

Video worksheet – Using Faraday's law and Faraday's constant in electrochemical calculations .

1. A galvanic cell is designed and built, as shown on the right.

a. Give the half equation taking place at the:

Cathode _____

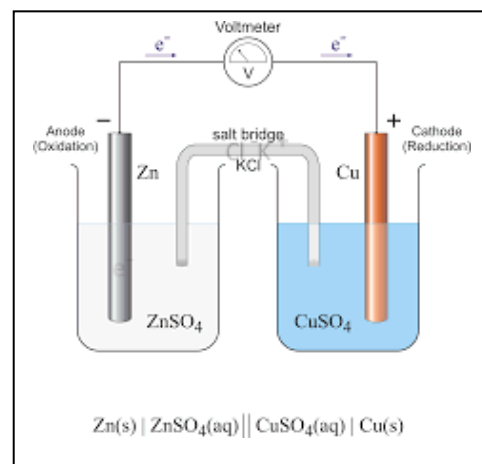
Anode _____

b. When connected, an average current of 1.25 amps flows through the cell for 2.50 minutes.

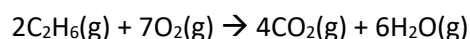
i. Calculate the mol of electrons that flowed through the cell during the time the cell was discharging.

ii. Calculate the mass loss, in grams, of the negative electrode.

iii. Calculate the mass gain, in grams, of the positive electrode.



2. Ethane is used as a fuel in a solid oxide fuel cell. The fuel cell runs for 12.00 hours and produces a steady current of 10.00 amps. The overall reaction taking place in the fuel cell is shown below.



a. Give the balanced reaction, states not included, taking place at the:

Anode _____

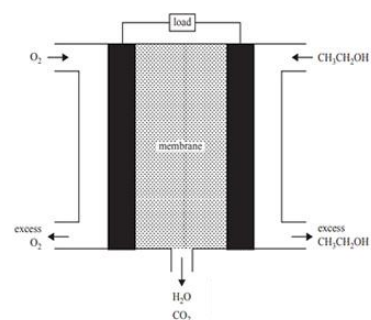
Cathode _____

b. Given that all the products were captured and stored at SLC.

i. What mass, in grams, of H_2O was produced?

ii. What volume, in litres, of CO_2 was produced?

3. A proton exchange membrane fuel cell (PEMFC) runs on ethanol is shown on the right. The cell runs for 30.00 hours and consumes 42.9 grams of pure liquid ethanol.



- a. Write the balanced reaction, states included, taking place at the negative electrode of the fuel cell.

- b. Calculate the mol of ethanol consumed.

- c. Calculate the total charge delivered by the current of electrons that flows through the external circuit during the 30 hour discharge, assuming 100% efficiency.

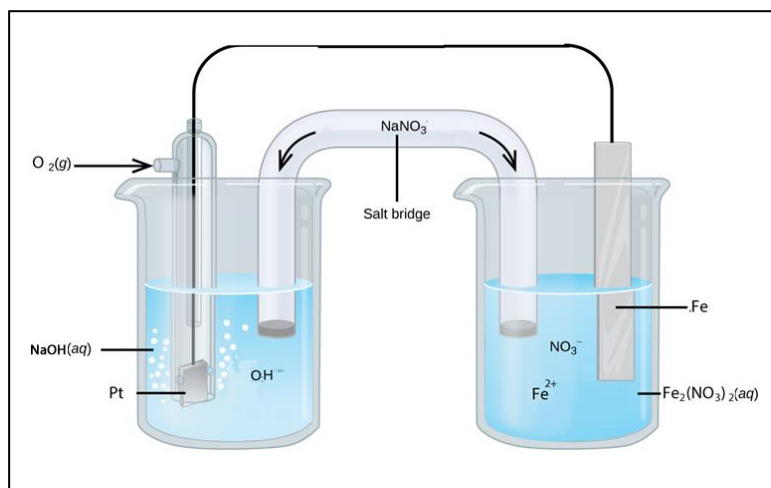
- d. Give the current, in amps, that flows through the external circuit. Give the answer to the right number of significant figures.

4. A molten carbonate fuel cell burns liquid propane in atmospheric oxygen. It operates for 5.00 hours producing a constant current of 5.00 amps.
- Write the balanced equation taking place at the cathode of the cell.

- What amount, in grams, of oxygen is consumed at the cathode

5. A galvanic cell is setup as shown on the right. The cell operates for 3.00 hours delivering a constant current of 2.53 amps at 0.84 volts.

- Is the cell operating at standard conditions, 25°C, 1M electrolyte solutions and 1 atm gas pressure? Explain.



- Give a balanced equation for the reaction taking place at the cathode> States included.
- What volume of oxygen gas must be delivered to the cell during the three hours of discharge.
- Which of the electrodes changes in mass? State if the change in mass is a decrease or increase and give the amount in grams