

Name: _____

Date: _____

Unit 11 - Topic 4

Electrochemical Cells

Electrochemical Cell Vocabulary

Electrode	
Anode	
Voltaic Cell	
Oxidation	
Electrolytic Cell	
Cathode	
Salt Bridge	
Reduction	
Half Reaction	

Refer to Table J: For each of the electrode pairs, which would be the anode in a voltaic cell?

1. Cu/Zn _____

4. Ba/Li _____

2. Pb/Sn _____

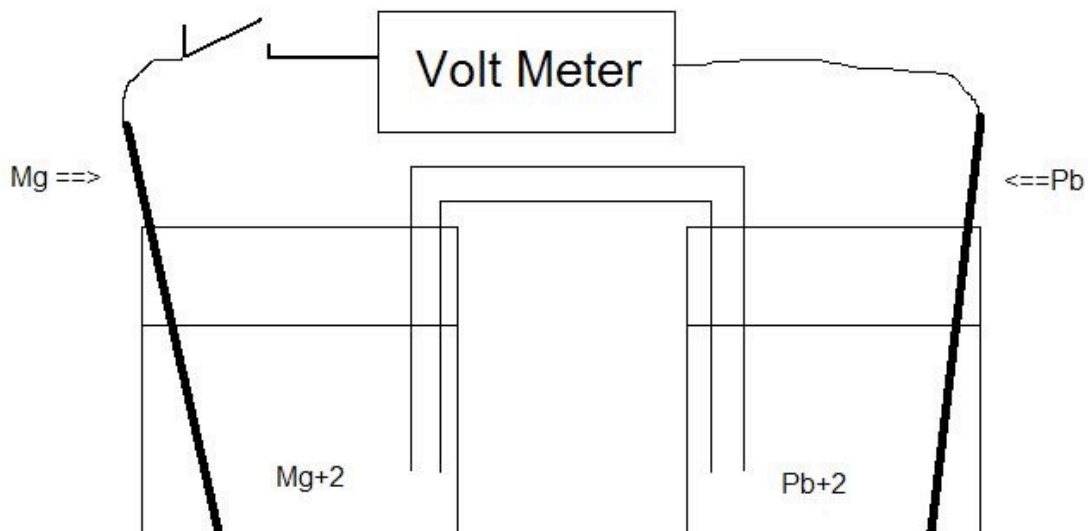
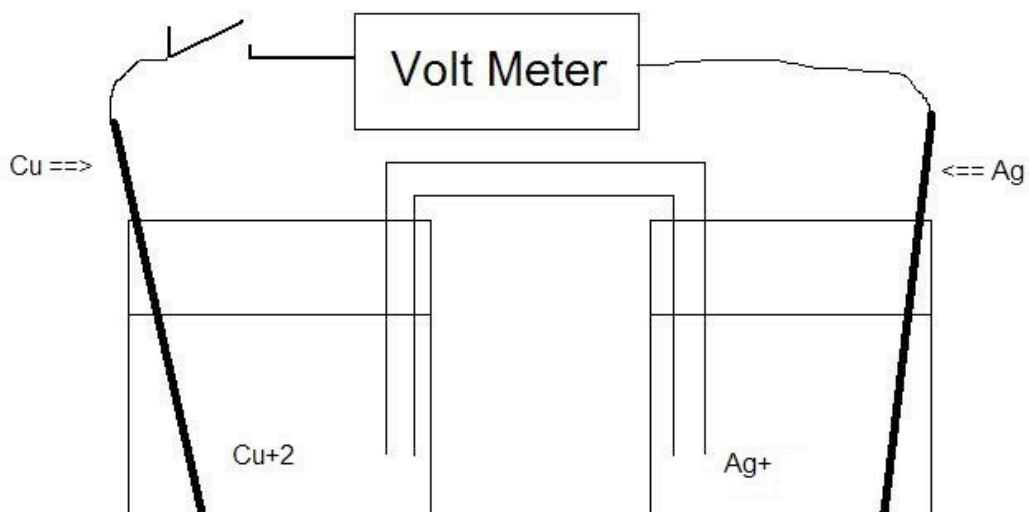
5. H₂/Ag _____

3. K/Al _____

6. Zn/Al _____

Cell Diagrams

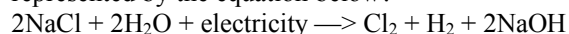
- Write the chemical half reactions for each cell.
- Write a balanced redox equation
- Label the cathode and the anode
- Show the direction of electron flow in the external circuit



1. Which component of a Voltaic cell is correctly paired with its function?

- external conductor — allows the solutions to mix
- external conductor — permits the migration of ions
- salt bridge — allows the solutions to mix
- salt bridge — permits the migration of ions

2. Which statement best describes the reaction represented by the equation below?



- The reaction occurs in a voltaic cell and releases energy.
- The reaction occurs in a voltaic cell and absorbs energy.
- The reaction occurs in an electrolytic cell and releases energy.
- The reaction occurs in an electrolytic cell and absorbs energy.

3. An electrolytic cell is different from a voltaic cell because in an electrolytic cell

- a redox reaction occurs
- a spontaneous reaction occurs
- an electric current is produced
- an electric current causes a chemical reaction

4. Given the statements:

A The salt bridge prevents electrical contact between solutions of half-cells.

B The salt bridge prevents the direct mixing of one half-cell solution with the other.

C The salt bridge allows electrons to migrate from one half-cell to the other.

D The salt bridge allows ions to migrate from one half-cell to the other.

Which two statements explain the purpose of a salt bridge used as part of a voltaic cell?

- A* and *C*
- A* and *D*
- C* and *D*
- B* and *D*

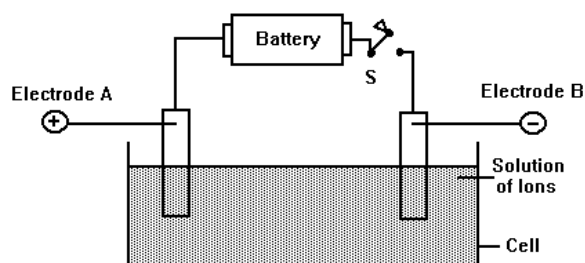
5. The purpose of a salt bridge in a voltaic cell is to

- allow for the flow of molecules between the solutions
- allow for the flow of ions between the solutions
- prevent the flow of molecules between the solutions
- prevent the flow of ions between the solutions

6. In an electrolytic cell, the positive electrode is the

- anode, where oxidation occurs
- anode, where reduction occurs
- cathode, where oxidation occurs
- cathode, where reduction occurs

7.



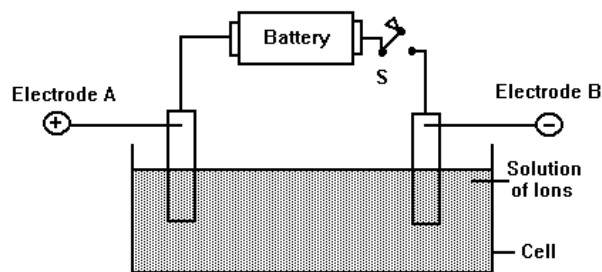
Which type of cell does the diagram represent?

- electrolytic, with the anode at *A*
- electrolytic, with the cathode at *A*
- voltaic, with the anode at *A*
- voltaic, with the cathode at *A*

8. An electrochemical voltaic cell setup consists of two half-cells, an anode, a cathode, an external circuit, and a salt bridge. When a reaction occurs, ion migration takes place through the

- anode
- cathode
- salt bridge
- external circuit

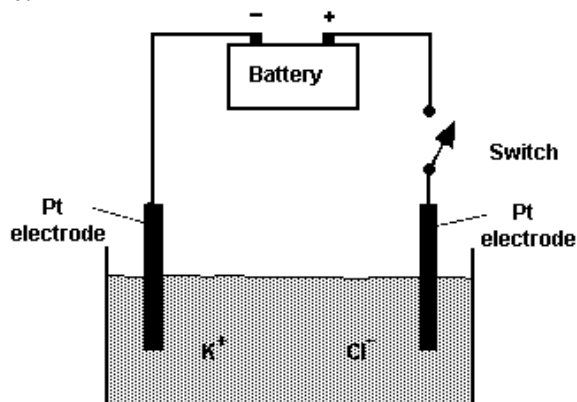
9.



When switch S is closed, positive ions will undergo

1. oxidation at electrode B
2. oxidation at electrode A
3. reduction at electrode B
4. reduction at electrode A

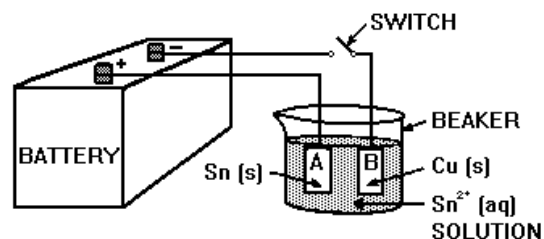
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The diagram shows the electrolysis of fused KCl . What occurs when the switch is closed?

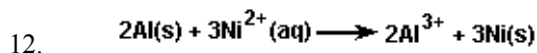
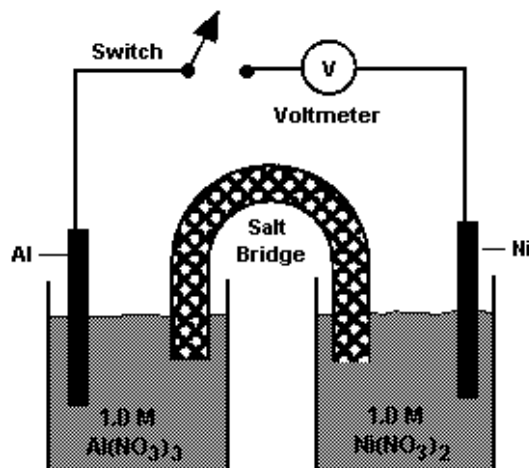
1. Positive ions migrate toward the anode, where they lose electrons.
2. Positive ions migrate toward the anode, where they gain electrons.
3. Positive ions migrate toward the cathode, where they lose electrons.
4. Positive ions migrate toward the cathode, where they gain electrons.

11.



The diagram shows an electrolytic cell in which the electrodes are tin and copper. In this electrolytic cell, electrode A is designated as the

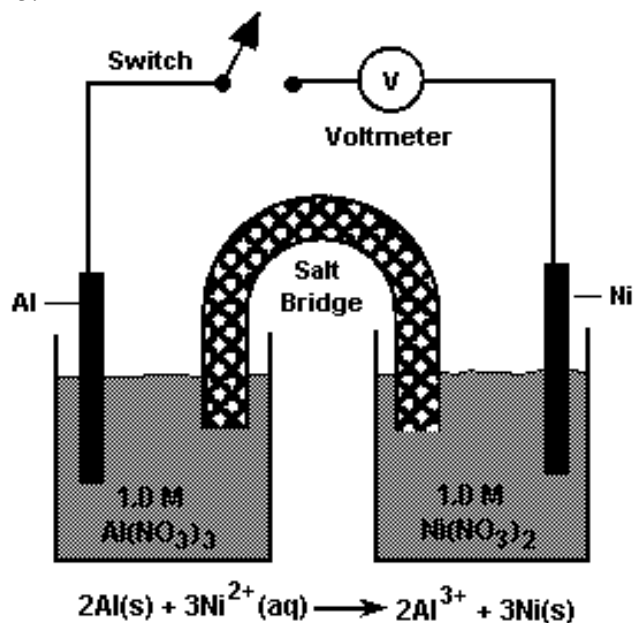
1. anode and is positive
2. anode and is negative
3. cathode and is positive
4. cathode and is negative



The diagram represents a chemical cell at 298 K. When the switch is closed, electrons flow from

1. $Al(s)$ to $Ni(s)$
2. $Ni(s)$ to $Al(s)$
3. $Al^{3+}(aq)$ to $Ni^{2+}(aq)$
4. $Ni^{2+}(aq)$ to $Al^{3+}(aq)$

13.



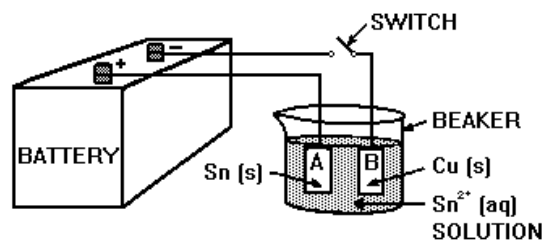
Which half reaction correctly represents the reduction that occurs when the switch is closed?

1. $\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$
2. $\text{Al} + 3\text{e}^- \rightarrow \text{Al}^{3+}$
3. $\text{Ni}^{2+} + 2\text{e}^- \rightarrow \text{Ni}$
4. $\text{Ni} + 2\text{e}^- \rightarrow \text{Ni}^{2+}$

14. A voltaic cell differs from an electrolytic cell in that a chemical cell uses

1. half-reactions
2. a solution of ions
3. an applied electric current
4. a redox reaction to produce electricity

15.



The diagram shows an electrolytic cell in which the electrodes are tin and copper. When the switch is closed, what will happen to the two electrodes?

1. *B* will dissolve and *A* will become coated with tin.
2. *A* will dissolve and *B* will become coated with tin.
3. *B* will dissolve and *A* will become coated with copper.
4. *A* will dissolve and *B* will become coated with copper.

16. Which process requires an external power source?

1. neutralization
2. synthesis
3. fermentation
4. electrolysis