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研究报告

电化学方法研究锈层覆盖下碳钢的腐蚀规律

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摘要： 分别采用失重法与电化学方法(包括极化曲线、线性极化法和电化学阻抗技术)研究了碳钢在海水中浸泡48周的腐蚀规律。结果发现，短期浸泡在海水中的碳钢，表面生成的腐蚀产物薄且疏松，长期浸泡后，锈层逐渐分为两层：外锈层薄且疏松，内锈层厚且致密。短期浸泡，失重法与电化学方法得到的腐蚀规律一致，腐蚀速度逐渐减小并且数值相近，此时电化学方法可以用来准确的估算碳钢的腐蚀速度。长期浸泡，电化学方法测定的腐蚀速度转为逐渐增大，偏离了失重结果，并且锈层越厚偏差越大，此时电化学方法会过高估算腐蚀速度。

关键词： 碳钢 海水 腐蚀形貌 复杂体系 偏差

ELECTROCHEMICAL STUDY ON CORROSION OF RUSTED CARBON STEEL

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Abstract: Mass loss measurement and various electrochemical methods, including polarization curves, linear polarization resistance measurement (LPR) and electrochemical impedance spectra technique (EIS) were employed to evaluate the corrosion of rusted carbon steel immersed in seawater for 48 weeks. Results indicated that the initial corrosion product formed on the carbon steel was thin and loose. With prolonged immersion, the rust layer could be divided into two layers: the outer layer was thin and loose, while the inner layer was thick and compact. The corrosion rates calculated by electrochemistry measurement, were consistent with the mass loss. The electrochemical methods could be used to accurately estimate corrosion rate at initial period of immersion. After long-term immersion, the electrochemical corrosion rate turned to increase and deviated from mass loss gradually.

Keywords: carbon steel seawater corrosion morphology complex system deviation

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