Powering Hydrogen Fuel Cells using Chemical Water Splitting

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In the current society, individuals depend heavily on fossil fuels to function properly. The non-renewable aspect of such energy looms over as resources dwindle over time. Options to combat the dwindling supply come up often, including the use of hydrogen. In our project, we test out the creation of hydrogen through Aluminum, which can act as a substitute to gasoline in transportation. The project set out to test the various amounts of Aluminum 0.4 g, 0.8 g, and 1.2 g. The process involved titrating a 1 M solution of Sodium Hydroxide into the a flask with specific amounts of aluminum the reaction emits hydrogen and produces Sodium Aluminate, which is unstable and further decomposes into Aluminate and Sodium Hydroxide. The hydrogen passes through a Hydrogen Proton Exchange Membrane where it converts hydrogen back into water and electricity. The experiment conducted tested for the total power of the various aluminum amounts were tested, the volume of gas produced by these amounts, and the regeneration of sodium hydroxide. Using the various data efficiency of each of the various amounts were tested and 0.4 g of aluminum was tested to be the most efficient source of power using hydrogen, but 0.8 g was more efficient in gas production. In addition to the experiment, a prototype was designed and built to miniaturize the reaction chamber and the purification chamber to test the feasibility of using the prototype as a small power source, and it was able to produce similar power as the experimental setup.

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