

COMPOSITION, DIAGENESIS AND RESERVOIR ROCK CHARACTERIZATION OF MIDDLE JURASSIC DATTA FORMATION, SALT RANGE, PAKISTAN

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Abstract

In the Salt Range of Pakistan, the sandstones of Middle Jurassic Datta Formation has been explored for reservoir potential. This study is based on 16 thin sections, supplemented by porosity and permeability determination, SEM analysis and petrophysical analysis. Detrital mineral composition of the Datta Sandstone shows that sandstones are lithic greywacke to sub litharenite. The Datta Sandstone is fine to coarse grained, moderate to well sorted with poor to moderate sorted and has sub-angular to well-rounded grains. Mineralogically and texturally the Datta Sandstone is immature, submature to mature. The Datta Formation sandstones contain evidences for numerous diagenetic processes which includes compaction and pressure solution, cementation and alteration, dissolution, dolomitization, and fracturing. Based on textural relationships, we set out a provisional diagenetic history (paragenesis) for the Datta Sandstone. These diagenetic processes occur in Eodiagenesis (early), Mesodiagenesis (burial) and telodiagenesis (uplift) stages.

The compaction, cementation and dolomitization reducing the reservoir quality while dissolution, pressure solution, alteration and fracturing enhancing the reservoir quality of Datta Sandstone. The average visual porosity of outcrop samples of Datta Sandstone range from 1-13%. The porosity types identified under SEM include intercrystalline, intracrystalline/intraparticle, vuggy and fracture. The petrophysical aspects of the Datta Sandstone was carried out by using the wire-line logs of Chonai-01 well which suggests effective porosity (0.151%), average porosity (0.241%), density porosity about 0.217%, saturation of water averages 0.986% and saturation of hydrocarbons about 0.0139%. These parameters show that Datta Sandstone may not be recommended as hydrocarbon reservoir around the study area.