

Origin of hydrogen sulfide in one of the Iranian southern gas field

*A. Karimian Torghabeh^{*1}, M. R. Ghorbani², A. Kalantari Asl³ and M. Gh. Akbarifard⁴*

1, 2- Assist. Prof., Dept., of Geology, Faculty of Sciences, Shiraz University, Shiraz

3- Assist. Prof., Petroleum Engineering, Faculty of Chemical, Shiraz University, Shiraz

4- Chair of Operation Management Reservoirs Engineering, South Zagros Oil and Gas Production Company

** amirkarimian@shirazu.ac.ir*

Recieved: 2020/3/17 Accepted: 2020/6/6

Abstract

Production of hydrogen sulfide in various oil and gas reservoirs has been reported around the world. Hydrogen sulfide is one of the major challenges in the operation and refining process of oil and gas. Therefore, determining the origin and mechanism of hydrogen sulfide production in gas and oil reservoirs is great importance. Due to the relative increase in hydrogen sulfide concentration in the gas field studied and its possible problems in downstream process facilities and the gas refinery, the source of hydrogen sulfide production has been investigated. The ability to predict the presence of hydrogen sulfide in non-drilled material would be a good idea to reduce the risk of exploration and production. In this research, detailed geological and comprehensive laboratory studies (petrography and isotopic gas, gas condensate, water) were performed in different parts of the field to determine the source of hydrogen sulfide. According to petrographic studies, the conversion of anhydrite to calcite was observed at the upper depths of the Upper Dalan Formation. Geochemical evidence, such as increased nitrogen content, lighter CO₂ isotope composition and heavier isotopic composition of hydrocarbon compounds, as well as isotopic evidence of sulfur in rock and gas, suggest a thermochemical sulfate reduction process. Negative values of the sulfur gas isotope as well as the burial history and presence of dark condensates in the studied field indicate the role of bacterial sulfate reduction and thermal cracking in organic matter with less impact for H₂S production.

Keywords: *Hydrogen sulfide, Bacterial sulfate reduction, Thermochemical sulfate reduction, Sulfur isotope*