

IX.—*On a Curious Blast Furnace Slag.*

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ONE of the blast furnaces at the the Eglinton Iron Works, Kilwinning, having been blown out, it was noticed that on the hearth there was a curious deposit of a bluish black semi-metallic colour, which by its brittleness seemed to be a slag. Mr. Smith having forwarded to my friend Mr. John Young, F.G.S, a sample of the substance, it was submitted to me for analysis and examination. On a cursory examination it was seen that it was not homogeneous but consisted of different substances mixed, the most conspicuous being the bluish substance with a plumbago lustre before referred to. On powdering it the substance was found to contain pieces of metallic iron in irregular masses imbedded in the matrix. This Iron had likely been splashed in amongst the slag, as it did not seem to belong to it, and was very irregularly distributed throughout the mass. Several portions had a reddish colour and did not look like the general mass, but were, as will be seen, of an entirely different composition. The substance in powder had a specific gravity of 3·839, but when freed as much as possible from metallic iron by means of a magnet, its specific gravity was lowered to 3·751. A qualitative analysis showed that the substance contained carbon as "kish," silicon, silica, titanium nitrocyanide, iron, manganese, calcium, magnesium, sulphur and phosphorus. In the bluish portion the manganese was in large excess, whilst in the reddish the calcium and magnesium increased so as to be nearly equal to the manganese. The great bulk of the slag, however, consisted of the bluish substance. The following is an analysis of an average sample of the slag.

Insoluble in	{ Carbon, Silicon and Silica	15·51
Hydric Chloride	{ Titanium nitrocyanide ..	5·27
	Iron	18·31
	Manganese	30·51
	Calcium	4·45
	Magnesium	5·16
	Sulphur	18·28
	Phosphorus	2·17

 99·66

If we leave out the iron we find that there is not enough sulphur and phosphorus to saturate the remaining metals, so that we must suppose either that a portion of the manganese existed in the metallic state, or as a carbide or as a lower sulphide. It may be that all three cases may have existed, but as I could not free the pieces of iron from all adhering matrix I had no means of knowing. Two other portions were analysed, one a picked sample of the blue portion and the other of the red. The following are the analyses.

	I	II
Insoluble in { Carbon, Silicon, and Silica	18.04	16.34
Hydric Chloride { Titanium nitrocyanoide ..	4.88	7.01
Iron	19.06	16.47
Manganese	35.52	20.53
Calcium	0.85	12.07
Magnesium	2.07	8.45
Sulphur	17.64	18.72
Phosphorus	1.01	0.14
	99.07	99.73

It will be noticed that in these analyses the sulphur and phosphorus are again too low to form mere sulphides, so that some of the metals, besides the iron, must have been either in the metallic state or in a lower state of combination.