

1. Only one element is being used in the diagram to the left. The silver plate ionizes and the ions attach to the spoon. Show a half reaction for silver oxidizing.
2. Label the anode and cathode with charges on the diagram.
3. Explain the direction of e^- flow through the wire.
4. Is this reaction spontaneous? _____ How can you tell?

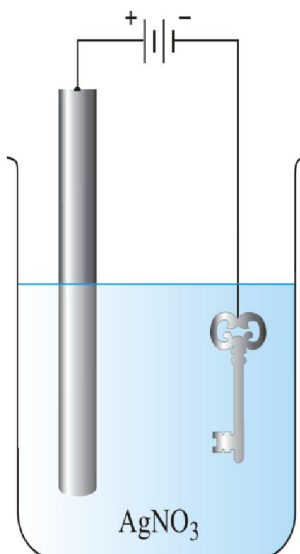
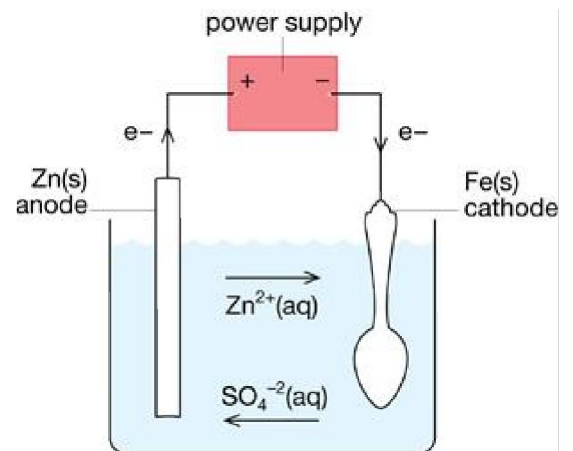
5. Write the half reaction for the anode in the diagram to the right:

6. Write the half reaction for the cathode:

7. How many e^- are transferred per mole?

8. What is the charge of the Zn electrode?

9. Why is a power source needed in this cell?



10. Show a half reaction for silver reducing.
11. Label the anode and cathode on the diagram to the right.
12. What will happen to the mass of the key?
13. What will happen to the mass of the silver metal?
14. Show the direction of e^- flow through the wire on the diagram to the right.
15. State the difference between voltaic and electrolytic cells in terms of electrical and chemical energy.

Electrochemical Cells Regents Questions

1. In a voltaic cell, chemical energy is converted to

- (1) electrical energy, spontaneously
- (2) electrical energy, nonspontaneously
- (3) nuclear energy, spontaneously
- (4) nuclear energy, nonspontaneously

2. A voltaic cell spontaneously converts

- (1) electrical energy to chemical energy
- (2) chemical energy to electrical energy
- (3) electrical energy to nuclear energy
- (4) nuclear energy to electrical energy

3. A voltaic cell differs from an electrolytic cell in that in a voltaic cell

- (1) energy is produced when the reaction occurs
- (2) energy is required for the reaction to occur
- (3) both oxidation and reduction occur
- (4) neither oxidation nor reduction occurs

4. Which half-reaction can occur at the anode in a voltaic cell?

- (1) $\text{Ni}^{2+} + 2\text{e}^- \rightarrow \text{Ni}$
- (2) $\text{Sn} + 2\text{e}^- \rightarrow \text{Sn}^{2+}$
- (3) $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$
- (4) $\text{Fe}^{3+} \rightarrow \text{Fe}^{2+} + \text{e}^-$

5. Which process requires an external power source?

- (1) neutralization
- (2) synthesis
- (3) fermentation
- (4) electrolysis

6. Which energy transformation occurs when an electrolytic cell is in operation?

- (1) chemical energy \rightarrow electrical energy
- (2) electrical energy \rightarrow chemical energy
- (3) light energy \rightarrow heat energy
- (4) light energy \rightarrow chemical energy

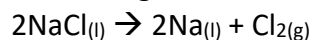
7. What is the purpose of the salt bridge in a voltaic cell?

- (1) It blocks the flow of electrons.
- (2) It blocks the flow of positive and negative ions.
- (3) It is a path for the flow of electrons.
- (4) It is a path for the flow of positive and negative ions.

8. Which statement is true for any electrochemical cell?

- (1) Oxidation occurs at the anode, only.
- (2) Reduction occurs at the anode, only.
- (3) Oxidation occurs at both the anode and the cathode.
- (4) Reduction occurs at both the anode and the cathode.

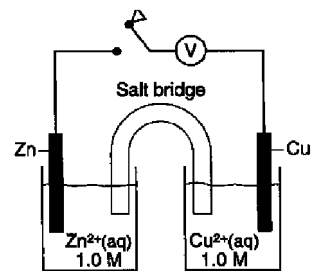
9. Given the balanced equation representing a reaction occurring in an electrolytic cell:



Where is Na(l) produced in the cell?

- (1) at the anode, where oxidation occurs
- (2) at the anode, where reduction occurs
- (3) at the cathode, where oxidation occurs
- (4) at the cathode, where reduction occurs

Answer questions 10 and 11 using the diagram below, which represents an electrochemical cell.



10. When the switch is closed, in which half-cell does oxidation occur?

11. What occurs when the switch is closed?

- (1) Zn is reduced.
- (2) Cu is oxidized.
- (3) Electrons flow from Cu to Zn.
- (4) Electrons flow from Zn to Cu

