



SALEM STATE 2021 EARTH DAYS

HYDROGEN FUEL CELLS

A FEATURE FOR THE FUTURE

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GPH 317 - TRANSPORTATION GEOGRAPHY



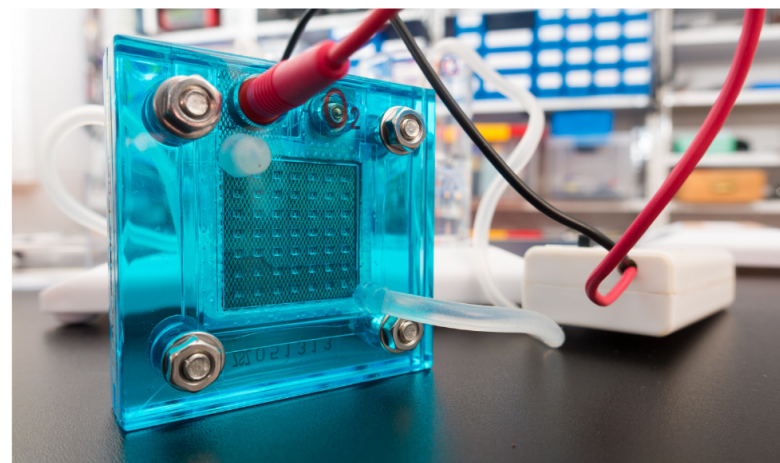
Salem State University

WHAT ARE HYDROGEN FUEL CELLS?

AND HOW DO THEY WORK?

INTRODUCTION

A hydrogen fuel cell consists of a negative electrode (or anode) and a positive electrode (or cathode) on either side of an electrolyte. Hydrogen is fed to the anode, and air is fed to the cathode. A catalyst at the anode separates hydrogen molecules into protons and electrons, which take different paths to the cathode. The electrons go through an external circuit, creating a flow of electricity. Hydrogen fuel cells generate power with a 60% efficiency, compared to internal combustion engines which operate at 25%.



ADVANTAGES

- Renewable and readily available
- Zero-emissions
- Increased efficiency
- Zero pollution
- Fast charging times
- Carbon footprint reduction
- Quiet operation
- Scalable
- Long usage times
- Ideal for remote areas

DISADVANTAGES

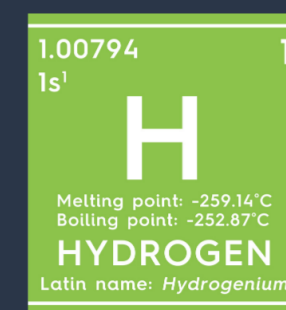
- Lack of infrastructure
- Hydrogen extraction
- Cost of raw materials
- Highly flammable

FOR MORE INFO PLEASE VISIT:

www.energy.gov/eere/fuelcells

THE MOST ABUNDANT ELEMENT

Hydrogen is the most abundant chemical substance in the universe, constituting roughly 75% of all baryonic mass. Unlike combustion engines, fuel cells do not burn the hydrogen atom, but rather combine with oxygen to form water as a byproduct. It has begun to be used in commercial fuel cell vehicles, such as passenger cars and buses. Using the process of electrolysis, we can extract hydrogen from water.



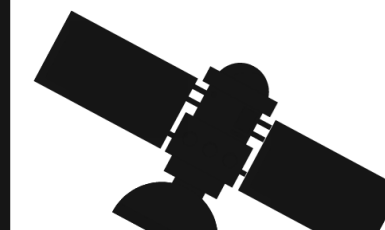
WE NEED SUSTAINABLE ANSWERS



THERE IS NO



PLANET B



TAKING THE CAR FROM CARBON

28% OF ALL CARBON EMISSIONS COME FROM TRANSPORTATION*

*U.S. ENVIRONMENTAL PROTECTION AGENCY, 2020

Learn more at www.epa.gov/ghgemissions

