Hydrogen Evolution Inorganic Inhibitors in Alkaline Electrolyte for Aluminum-Air Battery

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Arsenic oxide (As(III)), sodium phosphate monobasic anhydrous (H_2PO_4^-), and antimony trioxide (Sb(III)) are used as electrolyte additives in 4M sodium hydroxide (NaOH) electrolyte for Al-air batteries. The effects of inorganic additives are examined through hydrogen evolution and self-corrosion testing, electrochemical analysis, and surface analysis. Electrochemical tests show that the presence of the additives lowers the hydrogen gas evolution rate and inhibits the adsorption of hydrogen on the aluminum surface. The additives in order of effectiveness are: Sb(III) > As(III) > H_2PO_4^- . The addition of additives decreases the self-corrosion of 4N Al, which improves the efficiency of the Al-air battery. The additives are confirmed as effective inhibitors of the hydrogen generation reaction in Al-air batteries.

Keywords: Aluminum-air battery · Hydrogen evolution · Inhibitor · Battery efficiency · Electrochemical test

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