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The monitoring of corrosion rate using molecular absorption spectroscopy in gas treatment plant

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Introduction: Ionic iron forms as byproducts of corrosion reactions in some gas petroleum gas treatment plant is an important way to understand how corrosion process acts over absorption of highly acid gases to produce clean gas. Corrosion is an important problem to solve due to lack of production, no programmed main equipments shutdown and loss of investment. In KAR group, Kurdistan, Iraq is operating Gas Treatment Complex with the presence of this problem. In the present proposal with experimental nature of field level evaluation design have the object to monitor and follow up corrosion rate using molecular absorption spectroscopy occurring in the Gas Treatment Plant (GTP) in Khurmala Oil and Gas Field, KAR Group Company, Kurdistan, Iraq. The purpose of this study was to measure the concentration of iron dissolved on liquids phases and relates this with the corrosion rate occurring in metallurgical being attacked by hydrogen sulfide (H_2S) and carbon dioxide (CO_2) in order to help to control deterioration produced by this kind of corrosion.

Materials and Methods: The methodology has four parts: a) developing standard analytical method for determination of iron content in rich N-methyl-diethanolamine (MDEA) solvent including calibration, b) implementation of sampling schedule for taking enough data for developing relationship between iron concentration in amine streams and its corrosion rate, c) develop mathematical relationship between iron content and corrosion rate, d) establish routine analysis of iron content and prediction of corrosion rate as a routine analysis of quality control.

Results: Results obtained by this study shows a) Iron determination based on Molecular Absorption Spectroscopy is a reliable, high reproducible and trustworthy method with Accuracy of 97,05% and Precision of 99,92% with a standard deviation of 0,08% and analytical error less than 3%. b) overall corrosion rate in GTP is of 15,35 mpy at 80MMSCFD and 0,41 mol H2S/mol MDEA loading compared this average 2 months corrosion rate with international corrosion rate standards this system can be classified as high corrosion rate system but on control conditions (between borderline level 3 to 4). Some actions may need to be applied to reduce corrosion rate. Is recommended to maintain this procedure to estimate routine corrosion rate in absence of no destructive test in GTP.

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