J Chemical Sci 2018, Volume: 9
DOI: 10.4172/2150-3494-C4-027

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

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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 equipment 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 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. The methodology have four parts: a) developing standard analytical method for determination of iron content in rich 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 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 80 MMSCFD and 0.41 mol H_2S/mol MDEA loading compared this average two 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 three to four). Some actions may need to be applied to reduce corrosion rate. It is recommended that to maintain this procedure to estimate routine corrosion rate in absence of no destructive test in GTP.

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Oxidative-coupling reaction-based sensitive determination of dopamine at glassy carbon electrode using chronoamperometry

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A simple and rapid method based on oxidative-coupling reaction for determination of dopamine using chronoamperometry was developed. Based on oxidative-coupling reaction, dopamine was transformed into red azo dye by reacting with 2,4-dinitrophenylhydrazine (DNPH) oxidized. Subsequently, the concentration of dopamine can be determined indirectly from azo dye. Taking account of the advantage of their low-cost and the convenience in manipulation, chronoamperometry was employed to investigate the response of dopamine-derived azo dye. Square wave voltammetry and impedimetric studies were done to characterize the dopamine-derived azo dye. Various factors that influence reaction and amperometric intensity were investigated. Under the optimal conditions, the linearity was observed in the range of 0.1–0.0005 mmol L-1 with good correlation coefficient (R2= 0.9793). The relative standard deviation (RSDs) for five replicate measurements 3.37 %. The limit of detections of the method (S/N=3) was 0.02.36 mmol L-1. The performance of the proposed method to determine the concentration of dopamine in pharmaceuticals samples was evaluated.

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