SCIENCE

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"CARBORUNDUM"; A SILICIDE OF CARBON.

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UNDER the name "carborundum," a new compound of carbon and silicon has been commercially introduced as an abrasive; a substitute for emery and corundum. It is a very hard crystalline solid, of a deep green color, and was obtained about the year 1890 by Mr. E. G. Acheson, of Chicago, while experimenting with the electric furnace with the intent of producing artificial diamonds. Under the supposition that he had obtained a compound of carbon and alumina he gave it the name "carborundum." Analysis,* however, shows the following composition:

Si - - - - -	69.10
C. - - - - - -	30.20
Al_2O_3 and Fe_2O_3 -	0.49
CaO - - - - -	0.15

Which may be expressed by the formula SiC; the other substances being regarded as impurities, and as imparting the color, which is found to be variable, from nearly white to a deep green and blue.

At a session of the Academy of Sciences of France, May 16, 1892, M. P. Schützenberger described the production of a new compound with the same formula.† It appears, however, that some carborundum had previously been molded into buttons and mounted in bulbs for electric lighting and exhibited by Mr. Nikola Tesla before the Institution of Electrical Engineers in London in the month of February, 1892, but its composition was not then known.

The value of this substance as an abrasive has led to its manufacture upon a large scale, and its introduction in the form of powders of different degrees of fineness, and of wheels and whetstones and polishing cloths.

The processes of manufacture are described in the memoir cited and also in another by the inventor,‡ which gives illustrations of the furnace, which consists merely of a rectangular box, about six feet long, eighteen inches wide and a foot deep, built up of fire brick, in which a mixture of sand and carbon is exposed to the electric current for eight hours. The result is a mass of crystals of small size, which is crushed, and the powder is digested with dilute sulphuric acid to remove impurities.

The crystallization has been carefully studied by Prof. B. W. Frazier, of Lehigh Univ., who finds it to be rhombohedral, and in some cases hexagonal. Both direct and inverse rhombohedra were observed and determined, viz.: 1-5, 4-5, 10-11, 1, 5-4, 4-3, 10-7, 2, 5-2, 4, 19-4, 5, 10.‖ In some crystals the direct and inverse rhombohedra of the same parameters were found on the same crystal, so as to impart to it an appearance of holohedral hexagonal symmetry.

The value for the length of the vertical axis is given as, $C = 1.2264$.

In the crystals which I have examined the tabular habit prevails, and as seen under the microscope they consist of hexagonal plates with the rhombohedral planes too small to permit of their inclination being measured.¶

The specific gravity of a bluish-green colored mass as determined by myself at 60 F. was found to be 2.546. Prof. J. W. Richards found it to be for the green crystals 3.123, and for the blue somewhat less.

The hardness, which is the most important character industrially, lies between the sapphire and the diamond, and may thus be expressed by 9½. It is claimed by the inventor that the powder on a rapidly revolving lap will cut and polish the diamond, and he believes that it may be advantageously substituted for diamond dust in diamond cutting.

It is a good conductor of heat, and is not fusible before the blow-pipe. It also resists all acids, even the fluoric, and does not burn when heated in a current of oxygen; this being one of the methods adopted to obtain it free of any graphitic carbon.

The color and lustre are remarkably brilliant, and if by any modification of the process large and solid crystals can be made, we shall have a valuable addition to our list of gems.

Considering the abundance of these two elements in nature, both silicon and carbon, and the comparatively indestructible nature of the compound formed by their union, it is surprising that we do not find this compound in nature. Its absence indicates the prevalence of conditions during the formation of the crust of the earth unlike those of the electric furnace.

* By Dr. Mulhaeuser, chemist of the Carborundum Company, in Memoir by E. G. Acheson: "Carborundum, Its History, Manufacture and Uses." Jour. Frank. Inst., Philadelphia, Pa., Sept., 1893.

† Contribution to the History of Carbo-silicious Compounds.

‡ Carborundum, etc., The Electrical Engineer, XV., p. 227, March, 1893.

‖ From a Report to the Carborundum Co., Memoir cited. Appendix, p. 19.

¶ Vide Article in Eng. Min. Jour., Sept., 1893.

LATTER-DAY TAXIDERMY.

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TAXIDERMY is hardly recognized as one of the fine arts, yet. Perhaps it may never be. But the truthfulness of representation, and the artistic effects of posing and grouping which "mounted" animals may exhibit, can often invest such work with an interest for those who may not be much inclined toward taxidermy for the sake of the skin-preserving. The displays of mounted birds and mammals at the World's Fair present several stages of progress in the art of taxidermy, and lead one to speculate on the outcome of it all. For scientific purposes, *sensu stricta*, the making of birdskins is probably preferable to attempting the mounting of the specimens; and so perhaps with many of the mammals. Evidently, however, if the specimen in hand can be truthfully represented so far as form and characteristic position and externals go it may serve as a teaching object to many to whom the "made" skin, with accompanying written measurements, may be without a lesson.

But it seems as if it were possible to go even farther: