OMICS International
conferenceseries.com

International Conference on
Geology

June 22-23, 2015 Florida, USA

Feldspar dissolution, authigenic clays and quartz cements in open and closed sandstone geochemical systems during diagenesis: Typical examples from two sags in Bohai Bay Basin, East China

Guanghui Yuan, Yingchang Cao, Yanzhong Wang and Xiaoyan Li
China University of Petroleum, China

Feldspar dissolution and precipitation of clays and quartz cements are important diagenetic reactions in sandstone reservoirs and can have great significance in reservoir quality evolution. We examined two sets of burial sandstone reservoirs to determine if the diagenetic systems were open or closed and investigated the mass transfer of products from leached feldspars and its impact on reservoir quality. One of the reservoirs is the Eocene sandstone buried 2.5-4.0 km below sea level (BSL) in the Nanpu Sag and the other is the Eocene sandstone buried 1.5-4.5 km BSL in the Dongying Sag. Both sandstones consist mainly of lithic arkoses and feldspathic litharenites and have feldspar secondary pores. Widely developed fractures in the Paleogene and Neogene strata, low salinity and negative hydrogen isotopic composition of pore waters indicate massive meteoric water flux in sandstones of the Nanpu Sag. In the sandstones, extensive leached feldspars are generally accompanied by small amounts of authigenic clays and quartz. Authigenic clay in sandstones is mainly kaolin with little illite even at high temperature (>125° C). The low abundance of authigenic clays and quartz and low water salinity indicate that much of the K+, Al^{3}+ and SiO_2 (aq) released from feldspar dissolution were exported from the sandstone system. Therefore, extensive feldspar dissolution enhanced much porosity and permeability. In contrast, limited fractures and high water salinity indicate little meteoric water flux in sandstones of the Dongying Sag. Sandstones containing extensive feldspar dissolution were accompanied by massive quantities of authigenic clays and quartz. Kaolin dominates in sandstones at shallower depth (<3.1 km BSL) while illite dominates at greater depth (>3.1 km BSL) where temperature exceeds 125° C. The presence of abundant clays and quartz indicates that Al3+ and SiO2 (aq) released from leached feldspars were retained in the sandstone system. The dominance of authigenic illite at greater depth indicates sufficient K+ were retained within the connate water for illitization of kaolin and feldspar to occur. Feldspar secondary porosity in thin sections can be up to 3% but little porosity (<0.25%) is enhanced. Primary macropores are lost as clays and quartz precipitate while the proportion of microporosity increases occurring between clay crystals and within the partially dissolved remains of feldspars. The overall result is that permeability is significantly degraded.

Biography

Guanghui Yuan has completed his Bachelor degree in Geology at the age of 23 from China University of Petroleum. He will complete his Ph.D. in June 2015 from China University of Petroleum. He has published more than 15 papers in reputed journals.

yuan.guanghui86@gmail.com

Notes: