Electrocatalytic Process for Ammonia Electrolysis: A Remediation Technique with Hydrogen Co-Generation

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Alkaline ammonia electrocatalysis offers a favorable technique for hydrogen generation and simultaneous conservation of environmental sustainability. In this work, the electrooxidation of ammonia on platinum-Iridium (Pt-Ir) electrocatalyst was studied in 5 M potassium hydroxide (KOH) solution. The effects of operating conditions such as, temperature and ammonia (NH₃) concentration were investigated. Ammonia electrooxidation current density increased at elevated temperature and ammonia concentration. The maximum ammonia conversion was 78 % for 2300 ppm ammonia. Furthermore, the maximum hydrogen flow rate obtained was 25 L/ h and the corresponding energy consumption is 1.6 W h/ L-H₂. The hydrogen purity obtained from the gas chromatography was 86 %. Ammonia is poisonous to the proton exchange membrane (PEM), hence ammonia ion selective electrode was used to determine the amount of ammonia present in H₂ gas stream produced and was found to be < 0.1ppm.

Keywords: Ammonia electrolysis, Pt-Ir electrocatalyst, hydrogen production, fuel cell, ammonia removal

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