

Elimination of Interference from Aluminium in the Determination of Total Iron in Soils and Plant Materials Using 1,10-Phenanthroline Reagent

Comment on the Paper by Jayman *et al.*¹

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Of the many compounds proposed for the spectrophotometric determination of iron, none has received such wide acclaim as 1,10-phenanthroline. Not only is it a sensitive and stable reagent but, by virtue of the location of the two nitrogen atoms in the molecule, it is extremely selective; all but a few elements are sterically hindered from forming complexes with it. As long ago as 1938, the interference in the determination of iron by other ions was extensively studied by Fortune and Mellon,² who produced a long list of ions that had no effect on the determination even when present in relatively high concentrations. Included in their list was aluminium(III).

In complete contradiction to this was the paper by Jayman *et al.*¹ published in the October, 1975, issue of *The Analyst*. The authors claimed that aluminium forms a complex with the reagent that is identical in its absorption characteristics with that of iron(II) except for its sensitivity. If this were so, then plainly it would not be feasible to determine iron in aluminous materials without prior separation. However, there is abundant evidence that no such separation is necessary.

For example, the reagent has been proposed for the direct determination of iron in aluminium and its alloys³ and in aluminium oxide⁴ and it is widely used for the analysis of a wide range of aluminosilicate materials.⁵ In none of the standard methods cited is there any suggestion that aluminium forms a complex with 1,10-phenanthroline, or that it interferes in any way with the determination of iron. Hence no separation has been found necessary. My colleagues and I, working in the field of aluminous refractory materials, have determined iron by this method for many years and we have never noted any interference from aluminium. International standards for the determination of iron in aluminium⁶ and aluminium oxide⁷ give further support to these views.

In the light of this overwhelming evidence, it is not plausible that aluminium was responsible for the reactions that Jayman *et al.* observed. As they claim that the absorption spectrum is identical with that of iron, it is most probable that it was, in fact, due to iron and that they were misled by systematic contamination. Their results suggest that the iron was probably present as an impurity in the aluminium that they used for preparing their reference standards.

References

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Received February 4th, 1976
Accepted February 13th, 1976