

*On Plattnerite.*

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THIS mineral, lead dioxide, does not seem to have been examined since it was first noticed by Breithaupt and Plattner in 1837 (*Journ. pr. Chem.* x. 508). This specimen, named "Schwerbleierz," is said to be probably from Leadhills, and the mineral is called, in the manuals of Dana and others, a doubtful species. It was named Plattnerite by Haidinger and subsequent authors.

A short time ago my friend Mr. Thos. Davies, F.G.S., of the British Museum, asked me to analyse a mineral from Leadhills, Lanarkshire, which he had had in his possession for some years, but the examination of which he had, from various causes, frequently postponed. On examination it was found to be lead dioxide—Plattnerite.

It is a black mineral, in globular or mammillated concretions, with crystalline exterior; with a velvety lustre on surfaces, the lustre of fractures being sub-metallic; fracture uneven; opaque, streak dark brown to puce colour; H. about 5; S. G. 8.54.

On heating it gives off oxygen, leaving a residue of litharge. With hydrochloric acid it gives off chlorine even in the cold, and on warming entirely dissolves, lead chloride separating out on cooling. The matrix consists mainly of lead carbonate (cerussite), with some chlorophosphate (pyromorphite); from these it was rather difficult to entirely separate the black mineral.

The prepared specimen was found to contain traces, but traces only, of water, carbon dioxide, lime, and ferric oxide.

It underwent no loss at 100° C.

On analysis of the carefully selected mineral the following results were obtained:—

*Loss on ignition at a low red heat.*—This loss was of oxygen with traces of carbon dioxide and of water.

·8805 gram lost ·0617 = 7.01 per cent.

·6522 ,, ,, ·0469 = 7.19 ,,

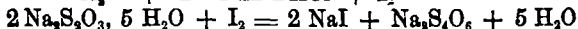
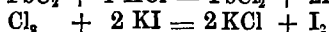
The residue from the first of these ignitions contained very small amounts of undecomposed mineral and of red lead,  $Pb_4O_6$ .

*Estimation of lead protoxide.*

|                 |                          |                          |       |               |
|-----------------|--------------------------|--------------------------|-------|---------------|
| ·8805 gram gave | 1·1061 PbSO <sub>4</sub> | =                        | 92·45 | per cent. PbO |
| ·616            | „ „                      | ·7743 PbSO <sub>4</sub>  | =     | 92·46 „ „     |
| ·5492           | „ „                      | ·6562 PbCl <sub>2</sub>  | =     | 92·88 „ „     |
| ·7865           | „ „                      | 1·060 PbCrO <sub>4</sub> | =     | 92·90 „ „     |

*Estimation of oxygen over that required to form PbO.*—This was estimated by treating the finely powdered mineral with strong hydrochloric acid in a small flask and distilling the liberated chlorine into a strong solution of potassium iodide, and afterwards estimating the liberated iodine with a solution of sodium thiosulphate, exactly as in Bunsen's method for estimating the value of manganese ores.

The equations representing the reactions are as under :—



|                             |   |               |   |                       |
|-----------------------------|---|---------------|---|-----------------------|
| ·4905 gram liberated iodine | = | ·08081 oxygen | = | 6·28 per cent. oxygen |
| ·5492 „ „ „                 | = | ·088575 „     | = | 6·11 „ „              |

One or two other methods of estimating the available oxygen were tried, but failed to give satisfactory results.

*Mean of results.*

|  |                |
|--|----------------|
| Loss on ignition ... ..                                | 7·10 per cent. |
| Lead protoxide, PbO, by direct determination...        | 92·66 „        |
|  | 99·76          |
| Equivalent to lead ... ..                              | 86·01 „        |
| Available oxygen in excess of PbO, by determination... | 6·20 „         |
| Water, carbon dioxide, ferric oxide, and lime...       | traces         |

## Lead dioxide requires

|        |                 |    |                |                 |
|--------|-----------------|----|----------------|-----------------|
| Lead   | 86·61 per cent. | or | Lead protoxide | 98·31 per cent. |
| Oxygen | 13·39 „         |    | Oxygen         | 6·69 „          |
|        | 100·00          |    |                | 100·00          |

Plattner (*loc. cit.*) found 86·2 per cent. of lead.

These results leave no doubt of its identity with Plattnerite (Schwerbleierz, *Breithaupt*), and remove all doubt from that species.

The specific gravity of this specimen is lower than that given by Breithaupt, which is 9·39 — 9·45. The sp. gravity of artificial PbO<sub>2</sub>, variously prepared, is given by Herepath, 1824, *Phil. Mag.* lxiv., as 8·902; by Karsten, 1832, *Schweigger's Journ.*, lxx., as 8·933; by Playfair and Joule, 1849, *Journ. Chem. Soc.* 1, from 8·756 to 8·897; and by Werwicke, 1870, *Pogg. Annalen*, cxli., as 9·045; PbO<sub>2</sub>, H<sub>2</sub>O, given by the same author as having sp. gravity 6·267.