Evidences of Petroleum Movement from Organic-rich Shale/Marlstone into Sandstone-A Case Study from Lacustrine Basin in Huahai Depression, Jiuquan Basin,West China

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Explusion of petroleum hydrocarbons from shale source rocks has never been answered perfectly[1]. A complelling evidence from both geochemical and petrophsical recognitions illustrates the movement of petroleum from organic-rich shale/marlstone into sandstones, occuring in the subsurface. Three different shale-sandstone payzones in a typcial lacustrine petroliferous stratigraphic column have been selected to demonstrate the difference.

(i) GC oil fingerprints from sandstone dominated intervals show unmodified ditribution with high C_{15}- hydrocarbons distribution.The oily coating presents an oil-wet interconnection among the intergranular pores;

(ii) GC oil fingerprints from shale-sandstone interbeded intervals reveal a unimodal and significant mass lost in C15- hydrocarbons distribution. Microscope observations from the transitional section varies;

(iii) GC oil fingerprints from the shale dominanted exhibt similar profile and unmodified, while show lighter-end biased distribution. Petrophsical figures illustrate the ubiquitous and representative heterogeneity in laminar algal shaleand marlstone[2] deposited in seasonal lacustrine sedimentation.

Sandstone donminated reservoir suggest conventional oil accmulation and movement of hydrocarbons. Interbeded intervals indicate complex transitional geochemical process and interfacial interaction. Thick shale or marlstone is avaialbe for either higher maturation from the geothermal increase or petroleum expulsion from the overpressure release caused by artificial exhumation.

[1] Mackenzie et al.(1983) *Nature*, 301(5900):506-509.

[2] Tu et al. (2012) *Acta Petro. Sinica*, 28(3):917-926.