

Unit 11

NAME

Class Work

5/16/14

11.5 Electrolytic and Voltaic Cells

SPARK (Show me your 11.4- Cations: 11.3)

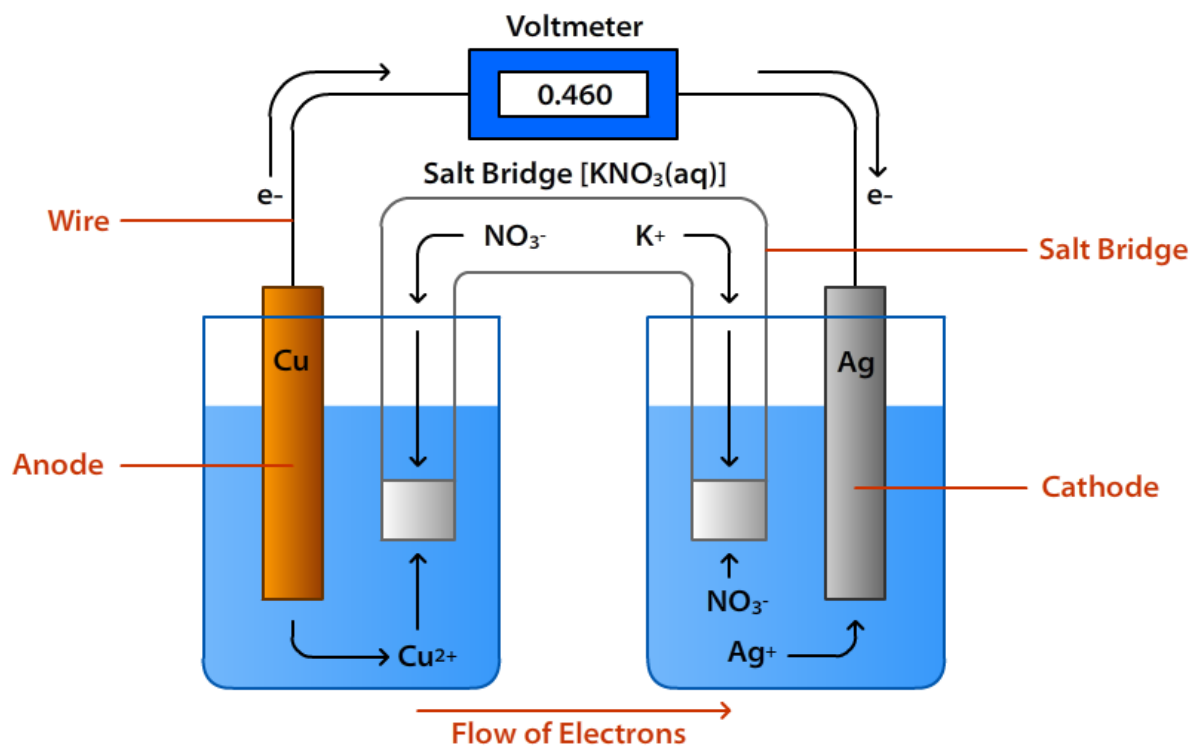
1. Complete your SPARK on your guided notes

Objective

SWBAT identify the parts of an electrochemical cell

Electrochemical Cells

- Involves a **chemical reaction** and a flow of **electrons**

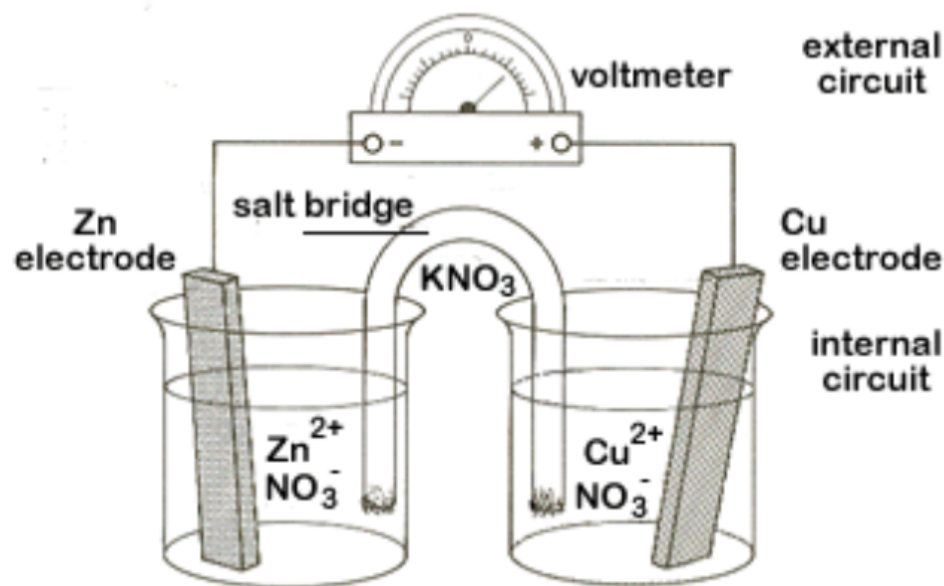


Graphic by Shamsher Singh

Objective: SWBAT identify the parts of an electrochemical cell

Two Types of Electrochemical Cells

- A **voltaic cell** is an electrochemical cell in which a **spontaneous** chemical reaction produces a flow of electrons (electricity).



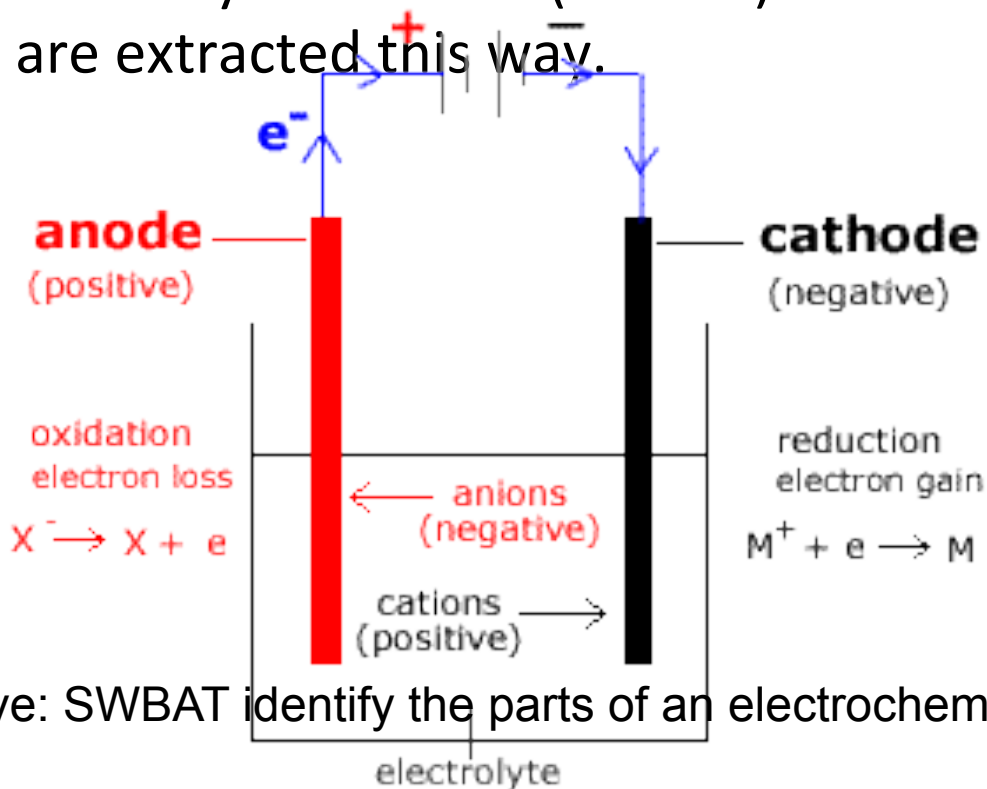
Objective: SWBAT Identify the parts of an electrochemical cell

$\text{Zn}_{(s)} \rightarrow \text{Zn}^{2+}_{(aq)} + 2e^-$	$\text{Cu}^{2+}_{(aq)} + 2e^- \rightarrow \text{Cu}_{(s)}$
Anode	Cathode
oxidation	reduction

Two Types of Electrochemical Cells

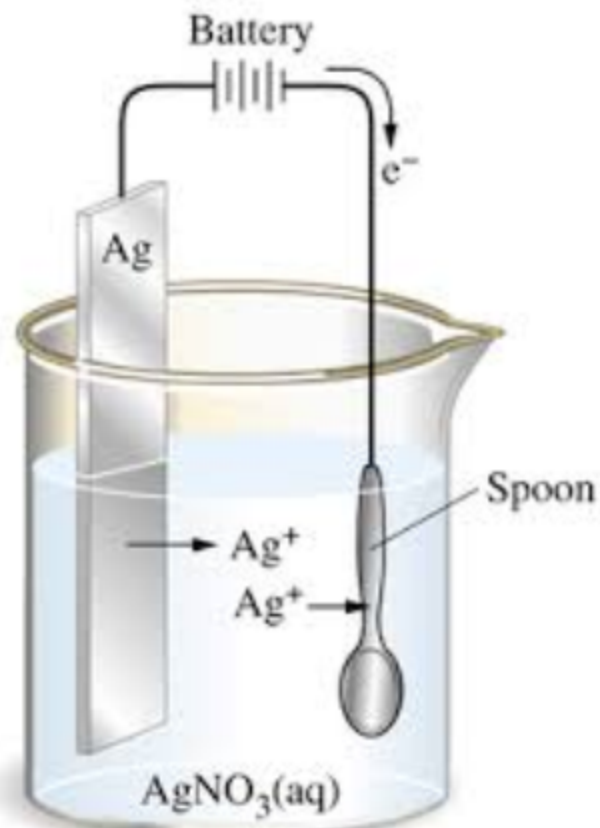
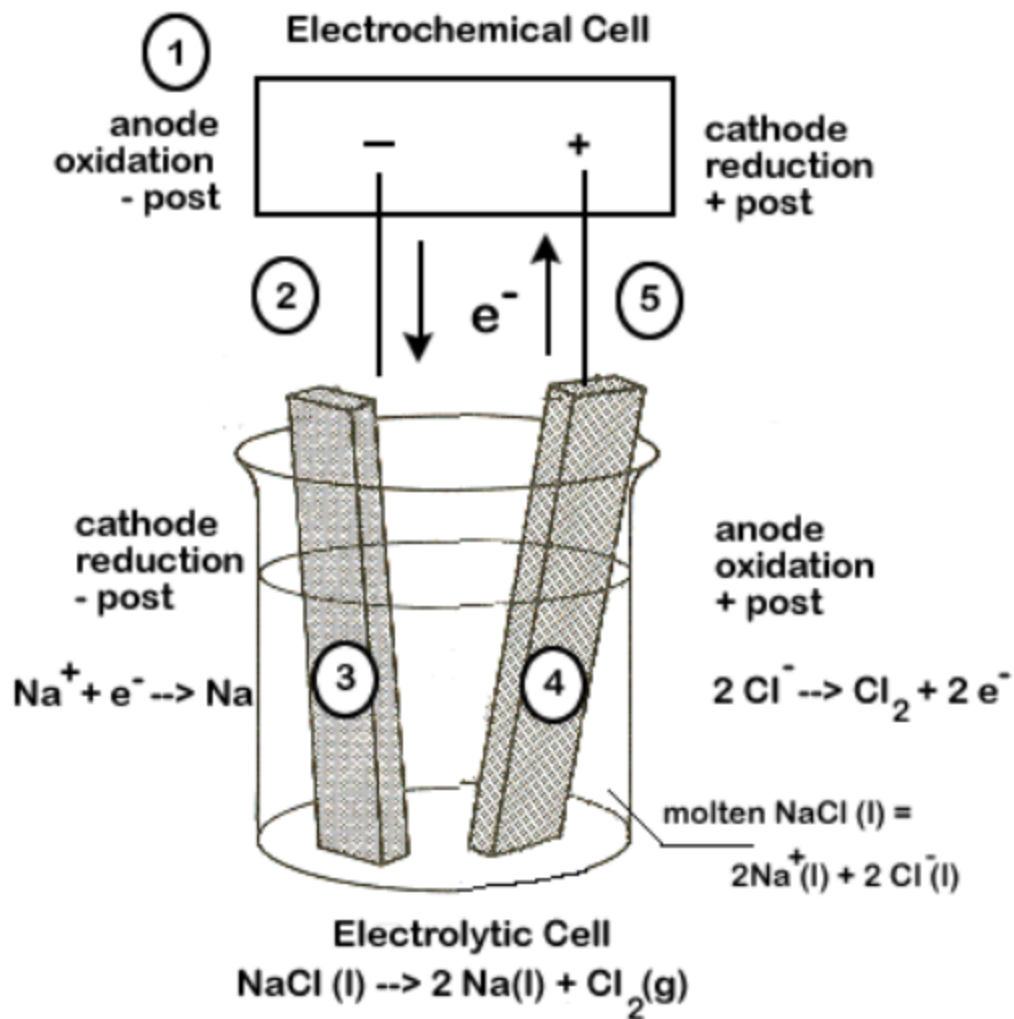
– An **electrolytic cell** requires an electric current (power source) to force a nonspontaneous chemical reaction to occur.

- Electrolysis can be used to obtain elements such as sodium and chlorine by the electrolysis of fused (molten) salts. Group 1 and group 2 metals are extracted this way.



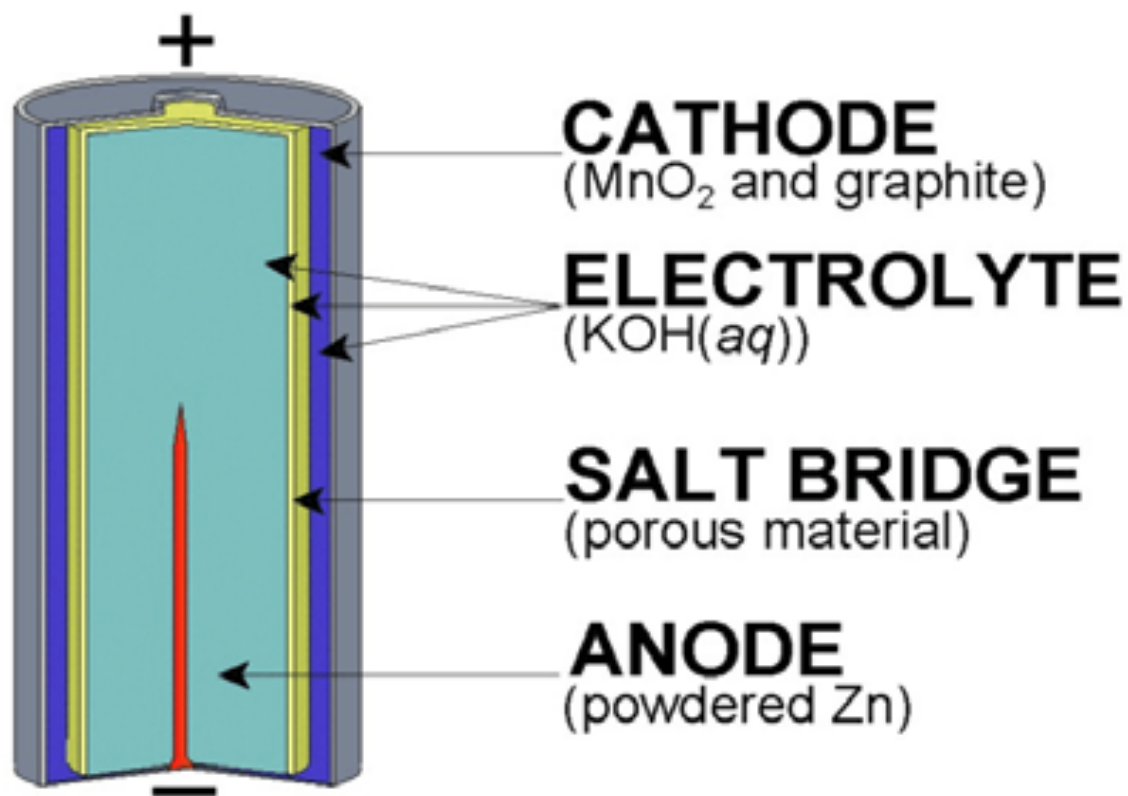
Objective: SWBAT identify the parts of an electrochemical cell

Electrolysis can be used to plate metals



Objective: SWBAT identify the parts of an electrochemical cell

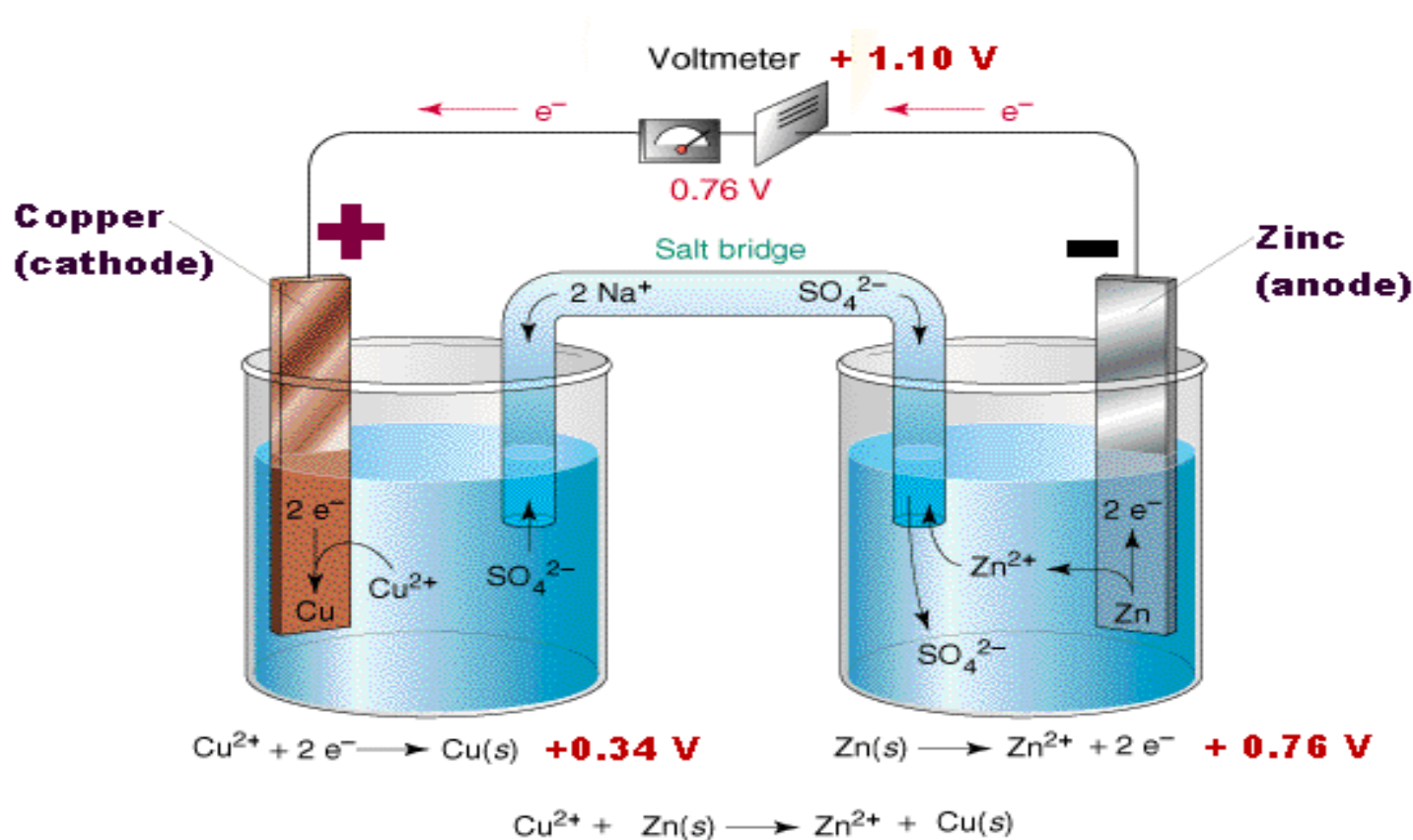
Batteries



Objective: SWBAT identify the parts of an electrochemical cell

NOTES

- **Electrode** = site where oxidation and reduction can occur (solid part).

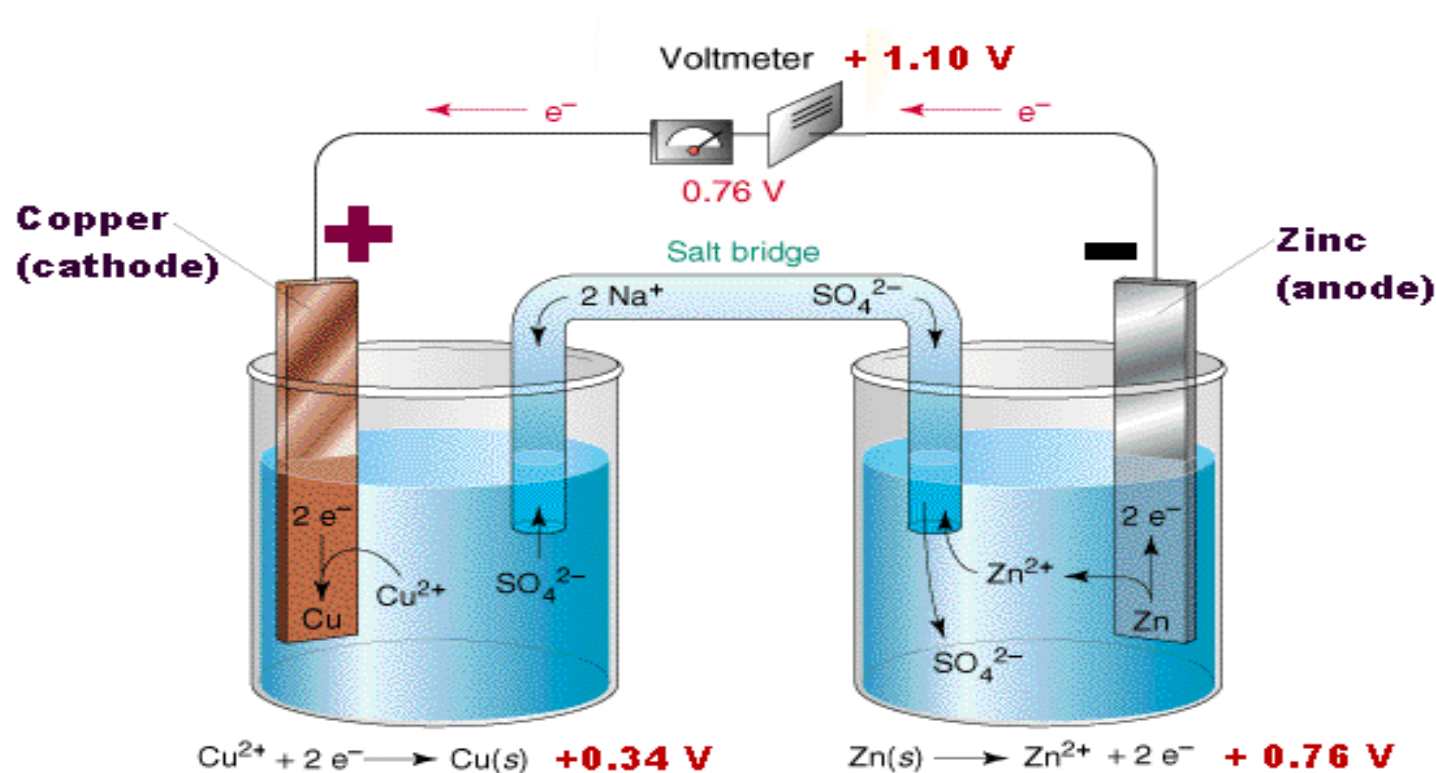


Objective: SWBAT identify the parts of an electrochemical cell

NOTES

- Important INFORMATION:

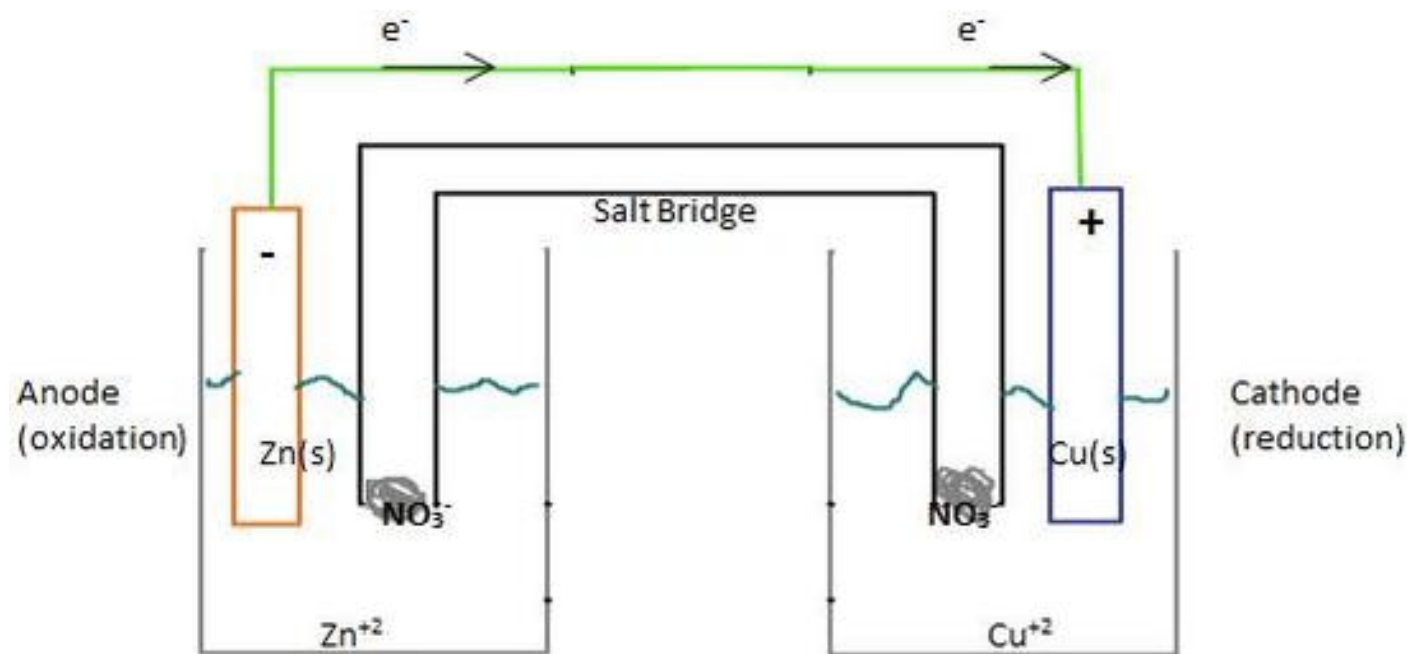
RED CAT Reduction occurs at the CATHODE
 AN OX Oxidation occurs at the ANODE.



Objective: SWBAT identify the parts of an electrochemical cell

NOTES

- **ELECTRON FLOW:** The flow of electrons ALWAYS goes from where they were “created/lost” (the anode) to where they are “used/gained” (the cathode). ALWAYS GOES FROM ANODE TO CATHODE!!!!

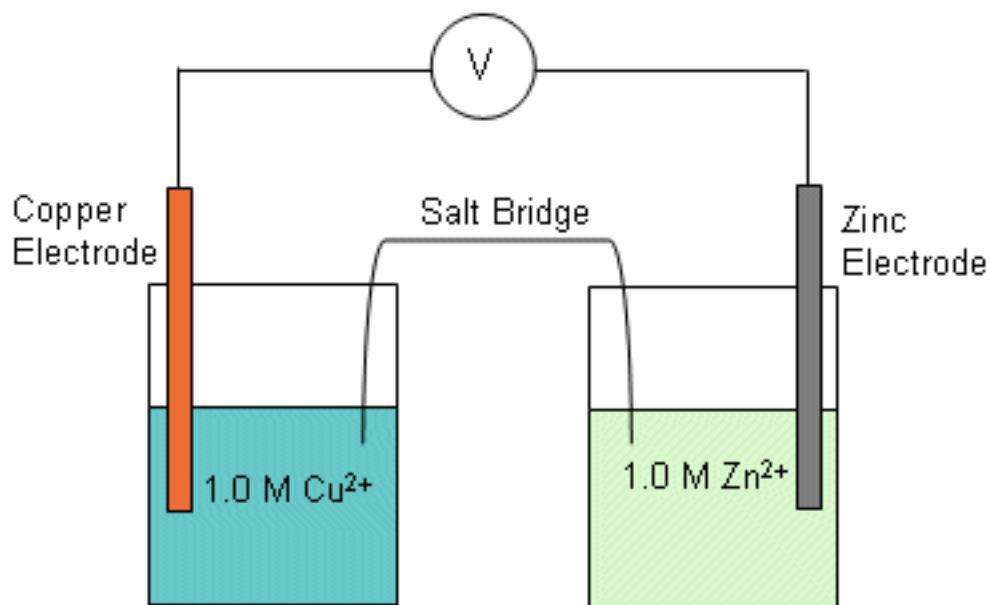


Objective: SWBAT identify the parts of an electrochemical cell

$$\text{Zn(s)} + \text{Cu}^{+2}(\text{aq}) \rightarrow \text{Zn}^{+2} + \text{Cu(s)}$$

NOTES

- To maintain neutrality the two solutions must be connected with a device called a **salt bridge**. A salt bridge allows for the migration of ions.



Objective: SWBAT identify the parts of an electrochemical cell

How do we figure out what's the anode and cathode?

Objective: SWBAT identify the parts of an electrochemical cell

Using Activity Series

- The activity series identifies the anode and cathode for a voltaic cell. The metal that is higher on the chart is the one that will be oxidized and thus is the anode.

Table J
Activity Series**

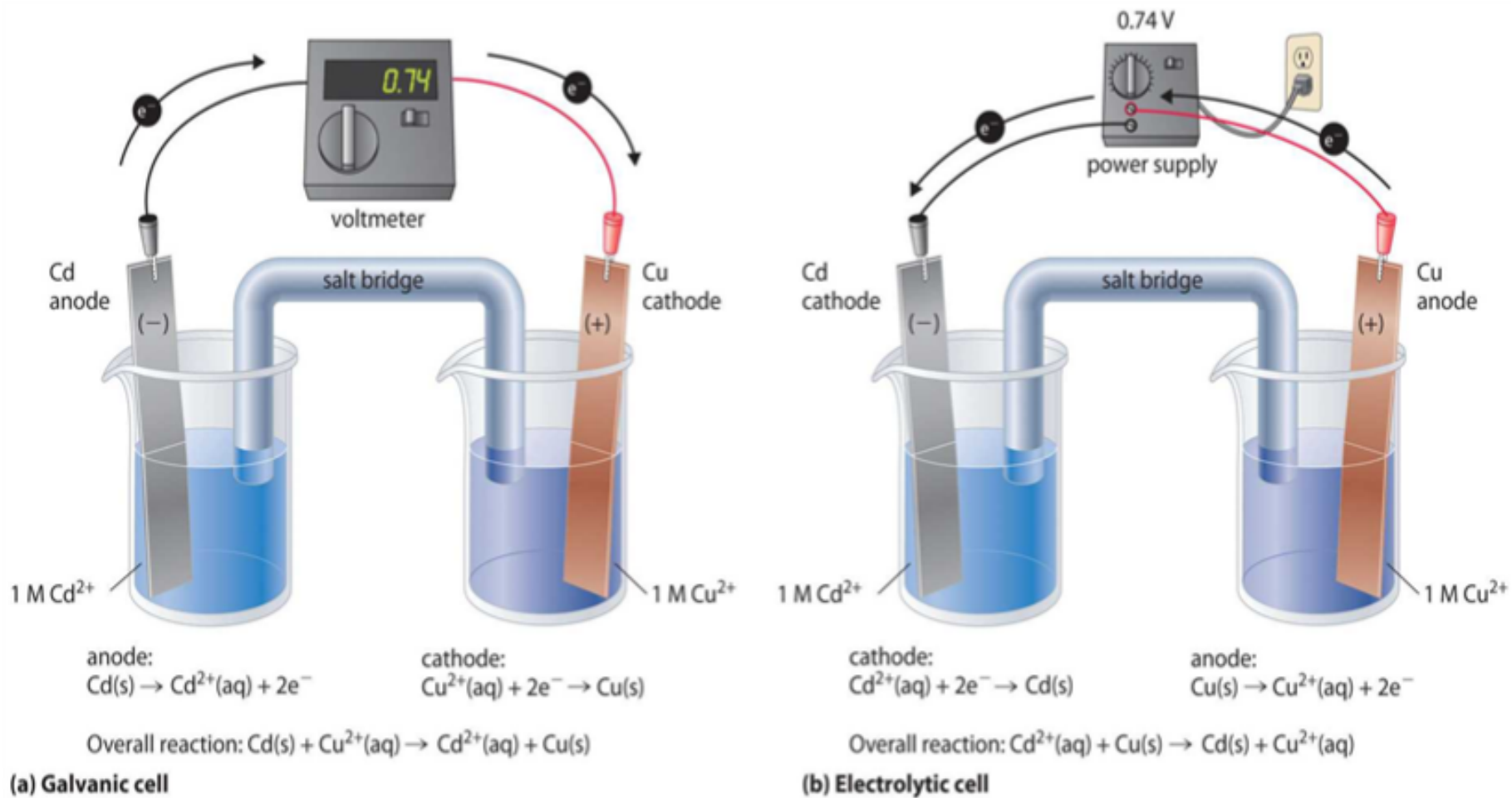
Most Active	Metals	Nonmetals	Most Active
	Li	F ₂	
	Rb	Cl ₂	
	K	Br ₂	
	Cs	I ₂	
	Ba		
	Sr		
	Ca		
	Na		
	Mg		
	Al		
	Ti		
	Mn		
	Zn		
	Cr		
	Fe		
	Co		
	Ni		
	Sn		
	Pb		
	Cu		

Objective: SWBAT identify the parts of an electrochemical cell

Electrolytic vs. Voltaic Cells

- Which one of the following reactions happens spontaneously? Write the products.
- $\text{Zn} + \text{Al}(\text{NO}_3)_3$
- $\text{Zn} + \text{Pb}(\text{NO}_3)_2$

Objective: SWBAT identify the parts of an electrochemical cell



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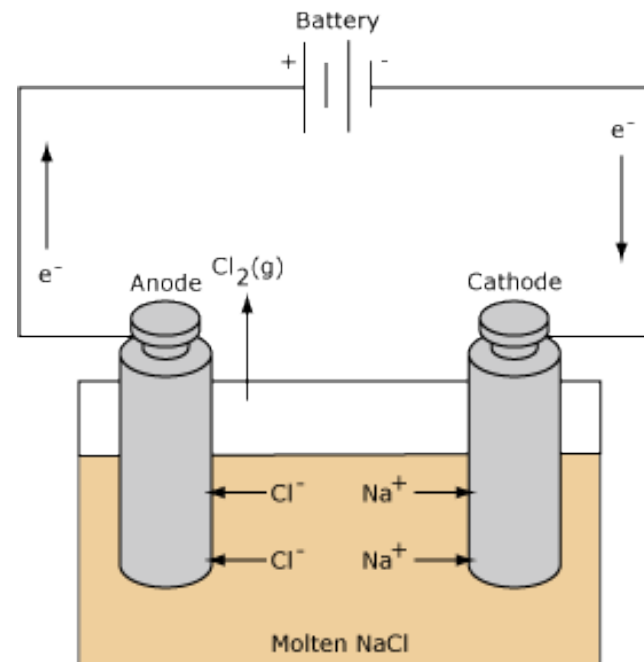
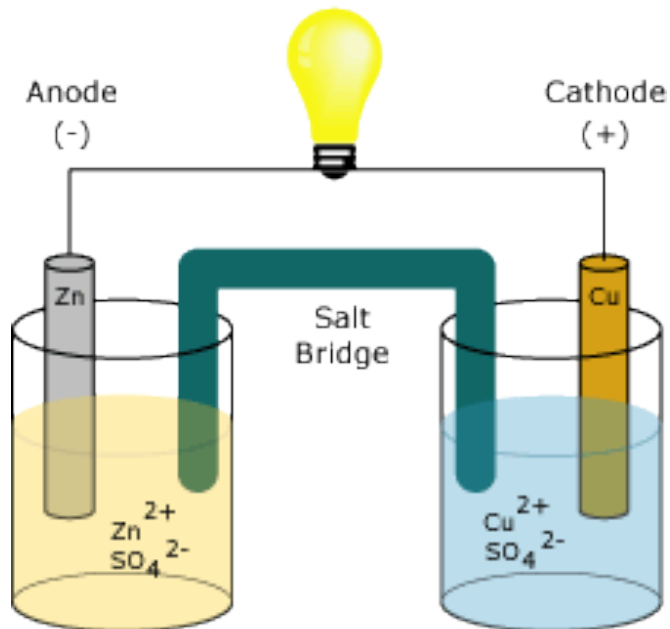
Two Types

SIMILARTIES:

Electrons always flow from the anode to the cathode.

DIFFERENCES:

In a voltaic cell, the anode is negative and the cathode is positive. In an electrolytic cell, the anode is positive and the cathode is negative.



HOMEWORK

Finish the rest of the 11.5 Practice!

Quiz on THURSDAY for Anions FRIDAY for cations

Objective: SWBAT identify the parts of an electrochemical cell