

论文

Q235钢在模拟海水环境混凝土孔隙液中阴极氧还原反应的动力学研究

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摘要:

通过用循环伏安和旋转圆盘电极伏安等电化学方法研究了Q235钢在模拟海水环境下的混凝土孔隙液中阴极氧还原反应行为及动力学参数.结果表明:在0.02 mol/L Ca(OH)₂溶液中氧还原反应在阴极反应电位范围内,最初为混合过程控制的二电子反应即O₂还原为HO₂⁻,电位较负时为扩散过程控制的四电子反应,反应的最终产物为OH⁻.0.02 mol/L Ca(OH)₂+3.5% NaCl溶液中氧还原反应半波电位与无氯离子溶液体系相比发生正移,氧还原反应以四电子反应为主,反应的最终产物为OH⁻.

关键词: Q235钢 氧还原反应 循环伏安法 旋转圆盘电极 碱性溶液

KINETICS OF CATHODIC OXYGEN REDUCTION REACTION ON Q235 STEEL IN A SIMULATED CONCRETE PORE SOLUTION IN SEAWATER ENVIRONMENT

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Abstract:

Cyclic voltammetry and rotating disk electrode voltammetry were used to study the kinetics process of cathodic oxygen reduction reaction (ORR) on Q235 steel in an artificial solution simulated concrete pore liquor in seawater environment. The results show that the ORR in 0.02 mol/L Ca(OH)₂ solution was a two electron reaction accompanying with that O₂ reduced to HO₂⁻, which was controlled by a mixed process of charge transfer and mass transport, at the potentials of the beginning of ORR. Thereafter it was a four electron reaction controlled by mass transport process, therewith O₂ reduced to OH⁻ at the much negative potentials. The half-wave potential of the ORR in 0.02 mol/L Ca(OH)₂+3.5% NaCl solution was much positive than that in 0.02 M Ca(OH)₂ solution, the ORR in the former solution was a four-electron reaction with the final reaction product OH⁻.

Keywords: Q235 steel oxygen reduction reaction cyclic voltammetry rotating disk electrode alkaline solution

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