

## **Applying Petroleum Hydrogeochemistry – A Novel Approach to Understand the Evolution of Kuwait Sedimentary Sub-Basin and the Development of its Petroleum System**

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### **ABSTRACT**

The aim of this feasibility study is to evaluate the application of petroleum hydrogeochemistry in Kuwait. This tool may help us to better understand the evolution of Kuwait sedimentary sub-basin and the development of its petroleum systems. Formation water is a ubiquitous geological fluid which is always found co-existing with hydrocarbons. Despite its ubiquity, applying petroleum hydrogeochemistry is a useful tool for constraining fluid flow in the subsurface at both the basin and reservoir scales. In addition, it can provide an insight as to what has happened in the past during the development of the sedimentary basin and help understand the behavior of hydrocarbons during migration. Understanding the composition of water bodies provide important geological, hydrological, thermal, tectonic information on the evolution of the Kuwait sedimentary sub-basin. In Kuwait petroleum system formation water chemistry can be tied to diagenetic processes within key reservoir intervals (influencing both hydrocarbon and reservoir quality) and basin scale fluid movements – including major episodes of petroleum charging. Enormous water database consists of chemical, physical and salinity data; and water isotopes of sulphur for sulphate and sulphides, strontium, chlorine and bromine. In addition, rock samples from Hith and Gotnia evaporite formations were considered to fingerprint produced fluids and constrain their origin. Rationalisation the spatial (geographically/ laterally and stratigraphically/vertically) geochemical variation throughout Kuwait appear a good tool for evaluating basin models.