it was stored in liquid form. The gas was burned from open burners and in different types of car lamps, one of its prospective uses being the lighting of railroad trains.

In the foreground of the larger cut the direct evolution apparatus is shown in operation, while its section is given in the smaller cut. This apparatus is of the type of the familiar hydrogen gas generator of the chemist. In all such apparatus for the production of acetylene due regard has to be had to the extraordinary rapidity of evolution, comparable only to the evolution of carbon dioxide gas from sodium bicarbonate and acid. In the outer casing, which is about one-half filled with water, a fixed bell or receiver is inverted, whose lower lip reaches to within a short distance of the bottom of the containing vessel. A rod passes through the top of the receiver, the joint being made gastight by a stuffing box, so that the rod can be pushed up and down. To the lower end of the rod a conical wire basket is secured. From the top of the receiver a tube passes off to conduct the gas to the burners, and a hole with tightly fitting screw stopper is provided in the top for the introduction of calcium carbide.

The apparatus is on exactly the lines of the experimental one illustrated in the SCIENTIFIC AMERICAN of March 30, 1895. As the water comes in contact with the calcium carbide in the basket, acetylene gas is generated. This forces the water down and out of contact with the carbide, and gas is no longer evolved. If any gas is drawn off, the water rises, again reaches the carbide and evolves more gas. Thus a constant supply can be taken from the apparatus. As the carbide becomes decomposed the calcium hydrate resulting from the decomposition falls through the basket to the bottom of the water, and the fresh material keeps descending to the

point of the basket. Thus an approximately constant water level and pressure is maintained. When more carbide is to be added, the apparatus is opened at the top for its introduction, and the evolution of gas must cease for the time. To insure a constant pressure a gas governor is mounted on the delivery tube and a pressure gage enables the pressure to be watched.

In the background of the large illustration are shown



SECTION OF GAS EVOLUTION APPARATUS.

the compression cylinders as arranged for household uses. The steel cylinders are 3 feet 10 inches in height and 5 inches in diameter. They are mounted on a reducing valve or high pressure governor whose case forms a base for the cylinder to rest on. From the base the delivery pipe rises, and is carried to the burners.

The effectiveness of the liquefied gas can be determined from the following considerations. One volume of the liquid gives at 64° F. 400 volumes of gas, and for the supply of a single burner from  $\frac{1}{4}$  to  $\frac{1}{2}$  a cubic foot per hour is sufficient. A common gas burner uses 5 to 8 cubic feet per hour. It is therefore a fair average to take 70 cubic feet of acetylene gas as the equivalent of 1,000 cubic feet of ordinary gas. This 70 cubic feet would be yielded by about 300 cubic inches of the liquid.

There is one point in connection with the liquefaction of the gas which might be the occasion of some

difficulty. The critical point is put at 98° 69' F., about 10° above that of carbon dioxide. If this is correct, acetylene would cease to be a liquid above that temperature and the conditions of its storage in cylinders might be considerably modified.

### Auriferous Beach Mining in Australia.

A considerable portion of the New South Wales coast, north of Newcastle, is largely auriferous, and for many years numbers of people have been regularly employed in extracting gold from the sand, both from the beaches and from the natural terraces at their back, the principal scene of operations being confined to that portion of the coast between the Clarence and Tweed Rivers. Gold is found on other parts of the coast, both north and south of Sydney, but rarely in payable quantities. The beach miners appear to derive a comfortable living from their labors, but the exact amount of metal cannot be ascertained, because a considerable portion of the miners have a migratory tendency, not remaining long in one place; consequently many parcels of amalgam are taken elsewhere and included in the returns from other districts. The Sydney mint returns show, however, that something like 3,400 oz. were received during 1894 from the coast between Byron Bay and Iluka. The gold on the beaches is more plentiful after violent storms, and at such times the miners are actively employed. The busiest scene is perhaps that afforded by the Seven Mile Beach, near Byron Bay, where, according to a recent visitor, many men are engaged on a line of reef at low tide, scooping up the black sand from the crevices in the rocks, from which they generally obtain good returns, an instance being recorded of a party of miners on this part of the coast clearing £700 per man in a few months. This, of course, was an exceptional return. Considerable discussion has taken place respecting the probable source of the gold, but nothing definite has been ascertained. The local opinion is that it is washed up from auriferous beds at the bottom of the sea. The gold-saving appliances used are generally of a somewhat primitive character, the returns not being sufficiently large to encourage the introduction of costly machinery. One peculiar feature of beach mining is that, as a rule, where the black sand is deepest the gold is least plentiful. In the vicinity of the Macleay Heads there are veins of black sand from 2 to 6 feet in thickness, but these contain only slight indications of gold. The best returns have been obtained during exceptionally low tides, when the masses of submerged rock can be approached, and the black sand in the holes and crevices extracted. The plates often require different

modes of treatment, according to the locality from which the sand is obtained. In preparing the plates cyanide of potassium is used to a large extent, and in many instances the concentrates have to undergo a separate treatment before finally passing over the plates, especially where traces of coated gold are perceptible.—Engineering and Mining Journal.

### Angling by Electric Light.

One evening recently two anglers, one a resident of Newhaven, tried the interesting experiment of fishing in Seaford Bay by electric light. A fisherman of Newhaven rowed the anglers from the railway pier soon after six o'clock, when it was completely dark. A portable battery with a 5 candle power incandescent lamp was taken, and this lamp was lowered until a weight below it touched the bottom at 25 feet. Both battery and lamp were specially made for the trial, and the lamp was protected by a galvanized crinoline and was made watertight. When it reached the bottom of the sea, there was, it is stated, a circular area, 20 yards in diameter, brightly illuminated right up to the surface. Fishing was carried on with an ordinary line on the port side, the lamp having been lowered on the starboard side of the boat.



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