

PLATINUM-GROUP ELEMENTS IN UNDERSTANDING THE EARTH'S PROCESSES

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Abstract

The importance of platinum group elements (PGE) in modern technological applications as well as in earth science studies is highlighted. These elements provide a unique view of how the early Earth's mantle and crust prevailed and the mysteries of Earth's formation, dating back to 4.5 billion years. A few aspects on how PGE are used to derive important conclusions pertaining to the understanding of earth's interior are discussed with inputs from various latest studies. Minerals such as sperrylite, cobaltite, pentlandite, chalcopyrite, and another mineral containing iridium and tungsten have been identified by SEM-EDS by our group in the chromite and sulfide-bearing ultramafic rocks of Madawara Igneous Complex, Lalitpur district, Uttar Pradesh. In another interesting study, very high concentrations of PGE, especially that of platinum (up to 1 $\mu\text{g/g}$), were identified in the ferromanganese crusts of the Afanasy-Nikitin Seamount (ANS) in the Eastern Equatorial Indian Ocean. Surface oxidation of seawater is believed to be involved in this extreme enrichment of Pt in ferromanganese crusts. These could become resources of platinum in future. Finally, a discussion on the high concentrations of iridium found in a particular sediment horizon of 65 m. y. at various places around the planet including Deccan basalts which played an important role in studies linking the impact of an extraterrestrial object to the mass extinctions at the K-T boundary is presented. Scientific data from different studies, especially related to the iridium anomaly, adds weight to the theory that the K-T extinction was caused by a massive asteroid fragmenting and hitting several locations around the Earth at K-T boundary.

Keywords: platinum group element, PGE deposits, ultrabasic rock, Bundelkhand Massif, ferromanganese crust, Iridium anomaly,