“Typology of coatings from two sandstone reservoirs: The case studies of Neocomien in the Paris Basin and Upper Cretaceous Sego formation (Colorado)”

Abstract

The present study is a continuation of the scientific project CLAYCOAT “CLAY COATING in shallow marine clastic deposits to improve reservoir quality prediction” launched by Engie Company. The development of clay coatings around detrital quartz can be a major factor controlling reservoir quality in buried sandstone reservoirs. These coatings prevent quartz overgrowth and thus preserve porosity and permeability during burial. Hence, the aim is to describe the occurrence, abundance and nature of clay coatings from an estuary environment within sandstone reservoir of Neocomien in the Paris Basin buried at 500:1000 m depth. A total of 250 m of core, 30 thin sections mostly from an estuary environment was described in the 5 boreholes using X-ray Diffraction patterns (XRD), Fourier Transformed Infrared Spectroscopy (FTIR), and Scanning Electron Microscopy (SEM) coupled with an Energy Dispersive X-ray Spectroscopy (EDX). The results show that clay minerals present are Kaolinite with two origins; diagenetic (well crystalized) and detrital (partly dissolved), detrital illite/ mica and Fe-rich phase, smectite with difficulty in identification. The non-clay minerals are siderite, pyrite and calcite. Based on both petrographic observation and chemical composition by SEM-EDX; the clay distribution represented by bridge coating, grain coating and Matrix (nonclay) with 2 main compositions. Aluminous (Al) coating in most of the samples appears as mixtures of kaolinite, illite and smectites; Iron (Fe) rich coating which clearly observed in sample CR12-14 as very fine grained Heterogenic mixtures rich in iron phase with composition far from chlorite or glauconite. And close to Bethierine composition. The chemical control Bethierine like

composition are source of iron (with low amount of sulphides and carbonates because of the affinity of iron for these phases), source of Source of Aluminous from destabilization of eogenetic and detrital kaolinite; and reduced environment. Comparisons with Upper Cretaceous Sego formation (Colorado) based only XRD results showed that; Sego formation has lower amount of chlorite or iron rich phase.