

A CURIOUS FORMATION OF THE ELEMENT SILICON.

By H. N. WARREN, Research Analyst.

DURING the preparation of specimens of crystalline and other forms of silicon, I obtained a most curious formation of that substance, which would appear, when tested analytically, to be composed of graphitoid silicon, constituted so as to form most perfect and well-developed crystals consisting of oblique octahedrons. This peculiar form of silicon first made its appearance upon subjecting potassium silicofluoride to a most intense heat in contact with impure aluminum. Upon separating graphitoid silicon thus formed by the aid of dilute acids, small quantities of the other substance were observed. Direct steps were at once taken to procure it, if possible, in larger quantities. After numerous experiments had failed to reproduce it, the following method was used with success, although still very uncertain. Graphitoid silicon was first obtained by introducing pieces of metallic aluminum about the size of a walnut into a clay crucible of convenient dimension, and subjected to a heat sufficient to maintain in a fused state a mixture of four parts potassium silicofluoride, one of potassium carbonate, and two of potassium chloride. After the violent reaction attending the introduction of the aluminum had subsided, the crucible was urged to whiteness for about five minutes; after cooling and breaking the same a perfect round button, containing about 80 per cent. of silicon, was obtained. This, after carefully detaching any adhering slag, was placed in a plumbago crucible containing about twelve times as much aluminum as the button obtained, together with an addition of two parts of metallic tin, and covered with a layer of sodium silicate. The crucible and its contents were then subjected to the most powerful heat that could be obtained for about two hours; after cooling the same and breaking the piece of aluminum contained therein, the new modification was obtained in large perfect crystals possessing a full metallic luster and true models of oblique octahedrons. After dissolving the small quantity of aluminum mechanically entangled, the analysis of the residue showed pure silicon, insoluble in all acids except hydrofluoric, and infusible. In appearance the crystals resemble crystals of cast iron which are sometimes met with upon breaking a pig of that substance, the largest assuming a size of over half an inch across the faces, and as perfect as a crystal of alum.—*Chem. News.*

COST OF STEEL MAKING IN SPAIN.

THE manufacture of steel in Spain has given considerable concern to the Spanish government in connection with the production of equipment for the army and navy. Don Francisco Gasque has lately published a memoir on the subject, which contains some interesting data. The two districts considered are Asturias and Biscaya, the former the seat of the coal industry and the latter possessing the Bilbao ore deposits.

The cost of making Bessemer pig at Bilbao is placed as follows:

Cost of Bessemer Pig at Bilbao.	
	Francs.
1,920 kilogrammes of ore at 7 fr.	13.44
432 kilogrammes of limestone at 2 fr. 75 c.	1.58
970 kilogrammes of coke at 26 fr.	25.22
Labor	4.50
Repairs and general expenses	3.50
Total	48.24

The manufacture of Bessemer pig at Gijon, Mieres and Felguera, and Quiros, in Asturias, is placed respectively at 58 fr. 34 c., 57 fr. 74 c., and 67 fr. 13 c. per metric ton. Basic pig at Mieres and Felguera would cost 52 fr. 74 c., making the cost of basic Bessemer 87 fr. 52 c., and of basic open hearth 96 fr. 61 c. At Bilbao the cost of making acid Bessemer at the works of the Société Altos Hornos, with two 8-ton vessels, single turn, is as follows:

Cost of Acid Bessemer Steel at Bilbao.	
	Francs.
1,107 kilogrammes of pig at 48 fr. 20 c.	53.47
56 kilogrammes of spiegel at 1 fr. 70 c.	9.52
180 kilogrammes of coal at 20 fr. 50 c.	2.70
50 kilogrammes of coke at 26 fr.	1.30
Labor	2.95
Refractories	1.50
Moulds	1.50
Repairs and miscellaneous	2.00
General expenses	2.00
Total	77.74
Deduct 70 kilogrammes of scrap at 48 fr.	3.36
Cost per metric ton	74.38

The cost of acid open-hearth is placed as follows:

Cost of Acid Open-hearth Steel at Bilbao.	
	Francs.
537 kilogrammes of pig at 48 fr. 25 c.	35.90
536 kilogrammes of iron scrap at 72 fr.	38.50
25 kilogrammes of steel scrap at 60 fr.	1.50
12 kilogr. of ferro-manganese at 330 fr.	3.96
95 kilogrammes of ore at 10 fr.	0.95
Labor	6.00
Moulds	1.50
Refractories	1.60
Repairs and miscellaneous	3.00
General expenses	2.00
Total	96.22
Deduct 25 kilogrammes at 60 fr. per ton ..	1.50
Cost per metric ton	94.72

PAPER gas pipes are made from strips of manila paper in width equal to the length of the pipe to be made. This is passed through a vessel filled with melted asphalt, and then wrapped around an iron core until the desired thickness is obtained. The pipe is then subjected to powerful pressure, after which the outside is strewed with sand, and the whole cooled with water. The core is removed, and the inside coated with a waterproof composition.

POLARIZATION WITHOUT A POLARIZER.

I HAVE accidentally made a quite useful discovery, which I have not seen mentioned before. In order to polarize, we put a polarizer (Nicol) beneath the stage and an analyzer (Nicol) above the objective (either right next to it, at the end of the draw tube, or above the eye piece). The selenite comes on top of the polarizer. Now, I found that the polarizer is not absolutely indispensable. Given a certain polarizing condition of the sky (*i. e.* blue, with more or less watery vapor—as either before or after a rain, snow, or fog), you can polarize very nicely with the analyzer alone, and, if you want display of color, put the selenite on top of the slide, or anywhere convenient to you—so it comes beneath the analyzer. The colors (and crosses) will, of course, be somewhat fainter than when you use the polarizer too. In order to get the best display, it will be necessary to rotate both analyzer and selenite until in the proper relative positions; or, to speak more correctly, the relative position of the P. A. of the selenite to the beam of light from the mirror decides the more or less intense coloration. With any other sky the polarization is not observed.

This observation is useful in so far as to enable the possessors of microscopes, without substage facilities, to polarize fairly well—under the circumstances—and the proper condition of the sky is often obtained in our latitude.—*H. M. Wilder, in Amer. Jour. Pharmacy.*

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