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研究报告

碳钢在90℃、H₂S-HCl-H₂O环境下的腐蚀行为 I - H₂S浓度对碳钢腐蚀行为的影响

唐俊文¹, 邵亚薇¹, 郭金彪², 张涛¹, 孟国哲¹, 王福会^{1,3}

1. 哈尔滨工程大学材料科学与化学工程学院 腐蚀与防护实验室 哈尔滨 150001
2. 中国石油兰州石油化工公司 兰州 730060
3. 中国科学院金属研究所金属腐蚀与防护国家重点实验室沈阳110016

摘要: 在实验室模拟炼油厂常减压塔顶冷凝水系统环境, 用腐蚀失重法和电化学测试方法并结合扫描电镜 (SEM) 和X射线衍射 (XRD) 分析手段, 研究90℃ 条件下低碳钢在含有不同浓度H₂S的模拟溶液中的腐蚀电化学行为。结果表明, H₂S强烈地促进碳钢的阴极过程, H₂S浓度升高, 阴极过程加剧, 腐蚀速率加快; H₂S存在时, 电极表面发生严重的局部腐蚀而形成大量腐蚀坑, 同时形成一层主要成分为四方硫铁矿的腐蚀产物, 硫化物沉积层随H₂S浓度升高而变得疏松、易于破裂和脱落。

关键词: 碳钢 H₂S 腐蚀 四方硫铁矿

CORROSION BEHAVIOR OF CARBON STEEL IN H₂S-HCl-H₂O AT 90℃ I -The Effect of H₂S Concentration on the Corrosion Behavior of Carbon Steel

TANG Junwen¹, SHAO Yawei¹, GUO Jinbiao², ZHANG Tao¹, MENG Guozhe¹, WANG Fuhui^{1,3}

1. Corrosion and Protection Laboratory, College of Materials Science and Chemical Engineering, Harbin Engineering University, Harbin 150001
2. The Academy of Lanzhou Petrochemical Company, CNPC, Lanzhou 730060
3. State Key Laboratory for Corrosion and Protection, Institute of Metal Research, Chinese Academy of Sciences, Shenyang 110016

Abstract: The electrochemical behavior of low carbon steel in acidic simulation solutions containing different concentrations of H₂S at 90℃ was investigated by mass loss method, electrochemical measurements and observations of scanning electron microscope (SEM) and X-ray radiation diffraction (XRD). The results showed that the cathodic depolarization was enhanced greatly and the corrosion rate of carbon steel increased remarkably with the increase of H₂S concentration. The severe corrosion holes were observed on the carbon steel surface in the H₂S-containing solutions. The corrosion products layer deposited on carbon steel were mainly composed of mackinawite, which became loose, easily cracked and sloughed off with increasing concentration of H₂S.

Keywords: carbon steel hydrogen sulfide corrosion mackinawite

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通讯作者: 邵亚薇

作者简介: 唐俊文, 男, 1985年生, 硕士生, 研究方向为金属材料腐蚀与防护

通讯作者E-mail: shaoyawei@hrbeu.edu.cn

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