

Shale gas potential of Sembar and Goru Formations in Lower Indus Basin, Pakistan

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Abstract

In this paper Shale-Gas potential of the Sembar and Goru shales are investigated in the Lasbella area of Balochistan and the sub-surface study of the Badin block. The outcrop samples of the potential shale-gas intervals were analyzed for the detailed petrographic, geochemical and textural study. The XRF results indicate that the Ca, Si, O, Al occurs in high concentration, while the XRD findings confirmed the presence of quartz, calcite, albite and clinocllore minerals. The petrographic study suggests that the quartz grains are sub-angular to sub-round and fractured while calcite is also present. The interparticle and intergranular porosity ranges 10 to 20 %. The pores are uniform in size. A high porosity is noted along the fractured zone of the quartz grains. The SEM and EDS findings revealed that matrix and cementing material are calcite and silica while subordinate feldspar, dolomite and the heavy metals (iron and tantalums) are also present. Based on the depth and gross thickness of the Semabr and Guru shales in the subsurface from the Badin block, an isopach map is drawn. The geochemical analysis of the Sembar-Guru shales confirmed a high TOC values, ranging from 0.5-3.5%, presence of Kerogen type II and type III, thermally mature (Early mature < 0.50 percent Ro, to mature >1.20 percent Ro) nature of the rock. These geochemical attributes are generally considered to be favourable for the shale gas extraction. The overall result indicate the existence of the numerous shale-gas horizons having favourable depth, a significant thickness, suitable kerogen type, maturity index and TOC values in the Sembar and Guru Formations, which can yield large volume of shale gas.