

The Effect of H₂S on Crystal Structure

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Abstract : For a better understanding on sulfide stress corrosion cracking, a theoretical approach based on crystal structure, molecule behavior, flow of electrons and electrochemical reaction is developed. Its impact on different materials such as carbon steel, low alloy, alloy for sour (H₂S) environments is studied. This paper describes the theories on various disaster and failures occurred in the industry by Stress Corrosion Cracking (SCC). Parameters such as pH of process fluid, partial pressure of CO₂, O₂, Chlorine, effect of internal pressure (crystal structure deformation by stress), and external environment condition are considered. An analytical line graph is then created for process fluid parameter verses time, temperature, induced/residual stress due to local pressure build-up. By comparison with the load test result of NACE and ASTM, it is possible to predict and simplify the control of SCC by use of materials like ferritic, Austenitic material in the oil and gas & petroleum industries.

Keywords : crystal structure deformation, failure assessment, alloy-environment combination, H₂S

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020