Application of REE and stable isotopic geochemistry in evaluating the geochemical history of an evaporite basin: A case study of late Neoproterozoic Nagaur-Ganganagar evaporite basin, western Rajasthan,India.

MAZUMDAR, A. and BANERJEE, D.M. Department of Geology, University of Delhi, Delhi-110007, India

The Nagaur-Ganganagar basin in western Rajasthan is a large, elongated, intracratonic sedimentary basin trending NNE-SSW. Jodhpur, Bilara,Hanseran Evaporite and Nagaur Group of rocks represent the Late Neoproterozoic to Early Cambrian deposits in this basin. The Evaporite Group is tentatively considered a coeval facies equivalent of the Bilara Group. Organic rich laminated dolomite of the Bilara Group is a repository of hydrocarbons and appear to have formed in a relatively deeper suboxic to anoxic environment. The Hanseran Evaporite Group is made up of layers of dolomite, anhydrite, halite, occasional gypsum and potash minerals. The dolomite bed at the base of each halite cycle is invariably rich in organic matter in contrast to organic-free evaporite beds. These represent periodic fluctuations in the redox conditions in the basin and is accompanied by density stratification and increased bio-productivity (mesohaline) during the evolution of the brine.

Attempt has been made to trace the vertical and lateral distribution patterns of $\delta^{13}C_{carb}$, $\delta^{34}S$ and REEs in the Bilara dolomite and individual evaporite cycles. $\delta^{13}C_{carb}$ (+2.1 to –8‰) and $\delta^{34}S_{sulfate}$ (+27 to 35‰) values show inverse relationship. The shale normalized REE patterns of dolomite show a relative HREE enrichment, variable Ce concentration (0.01 to 2.13) and Ce anomaly (0.48 to 0.89) suggesting variable redox conditions. Some samples show negative Nd anomaly. The study shows that the redox as well as changes in ionic strength of the brine controlled the REE distribution in the dolomite.