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Please fill in your manuscript title.	An Assumptions for High H2S Occurrence in Arab/Carbonate Reservoir, Offshore Abu Dhabi

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Abstract

Hydrogen sulfide (H2S) is a toxic and corrosive gas that impacts the commercial viability of petroleum resources. Therefore, understanding the origin of H2S is instrumental for the petroleum industry. Arab formation in western offshore Abu Dhabi is a huge sour gas reservoir that will negatively affect the drilling operations, reservoir management and field development. To avoid an encountering this sour gas, understanding its origin and distribution is necessary.

This study aimed to determine the gas composition and assumed the origin of H2S gases in Arab reservoirs. Many studies have demonstrated that thermochemical sulfate reduction (TSR) is one of the most important mechanisms responsible for the substantial quantity of H2S observed in many petroleum reservoirs deeply buried. First of all, we extract all available fluid compositions from the well report and integrate them with the theory of TSR. Then see the possible factor that controls the amount of H2S content in the Arab reservoirs and their distribution.

The results highlight that H2S is most likely formed from thermochemical sulfate reduction (TSR) within the Arab Formation. The Arab Formation is composed of a carbonate succession interbedding with anhydrite and overlain by Hith anhydrite. TSR may occur within an evaporitic environment at temperatures of approximately 120–145 °C. Based on the observation most of the Arab reservoirs in the offshore Abu Dhabi positions within that temperature range. The direct reaction between methane and anhydrite occurred in solution condition, in residual pore waters which were initially dominated by dissolved carbonate derived from the marine dolomite matrix. Moreover, the data also show a positive correlation between the thickness of interbedded anhydrite and the amount of H2S. In areas where both Hith and Arab formations have thick anhydrite, there is also a high amount of H2S content and regionally increases toward the eastern part of the study area. Based on the aforementioned result, an assumption of high H2S content in the Arab reservoir from Offshore Abu Dhabi can be identified.

The application of this observation and assumption provides a good example of how such an approach can be used ahead of drilling. It can help to investigate and predict the souring level of hydrocarbon that we aiming to explore and develop.