

LESSON 6: Electrolytic Cells

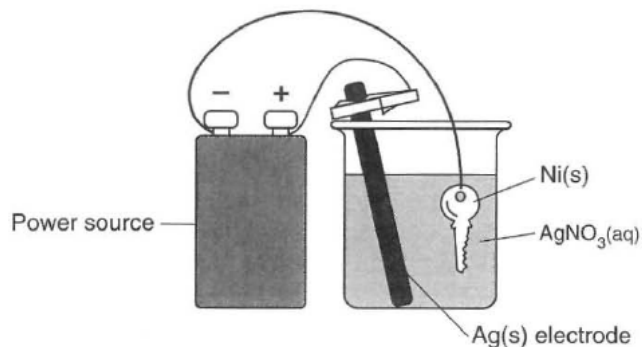
Objective:

- Identify an electrolytic cell
- Differentiate between an electrolytic cell and a voltaic cell

Electrolytic cells use a power source (battery) to force a nonspontaneous reaction. In an electrolytic cell, the anode and cathode are the same as in voltaic cells but the only difference is anode is + and the cathode is – Practical applications of electrolytic cells are electroplating, recharging batteries etc.)

1. In an electrolytic cell, _____ energy is converted to _____ energy.

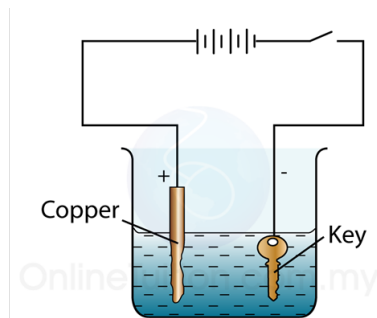
The diagram below represents an operating electrolytic cell used to plate silver onto a nickel key. As the cells operates, oxidation occurs at the silver electrode and the mass of the silver electrode decreases.



2. Identify the cathode in the cell.
3. What is the purpose of the power source in the cell?

Base your answers to the following questions on the diagram below:

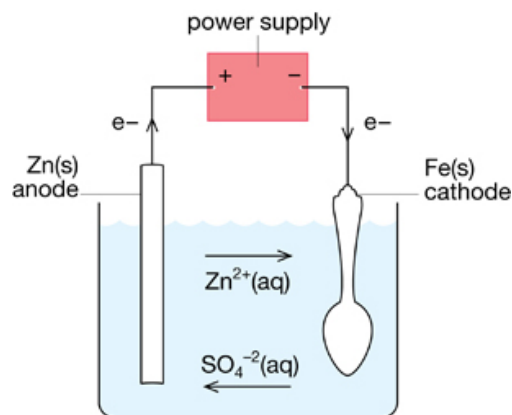
4. Why will the mass of the key increase?
5. Label the anode, cathode, and the direction of e-flow through the wire.
6. State the difference between voltaic and electrolytic cells in terms of spontaneity
7. State the difference between voltaic and electrolytic cells in terms of energy being released or absorbed.



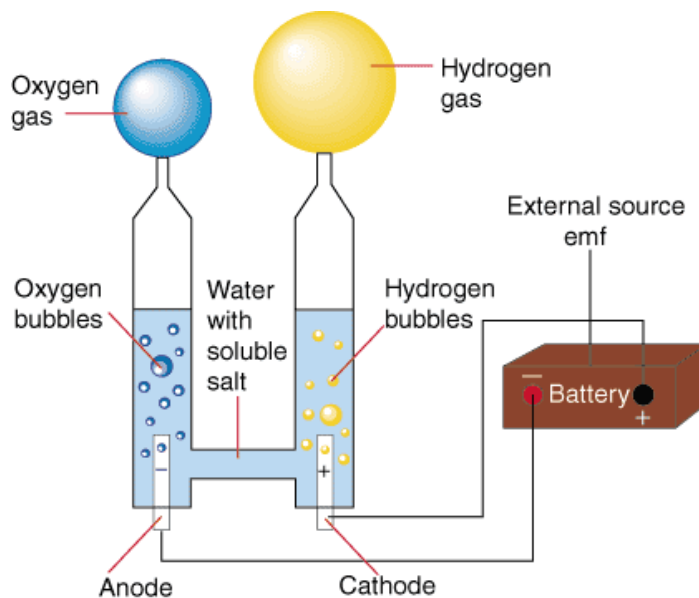
PRACTICE PACKET: ELECTROCHEMISTRY

Base your answers to the following questions on the diagram below:

8. Show a half reaction for zinc reducing.
9. Label the anode and cathode on the diagram to the right.
10. What will happen to the mass of the spoon?
11. What will happen to the mass of the zinc metal?
12. Show the direction of e^- flow through the wire on the diagram to the right.
13. Is the reaction spontaneous? How can you tell?



14. Water is being decomposed using a battery in the diagram to the right. Write the equation for the decomposition of water.

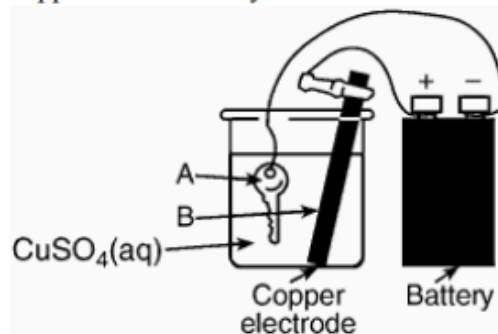


15. Which element is being oxidized?
16. How many e^- are lost?
17. Is this reaction spontaneous?

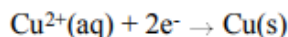
REGENTS PRACTICE

- Which reaction occurs at the anode in an electrochemical cell?
 - oxidation
 - reduction
 - combustion
 - substitution
- An electrolytic cell differs from a voltaic cell because an electrolytic cell
 - generates its own energy from a spontaneous physical reaction
 - generates its own energy from a nonspontaneous physical reaction
 - requires an outside energy source for a spontaneous chemical reaction to occur
 - requires an outside energy source for a nonspontaneous chemical reaction to occur
- Energy is required to produce a chemical change during
 - chromatography
 - electrolysis
 - boiling
 - melting
- Which energy conversion must occur in an operating electrolytic cell?
 - electrical energy to chemical energy
 - electrical energy to nuclear energy
 - chemical energy to electrical energy
 - chemical energy to nuclear energy

- The diagram below shows a key being plated with copper in an electrolytic cell



Given the reduction reaction for this cell:



This reduction occurs at

- A, which is the anode
 - A, which is the cathode
 - B, which is the anode
 - B, which is the cathode
- 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.