a separate portion of substance, setting it free by means of a mixed solution of ferrous chloride and hydrochloric acid and weighing it as above. In order to see whether the second method is affected by the presence in the substance of ferrous oxide (as Bunsen's undoubtedly is), a quantity of a pure "peroxide" of manganese was made by heating pure nitrate first to about 200° C., then to redness, and the percentage of loose oxygen in this preparation determined according to Fresenius and Will; first in the usual manner and then after addition to the substance of a known weight of artificial ferroso-ferric oxide (Fe_3O_4) prepared in the wet way from ferrous sulphate.

The results were as follows :—

Percentage of Loose Oxygen found.

By the oxalic acid method, ...	7·99	8·13
By the same in presence of ferroso-ferric oxide,* . . .	7·98	

Hence the presence of ferrous oxide does not sensibly affect the oxalic acid method, which at the same time showed me that the manganese nodule substance analysed could not have contained much ferrous oxide. In fact the 3·95 per cent. of loose oxygen reported in the summary were deduced from the following determinations :—

Oxygen found by oxalic acid, ...	4·02 = 0·502 × "O"
Oxygen found by iodine method, ...	3·88 = 0·485 × "O"
Difference, ...	0·017 × "O"
Manganous oxide found, ...	19·39 = 0·546 × MnO

The difference (0·017 × "O"), if not simply due to observational errors, would correspond to $0·017 \times Fe_2O_3 = 0·017 \times 72 = 1·22$ per cent. of ferrous oxide = 1·36 per cent. of ferric oxide, leaving 16·2 − 1·36 = 14·84 of real ferric oxide. But at any rate there cannot be much ferrous oxide present, or it would have told more strongly on the iodine result.

Another result which would appear to follow from the reported numbers, is that the loose oxygen is not sufficient to supplement the manganous oxide into binoxide. Taking 4·02 as the correct percentage of loose oxygen, we have for the percentage of—

Manganous oxide (MnO), ...	0·044 × MnO †
Real manganese oxide (MnO_2), ...	0·502 × MnO_2

Now the oxides MnO, FeO (as above calculated); CaO, MgO as reported under (*b*), amount in all to 0·197 × R″O.

These may be present in combination with manganese binoxide as components of psilomelanic compounds, leaving a balance of 0·305 × MnO_2 of real uncombined (or hydrated) binoxide of manganese.

* MnO . O = 0·6454 grms.; Fe_3O_4 = 0·18 grms., CO_2 obtained = 0·2832 = 7·98 per cent. of oxygen.

† Here, as everywhere, H = 0·5; ∴ MnO = 35·5.