

An investigation of the NO_3^- concentration effect on lead anodic electrochemical behavior in NaOH solution

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An electrochemical investigation of the effect of NO_3^- concentration on lead anodic behavior in 4 M NaOH solution was performed using cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS). The results reveal that the NO_3^- concentration has a positive influence on the formation of PbO at -0.46 V (SHE) from 0.0~0.24 M and a negative influence from 0.36~0.60 M. A large dosage of NO_3^- benefits the formation of PbO₂. Mechanisms for NO_3^- influence on the formation of PbO and PbO₂ on the lead surface were proposed. The anodic electrochemical behavior of lead in NaOH-NaNO₃ solution was successfully illustrated based on the mechanisms. SEM observation provided surface morphologies of lead electrodes obtained after potentiostatic polarization at a fixed potential in NaOH solution with different NO_3^- concentrations. XPS results indicate that the lead electrode surface is composed of PbO, Pb₃O₄ and PbO₂, which agrees with the analysis results of the cyclic voltammogram.

Keywords: lead; anodic electrochemical behavior; cyclic voltammetry; sodium nitrate;

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