Chapter 17 Review Answer Key

(Note: Solutions to Problems 39 - 68 can be found in the Book Answer Key)

Assignments:

- Chapter Review questions 1 - 69 on pages 633-635
- Written Assessment questions 70 - 77 on page 636
- Focus on Graphing questions 85 - 88 on pages 637

Chapter Review Assignment

1. A redox reaction is a oxidation-reduction reaction - a chemical change in which one species is oxidized (loses electrons) and another species is reduced (gains electrons).
2. Oxidation - lose electrons; reduction - gain electrons
3. Oxidation numbers show the number of electrons that must be added or removed from an atom in a combined state to convert the atom into the elemental form.
4. A half-reaction is the part of redox reaction that involves only one part (reduction or oxidation) and is important as it makes balancing easier.
5. Electrochemistry is the branch of chemistry that is the study of the relationship between electric forces and chemical reactions.
6. Electrode - a conductor used to establish electrical contact with a non-metallic part of a circuit, such as an electrolyte.
   Anode - the electrode on whose surface oxidation takes place; anions migrate toward the anode and electrons leave the system from the anode.
   Cathode - the electrode on whose surface reduction takes place.
7. Voltage is the amount of work needed to move the electric charge (electrons) between two points. Current is the movement of the electrons.
8. Galvanic cells change chemical energy into electrical energy, while in an electrolytic cell electricity is used to produce a chemical reaction.
9. In fuel cells, the oxidizing and reducing agents are brought in from outside the cell.
10. Corrosion is the gradual destruction of a metal or alloy as the result of a chemical process, like oxidation. A corrosion cell is an example of a (unwanted) galvanic cell where metal rusts as the result of the oxygen in air and water - they combine to convert chemical energy to electrical energy.
11. The sacrificial anode corrodes in place of the important metal.
12. Electroplating is the electrolytic process of plating or coating an object with a metal.
13. Mg = +2; Br = -1
14. N = -3; H = +1; O = -2
15. P = +5; F = -1

16.
    a. oxidation
    b. reduction
    c. reduction
17. No. It is a synthesis reaction.
18. The substance that gains electrons is the oxidizing agent and the reducing agent causes the reaction to happen by contributing the electrons.
19. $10NO + P_4 = 5N_2 + 2P_2O_5$

    phosphorus is oxidized and nitrogen is reduced

    nitrogen monoxide is the oxidizing agent and phosphorus is the reducing agent

20.
21. An electrochemical cell is made up of a cathode, anode and an electrolyte.
22. $Cd_{(s)} \rightarrow Cd^{2+}_{(aq)} + 2e^-$ anodic
    $Ag^+_{(aq)} + e^- \rightarrow Ag_{(s)}$ cathodic
    $Ag^+_{(aq)} + Cd_{(s)} \rightarrow Cd^{2+}_{(aq)} + Ag_{(s)}$
23. The + shows the positive terminal - the electrons flow to the positive terminal.
24. Reduction occurs at the cathode.
25. The porous barrier separates the solutions, but allows the electrons to cross the from one side to the other. There would be no current if it did not exist.
26. One half reaction is the oxidation, the other is reduction.
27. A galvanic cell changes chemical energy into electrical energy. Examples will vary.
28. See page 617 of the textbook.
29. Uses oxidizing and reducing agents from outside the cell.
30. A corrosion cell contains all the parts needed for a galvanic cell.
31. Examples will vary - examples can be found on page 621.
32. The standard electrode potential is negative so energy is needed for it to occur.
33. The negative one - explanations will vary, but must include explanation of standard electrode potential.
34. An electrolytic cell is a device in which electricity is used to cause a chemical change - electrolysis.
35. Electrical source attached to an anode and a cathode submerged in water. Something to trap the hydrogen and the oxygen gases coming from the cathode and anode. See Figure 16 on page 627 of the online textbook.
36. The melting point is reduced as a result.
37. Keeps the costs lower, protect from corrosion, keeps them lasting longer.
38. May not be uniform, impurities build up over time and high concentrations of toxic metals left behind.
39. Answers can be found in the textbook answer key.

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68. Answers can be found in the textbook answer key.
69. Answers can be found in the textbook answer key.
70. Answers will vary, but must explain that oxidation is the loss of lectrons in a redox reaction.
71. N = -3; H = +1; O = -2 - answers will vary
72. The electrons are on the "negative" end and they repel one another.
73. In an electrolyte solution, current is transferred with free ions and is transferred with free electrons in a wire.
74. The standard electrode potential increases as activity decreases.
75. 2 electrons
76. Answers can be found in the textbook answer key.
77. Answers can be found in the textbook answer key.

85. Ag = 20 g/h & Au = 11.7 g/h

86. Ag = 0.18 mol/h & 0.0594 mol/h

87. approximately five hours

88. Explanations will vary, but must include the half reactions.