Name(s)	Project Number
Jacob Fiskin	
	22596

Project Title
Alkaline Electrolyte Fuel Cells: A New Look at an Old Technology

Abstract

Objectives/Goals

The carbon dioxide reaction at the anode of an alkaline electrolyte fuel cell limits the cell#s usefulness. The purpose of these experiments is first to determine if hydrogen from methane-based fuels is the primary source of fuel cell energy. The second objective is to see if the production of carbon dioxide from these methane-based fuels can be isolated in the cell reaction.

Methods/Materials

A variety of fuels both carbon and non-carbon based were compared using a simple dissolved alkaline electrolyte fuel cell to determine whether hydrogen is the determining factor in a cell#s power output. Then a typical methane fuel reaction was broken into its component parts. Using methanol, methanal ax methanoic acid, the reaction rate of these parts was compared to show that the production of carbon dioxide is the last and fastest part of the complete reaction.

Results

The first experiment suggests that available hydrogen anions are the principal source of a fuel cellx power.

The second experiment showed that after methanol becomes methanal, the change from methanal p methanoic acid and from methanoic acid to carbon dioxide happens very quickly at the end of the reaction.

Conclusions/Discussion

These experiments suggest that hydrogen anions are the principal source of electrical energy in an alkaline electrolyte fuel cell. The experiments also confirm the timing of the carbon dioxide in the fundamental fuel cell reaction.

Summary Statement
A solution to the problem of carbon dioxide formation in alkaline electrolyte fuel cells might be to combine the AFC with a hydrogen anion-rich regenerative system that would limit carbon dioxide build-up at the anode.

Help Received
My dad helped edit the final project. My mom helped with cutting and gluing the board.