Name _____ Date _____ Class _____

CHAPTER 20 STUDY GUIDE FOR CONTENT MASTERY

Redox Reactions

Section 20.1 Oxidation and Reduction

In your textbook, read about redox reactions.

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

1. Redox reactions are characterized by
   - **a.** formation of a solid, a gas, or water.
   - **b.** replacement of one element in a compound by another element.
   - **c.** sharing of electrons.
   - **(d.)** transfer of electrons.

2. If a calcium atom loses two electrons, it becomes
   - **a.** a Ca^{2-} ion. **b.** an oxidizing agent. **(c.)** oxidized. **d.** reduced.

3. In a redox reaction, an oxidizing agent is
   - **a.** balanced. **c.** oxidized.
   - **b.** increased in oxidation number. **(d.)** reduced.

4. An oxidation reaction occurs
   - **(a.)** at the same time a reduction reaction occurs.
   - **b.** before its corresponding reduction reaction occurs.
   - **c.** independently of any reduction reaction.
   - **d.** only when electrons are gained.

5. Consider the equation $Ca(s) + O_2(g) \rightarrow 2CaO(s)$.
   In this reaction, calcium is oxidized because it
   - **a.** becomes part of a compound. **c.** loses electrons.
   - **b.** gains electrons. **(d.)** reacts with oxygen.

6. The number of electrons lost by an element when it forms ions is the element's
   - **a.** charge. **(b.)** oxidation number. **c.** reduction number. **d.** shared electrons.

7. A loss of electrons is
   - **(a.)** oxidation. **b.** oxidation–reduction. **c.** redox. **d.** reduction.

8. Redox reactions can involve
   - **a.** ions only. **c.** uncharged atoms only.
   - **b.** molecules only. **(d.)** ions, molecules, or uncharged atoms.

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CHAPTER 20 STUDY GUIDE FOR CONTENT MASTERY

Section 20.1 *continued*

In your textbook, read about determining oxidation numbers.

For each redox reaction below, determine the oxidation number of each element present. Write your answer above each symbol for the element.

0 +2 −2 +2 −2 0

9. $Cd(s) + NiO(s) \rightarrow CdO(s) + Ni(s)$

0 +2 +6 −2 +2 +6 −2 0

10. $Fe(s) + CuSO_4(aq) \rightarrow FeSO_4(aq) + Cu(s)$

0 0 +3 −1

11. $2Sb(s) + 3I_2(g) \rightarrow 2SbI_3(s)$

+1 −2 0 +1 −2 +4 −2

12. $2Cu_2S(s) + 3O_2(g) \rightarrow 2Cu_2O(s) + 2SO_2(g)$

+4 −2 0 +1 +6 −2 +2 +6 −2 +1 −2

13. $PbO_2(s) + Pb(s) + 2H_2SO_4(aq) \rightarrow 2PbSO_4(aq) + 2H_2O(l)$

−3 +1 +5 −2 +1 −2 +1 −2

14. $NH_4NO_3(s) \rightarrow 2H_2O(g) + N_2O(g)$

+3 −2 +2 −2 0 +4 −2

15. $Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$

In your textbook, read about oxidation, reduction, oxidizing agents, and reducing agents.

Use your answers from questions 9–15 to fill in the following table for the listed reactions. For each reaction, show what is oxidized, what is reduced, the oxidizing agent, and the reducing agent.

Equation	Oxidized	Reduced	Oxidizing Agent	Reducing Agent
16. $Cd(s) + NiO(s) \rightarrow CdO(s) + Ni(s)$	Cd	Ni^{2+}	Ni^{2+}	Cd
17. $Fe(s) + CuSO_4(aq) \rightarrow FeSO_4(aq) + Cu(s)$	Fe	Cu^{2+}	Cu^{2+}	Fe
18. $2Sb(s) + 3I_2(g) \rightarrow 2SbI_3(s)$	Sb	I	I	Sb
19. $2Cu_2S(s) + 3O_2(g) \rightarrow 2Cu_2O(s) + 2SO_2(g)$	S^{2-}	O	O	S^{2-}
20. $PbO_2(s) + Pb(s) + 2H_2SO_4(aq) \rightarrow 2PbSO_4(aq) + 2H_2O(l)$	Pb	Pb^{4+}	Pb^{4+}	Pb
21. $NH_4NO_3(s) \rightarrow 2H_2O(g) + N_2O(g)$	N^{3-}	N^{5+}	N^{5+}	N^{3-}
22. $Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$	C^{2+}	Fe^{3+}	Fe^{3+}	C^{2+}