Chapter 17 Section Review Answer Key

Assignments:

- Section Review questions 1-12 on page 611
- Section Review questions 1-18 on page 615
- Section Review questions 1-8 on page 624
- Section Review questions 1-15 on page 631

Answers to questions 6 - 10 of Section 1, questions 5 & 6 of Section 3, and questions 7 - 10, 13 & 15 can be found in the textbook answer key.

Section 1 Review Assignment

1. Oxidation is a reaction that removes one more electrons, while reduction is a reaction in which electrons are gained.
2. In a redox reaction - one species loses electrons and another gains.
3. One half reaction in a redox reaction is the oxidation, while the other is the reduction. They make it less difficult to balance the redox reaction.
4. They must always cancel out.
5. An oxidizing agent is a substance that gains electrons and a reducing agent is a substance that has the potential to reduce another substance.
6. Answers can be found in the textbook answer key.
7. Answers can be found in the textbook answer key.
8. Answers can be found in the textbook answer key.
9. Answers can be found in the textbook answer key.
10. Answers can be found in the textbook answer key.
11.
    a. Cr oxidized and Cl^- is reduced; Cl- is the oxidizing agent and Cr_2O_7 is the reducing agent.
    b. Ag^+ is oxidized and Cu is reduced; Cu is the oxidizing agent and Ag is the reducing agent.
    c. Br_2 is oxidized and I^- is reduced; I- is the oxidizing agent and Br_2 is the reducing agent.
    d. H_3O^+ is oxidized and both, I^- & NO_2^- are reduced; iodine and nitrogen dioxide are the oxidizing agents, while hydronium is the reducing agent.
12. It can both gain or lose electrons.

Section 2 Review

1. Voltage is the potential difference or electromotive force, measured in volts; it represents the amount of work that moving an electric charge between the two points would take.
2. Electric current is the movement of electrons.
3. An electrochemical cell contains two electrodes separated by an electrolyte.
4. cathode (where reduction takes place) and anode (where oxidation takes place).

5. In an electrolyte solution, current is transferred with free ions and is transferred with free electrons in a wire.
6. 2 V
7. cathode
8. Cathode = reduction - the cation becomes metal atom, charge is reduced, half reaction with e^- as a reactant. Anode = oxidation - metal atoms become cations, oxidation state increases, half reaction with e- as a product
9. The flashlight would not work as the voltage has to flow from the cathode end to the anode end.
10. The flashlight would not work as the electrodes are reversed.
11. $O_{2(aq)}$ --> $O^{2+}_{(aq)}$ + $2e^-$ anode
12. Br-(aq) --> Br2(aq) + e^- anode
13. Sn^{4+} + $2e^-$ --> Sn^{2+} cathode
14. Explanations may vary, but the bracelet must be on the anode side.
15. Answers may vary, but the light bulb would still light up.
16. Answers will vary, but should explain both half reactions and electrode reactions.
17. Answers can be found in the textbook answer key.
18. Answers can be found in the textbook answer key.

Section 3 Review

1. Fuel cells use reducing agents from outside the cell instead of having the reducing agent as part of the battery.
2. The two have different electrolytes - see Figure 9 on page 617 of online textbook for more detail.
3. Fe is the most active (on the activity series) and will rust (oxidize) to create iron oxide.
4. The standard electrode potential is the potential developed by a metal or other material immersed in an electrolyte solution relative to the potential of the hydrogen electrode, which is set to zero.
5. Answers can be found in the textbook answer key.
6. Answers can be found in the textbook answer key.
7. Answers can be found in the textbook answer key.
8. The sacrificial anode oxidizes - "removes the reducing agent(s)"

Section 4 Review

1. Galvanic cells generate electrical energy - while an electrolytic cell uses electricity to drive a chemical change.
2. oxygen forms during the electrolysis of water
3. hydrogen forms during the electrolysis of water
4. electrical energy
5. sodium, aluminum, electroplating
6. electrolysis is the process in which an electric current is used to produce a chemical reaction
7. Answers can be found in the textbook answer key.

8. Answers can be found in the textbook answer key.
9. Answers can be found in the textbook answer key.
10. Answers can be found in the textbook answer key.
11.
    a. $AlCl_3$ + 3K --> Al + 3KCl
    b. answers may vary, but it is not a redox reaction
    c. explanations will vary, but it will not need an electrolytic cell
12. Answers can be found in the textbook answer key.
13. Answers will vary, but must include adding electrons.
14. Answers can be found in the textbook answer key.
15. The production of aluminum by electrolysis is very expensive as it uses a great deal of electrical energy.