

## **The geochemical documentation of redox conditions in Paleogene lignite deposit of Barsingsar, Bikaner-Nagaur Basin, western India**

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The palaeo-depositional conditions of a lignite-bearing sedimentary succession play a significant role in preservation of organic matter (OM) and general climatic changes in the depositional niche. To understand the redox conditions of the paleogene lignite-bearing deposit of Barsingsar from Bikaner Nagaur-Basin, the *n*-alkane parameters as well as concentrations and ratios of redox-sensitive elements like V, Ni, Mo, U, Th, Cu, Cr, Cd and Ba and are used. The pristane to phytane (Pr/Ph) ratio values between 1.0 and 3.0 reflect suboxic to oxic environment. The average value of Pr/Ph ratio is 1.7 for the deposit. The values of terrigenous to aquatic ratio (TAR) are >1, indicating terrestrial sediment input to the succession. The average Ni/Co ratio of the Palana Formation is 5.58 which advocate for suboxic condition. This is further corroborated by the V/Cr of 1.43 (<2); indicating oxic condition for the same. Similarly, the U/Th ratio of 0.28 also indicate oxic environment while V/V+Ni ratio of 0.73 manifest a dysoxic condition. Average Rare Earth Elements (REE) concentration varies from ~24.70 ppm to 249.14 ppm with an average of ~215.60 ppm. The chondrite and Post-Archean Australian shale (PAAS) normalized patterns exhibit negative Europium (Eu) anomaly, enriched low rare earth element (LREE), depleted high rare earth element (HREE), and medium Y/Ho ratio (~20-35) along with positive correlation between Y/Dy and Y/Ho ratio. The overall REE and Trace element distribution, along with the phytol derivative-ratio and TAR values suggest that the organic matter and the clastic sediments of the deposit took place in a shallow marine regressive phase characterized by dysoxic environment with intermittent spells of minor oxic events in the Paleocene-Eocene.