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# The Platinum Group Metals in Iron Meteorites

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## ABSTRACT

Solvent extraction methods have been developed for the determination of Ru, Pd and Pt in iron meteorites. The method for Ru is based on the oxidation of this element in HCl solutions with sodium periodate followed by extraction of the tetroxide into  $\text{CHCl}_3$ . The  $\text{CHCl}_3$  phase is then removed to a  $\text{HNO}_3$ - $\text{NaIO}_4$  "keeper" solution for storage up to 17 hours prior to analysis. The method for Pd and Pt entails simultaneous extraction of their stable iodocomplexes into methylisobutyl ketone after removal of Fe(III) as the chlorocomplex. The digestion of the samples with reference to these elements has also been investigated.

All three elements were determined by the graphite furnace atomic absorption spectrometry technique. The limit of detection was lowered by increasing the volume of organic phase placed in the graphite furnace. The lowest absolute detection limits achieved in this study were 0.5 ng for Ru, 0.5 ng for Pd and 5 ng for Pt.

The platinum group metal values for 108 authentic iron meteorites were subjected to Principal Components Analysis and Discriminant Analysis. These procedures confirmed the validity of the classification of iron meteorites developed over the past 25 years, but highlighted poor fits for some individual iron meteorites within a group. Possible reclassification of these members was evaluated after consideration of the meteorite's morphological features.

The cases for the merging of some groups were investigated and discussed with reference to the chemical features of those groups.

The data obtained also revealed several cases of meteorite pairings (related members of a single meteorite shower catalogued as separate meteorites), instances of the mislabelling of museum fragments and two putative meteorites which proved to consist of man-made materials.

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