Name _____ Date _____ Class _____

CHAPTER 21 STUDY GUIDE FOR CONTENT MASTERY

Electrochemistry

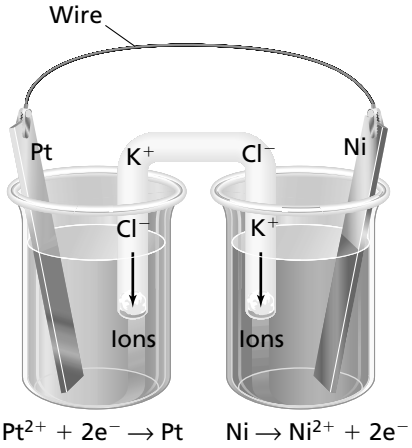
Section 21.1 Voltaic Cells

In your textbook, read about redox in electrochemistry.

Use each of the terms below just once to complete the passage.

voltaic	electrochemical cell	electric current	salt bridge	galvanic

Oxidation and reduction reactions can occur in separate solutions, as long as there are two connections between the solutions. One connection is a(n) **(1)**_____ through which ions can flow. The other connection is a metal wire through which electrons can flow. The flow of ions or electrons is known as a(n) **(2)**_____. The complete setup, called a(n) **(3)**_____, can convert chemical energy into electrical energy or electrical energy into chemical energy. These cells are also known as **(4)**_____ cells or **(5)**_____ cells.



Use the diagram of an electrochemical cell to answer the following questions.

6. The equation at the bottom of each beaker shows the half-reaction that is occurring in that beaker. What kind of reaction (oxidation or reduction) is occurring in each beaker?

Left beaker _____

Right beaker _____

7. Write the net ionic equation for this electrochemical cell.

_____

8. In which direction do electrons move through the wire?

_____

9. What kind of ions (positive or negative) move from the ∩-shaped tube into each beaker?

Left beaker _____ Right beaker _____

Section 21.1 *continued*

In your textbook, read about the chemistry of voltaic cells.

For each item in Column A, write the letter of the matching item in Column B.

Column A	Column B
_____ **10.** One of the two parts of an electrochemical cell, where either oxidation or reduction takes place	**a.** battery
_____ **11.** An electrode where oxidation takes place	**b.** electrical potential
_____ **12.** An electrode where reduction takes place	**c.** half-cell
_____ **13.** One or more electrochemical cells in a single package that generates electrical current	**d.** cathode
_____ **14.** A measure of the amount of current that can be generated from an electrochemical cell to do work	**e.** anode

In your textbook, read about calculating cell electrochemical potential.

Circle the letter of the choice that best completes the statement or answers the question.

15. The tendency of an electrode to gain electrons is called
- **a.** electron potential.
- **b.** gravitational potential.
- **c.** reduction potential.
- **d.** oxidation potential.

16. A sheet of platinum covered with finely divided platinum particles is immersed in a 1*M* HCl solution containing hydrogen gas at a pressure of 1 atm and a temperature of 25°C. The platinum sheet is known as a
- **a.** standard platinum electrode.
- **b.** standard hydrogen electrode.
- **c.** hydrogen chloride electrode.
- **d.** platinum chloride electrode.

17. The standard reduction potential of a half-cell is a measure of
- **a.** concentration.
- **b.** pressure.
- **c.** temperature.
- **d.** voltage.

18. Which of the following is the correct way to represent the equation, $H_2(g) + Cu^{2+}(aq) \longrightarrow 2H^+(aq) + Cu(s)$?
- **a.** $H_2|H^+\|Cu^{2+}|Cu$
- **b.** $H^+|H_2\|Cu|Cu^{2+}$
- **c.** $Cu^{2+}|Cu\|H_2|H^+$
- **d.** $Cu|Cu^{2+}\|H^+|H_2$

19. When connected to a hydrogen electrode, an electrode with a negative standard reduction potential will carry out
- **a.** reduction.
- **b.** oxidation.
- **c.** both oxidation and reduction.
- **d.** neither oxidation nor reduction.