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Topic:

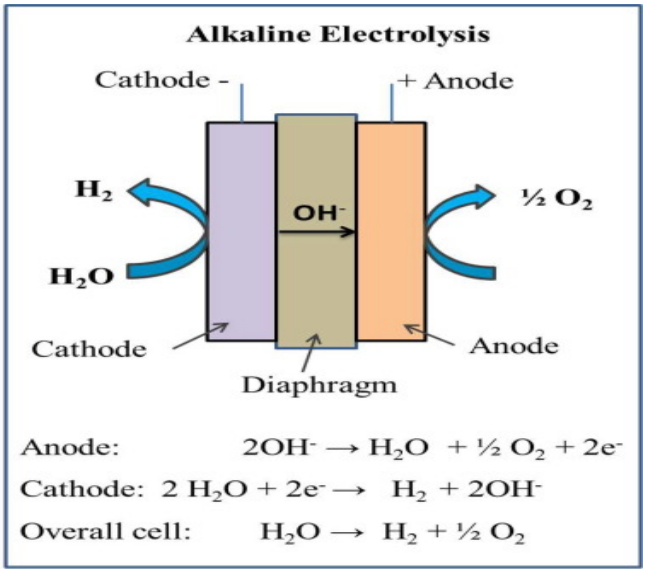
Production of Green Hydrogen from Water Alkaline Electrolysis Stored as Ammonia

Introduction

Green hydrogen (H_2) is a sustainable energy carrier produced via water electrolysis using renewable electricity. Among various electrolysis methods, alkaline water electrolysis (AWE) is a mature and efficient process. To enhance storage and transport feasibility, hydrogen is often converted into ammonia (NH_3), which acts as a stable hydrogen carrier.

Process Overview

Alkaline electrolysis involves splitting water (H_2O) into hydrogen and oxygen using an electrolyte, typically potassium hydroxide (KOH) or sodium hydroxide (NaOH). The key reactions occurring in the electrolyzer are:



The produced hydrogen is then reacted with nitrogen (N_2) in the Haber-Bosch process to form ammonia:

Applications

1. Energy Storage and Transport: Ammonia serves as a high-density hydrogen carrier, facilitating efficient long-distance transportation.
2. Fuel and Power Generation: Green ammonia can be directly used as a fuel or cracked back into hydrogen for fuel cells.
3. Fertilizer Industry: Ammonia is a crucial component in nitrogen-based fertilizers, promoting sustainable agriculture.

4. Decarbonization of Industries: Industries like steel, chemicals, and shipping can utilize ammonia-derived hydrogen for reducing carbon emissions.

Conclusion :

Producing green hydrogen via alkaline electrolysis and storing it as ammonia presents a promising pathway for the global energy transition. This method ensures efficient hydrogen storage, transportation, and utilization across multiple industries, promoting a sustainable and low-carbon future.