

1. Which statement describes the redox reaction that occurs when an object is electroplated?
- It is spontaneous and requires an electric current.
 - It is spontaneous and produces an electric current.
 - It is non-spontaneous and requires an electric current.
 - It is non-spontaneous and produces an electric current.

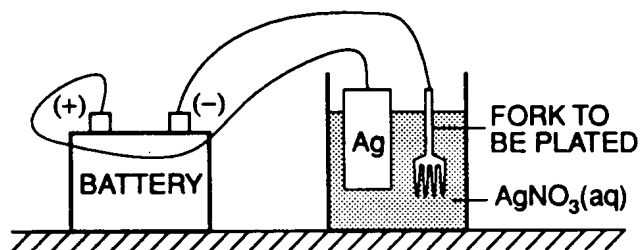
2. In an electrolytic cell, the anode is always the

- negative electrode, where reduction occurs
- negative electrode, where oxidation occurs
- positive electrode, where reduction occurs
- positive electrode, where oxidation occurs

3. A metal object is to be electroplated with silver. Which set of electrodes should be used?

- a silver anode and a metal object as the cathode
- a platinum anode and a metal object as the cathode
- a silver cathode and a metal object as the anode
- a platinum cathode and a metal object as the anode

Base your answers to questions 4 and 5 on the diagram below which represents the electroplating of a metal fork with Ag(s).



4. Which part of the electroplating system is provided by the fork?

- the anode, which is the negative electrode
- the cathode, which is the negative electrode
- the anode, which is the positive electrode
- the cathode, which is the positive electrode

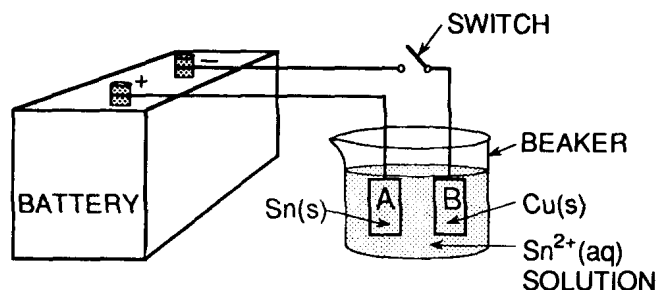
5. Which equation represents the half-reaction that takes place at the fork?

- $\text{Ag}^+ + \text{NO}_3^- \rightarrow \text{AgNO}_3$
- $\text{AgNO}_3 \rightarrow \text{Ag}^+ + \text{NO}_3^-$
- $\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag(s)}$
- $\text{Ag(s)} \rightarrow \text{Ag}^+ + \text{e}^-$

6. Which half-reaction occurs at the negative electrode in an electrolytic cell in which an object is being plated with silver?

- $\text{Ag}^0 + 1\text{e}^- \rightarrow \text{Ag}^+$
- $\text{Ag}^0 \rightarrow \text{Ag}^+ + 1\text{e}^-$
- $\text{Ag}^+ + 1\text{e}^- \rightarrow \text{Ag}^0$
- $\text{Ag}^+ \rightarrow \text{Ag}^0 + 1\text{e}^-$

Base your answers to questions 7 and 8 on the diagram below of an electrolytic cell in which the electrodes are tin and copper.



7. When the switch is closed, what will happen to the two electrodes?

- B* will dissolve and *A* will become coated with tin.
- A* will dissolve and *B* will become coated with tin.
- B* will dissolve and *A* will become coated with copper.
- A* will dissolve and *B* will become coated with copper.

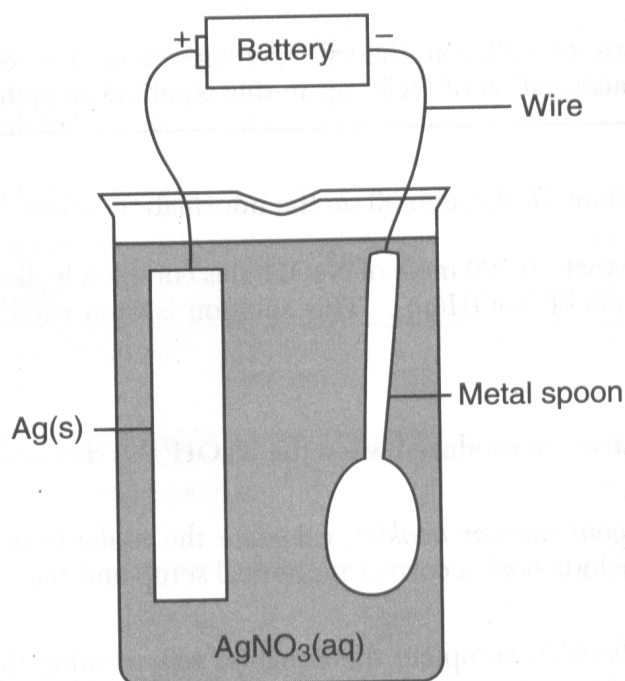
8. In this electrolytic cell, electrode *A* is designated as the

- anode and is positive
- anode and is negative
- cathode and is positive
- cathode and is negative

Base your answers to questions 9 and 10 on the information below.

Electroplating is an electrolytic process used to coat metal objects with a more expensive and less reactive metal. The diagram below shows an electroplating cell that includes a battery connected to a silver bar and a metal spoon. The bar and spoon are submerged in $\text{AgNO}_3(\text{aq})$.

An Electroplating Cell

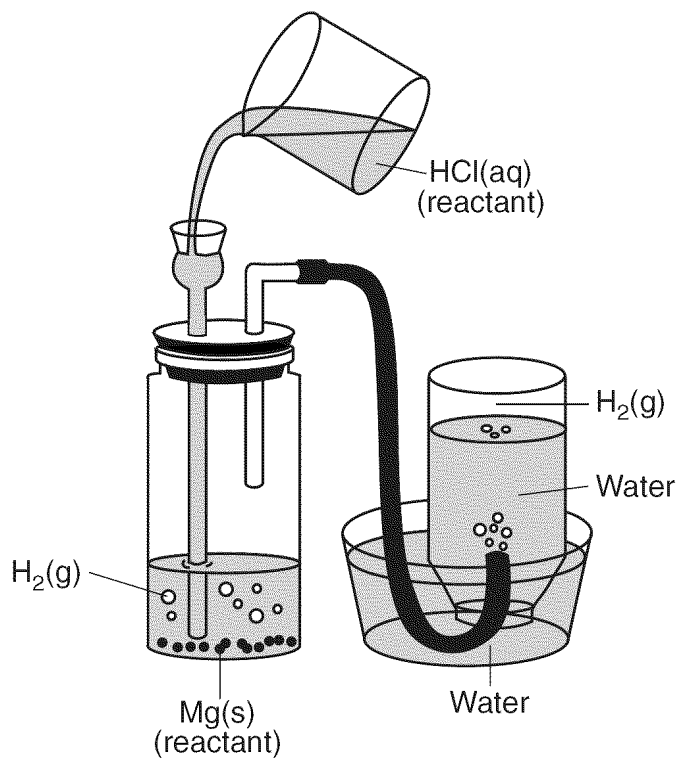


9. Explain why AgNO_3 is a better choice than AgCl for use in this electrolytic process.

10. Explain the purpose of the battery in this cell.

Base your answers to questions 11 and 12 on the information below.

A student places a 2.50-gram sample of magnesium metal in a bottle and fits the bottle with a 2-hole stopper as shown in the diagram. Hydrochloric acid is added to the bottle, causing a reaction. As the reaction proceeds, hydrogen gas travels through the tubing to an inverted bottle filled with water, displacing some of the water in the bottle.



11. Identify the type of chemical reaction that occurs when magnesium reacts with hydrochloric acid.

12. Based on Reference Table *J*, explain why $\text{Ag}(\text{s})$ will *not* react with $\text{HCl}(\text{aq})$ to generate $\text{H}_2(\text{g})$.