Influence of paleoredox conditions on pore attributes of Permian Shales of Krishna Godavari Basin, India

SHUBHANGI KALA[1], J. DEVARAJU[1] AND MOHAMMED ABDUL RASHEED[2]

[1]University of Petroleum and Energy Studies
[2]Gujarat Energy Research and Management Institute
Presenting Author: kalashubhangi@gmail.com

The Krishna Godavari (KG) basin is a category-I, prospective, petroliferous basin with a wide areal extent for potential gas shale exploration. The current study examines the Permian-aged Kommugudem Formation for geochemical signatures using laboratory evaluation of conventional core from six boreholes in the study region.

The assessment of pore attributes is important in evaluating the storage and fracture system of a shale reservoir. The occurrence of several micropores and mesopores in selected shale samples was revealed by low-pressure N_2 and CO_2 analysis. Complex and heterogeneous pore structures, primarily intergranular and intragranular pores, were identified, which may contribute as hydrocarbon storage sites. The XRD study, which is corroborated by SEM, suggests a silica-dominated shale lithotype. There is a high TOC concentration and the formation of gas-prone, type III kerogen. The clay and TOC have a positive association with micropore volume, demonstrating the contribution of clay micropores and related organic matter. The trace elements in the Kommugudem Formation imply the presence of detrital sediments derived from felsic igneous rocks in a humid and warm climate. The paleoredox findings suggest a suboxic fluvio-marine environment. Certain trace elements have a positive correlation with pore volume, suggesting that they may play a role in the pore genesis of silicate minerals. The fact that the redox proxies are strongly related to TOC and pore volume facilitates the formation of organopores. The study demonstrates the importance of paleoenvironmental indicators in understanding the complicated process governing pore attributes.