

Reducibility and commerciality of shale resource systems: contrasting geochemical attributes of shale gas and shale oil systems

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Abstract:

Increasing the producibility of petroleum from shale is a key challenge for this decade and beyond. While our understanding of producing petroleum from shales has advanced rapidly over the past decade, there remain many unknowns. In addition, fundamental differences remain between high thermal maturity shale gas systems (gas window shales) and oil window shales. Although it is demonstrated that oil is produced from the shale matrix similar to gas shales, it is not known what recovery factors improvement we should expect due to fundamental differences and uniqueness of shale oil systems.

Some of the challenges in early exploration of shales in the oil window are related the loss of oil from rock samples (cuttings, core), sample processing, storage conditions, sample preparation, oil type, API gravity, GOR, rock lithofacies, and analytical conditions. It is shown that old cuttings may lose up to 300% of their free oil content simply due to evaporation even in tight shale with black oil having a GOR of about 500 scf/bbl. When cuttings are compared to RSWC or core chips, the loss increases to almost 500%!

Projection of oil content to match measured GOR values on oils or even extracts of organic-rich tight shales allows prediction of this oil loss. This impact calculations of OOIP and hence hydrocarbon recovery estimates from such systems.

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