

Platinum group element occurrences from the Khetri basin, North Delhi Fold Belt, Rajasthan, India

Monika Mishra^{1,*}, Debojit Talukdar¹, Manish Banerjee¹, Sandip Nandy¹ and Rana Bandyopadhyay²

¹Geological Survey of India, National Centre of Excellence for Geoscience Research, Central Headquarters, Kolkata 700 091, India

²Geological Survey of India - Western Region, Jaipur 302 004, India

The Precambrian Khetri basin of the western Indian shield is globally renowned for its base-metal, gold, and uranium endowment. However, there are only a few studies from a critical mineral perspective. We report the occurrence of platinum group elements (PGE) from the Khetri basin of the North Delhi Fold Belt, Rajasthan, essential for the transition towards clean energy. This occurrence is hosted by the linear, discontinuous, NE-SW trending, deformed magnetite bands, brecciation zones, and associated metamorphosed mafic rocks. Our results yielded enrichment of critical \sum PGE (Ru + Rh + Pd + Pt) metals in the surface bedrock ($n > 50$) with values ranging between 59.8 and 5446.0 ppb (parts per billion) at an average of 272.7 ppb. *In situ* trace element concentration of the magnetite also reveals the presence of up to 3000 ppb PGE concentration. The mineral phases occur along grain boundaries and within magnetite and rutile inclusions. The primitive mantle-normalised PGE pattern closely resembles that of other comparable deposits, while the bivariate Pd-Cu/Pd relationship points towards significant mineralisation potential and an enriched mantle source component.

Keywords: Enrichment, Khetri basin, magnetite, North Delhi Fold Belt, platinum group elements.