Name: _____ / **20 Pts.**

Classify and Write a Balanced Chemical Equation for each of the Following Reactions.

1. For the reaction of aluminum with oxygen to form aluminum oxide:
   a.) Each aluminum atom (gains/loses) how many electrons? ___3_____
   b.) Each oxygen atom (gains/loses) how many electrons? ___2_____
   c.) How many total electrons are transferred in the compound? ____12_____

2. Iron metal reacts with oxygen. (iron (III) is the product) (Direct Combination)

   $4\ Fe + 3\ O_2 \longrightarrow 2\ Fe_2O_3$

3. Nickel(II) chloride and calcium (SD)

   $NiCl_2 + Ca \longrightarrow CaCl_2 + Ni$

4. Butane, C_4H_{10} is combusted (C)

   $2\ C_4H_{10} + 13\ O_2 \longrightarrow 8\ CO_2 + 10\ H_2O$

5. Potassium chloride is decomposed (D)

   $2\ KCl \longrightarrow 2K + Cl_2$

6. Sodium metal is added to a solution of magnesium nitrate (SD)

   $2\ Na + Mg(NO_3)_2 \longrightarrow 2NaNO_3 + Mg$

7. Bubbles form when an electric current is added to water. (D)

   $2\ H_2O \longrightarrow 2H_2 + O_2$

8. Glucose, $C_6H_{12}O_6$ is combusted (C)

   $C_6H_{12}O_6 + 6\ O_2 \longrightarrow 6\ CO_2 + 6\ H_2O$

9. Mercury(II) oxide is heated and decomposes into its elements (D)

   $2\ HgO \longrightarrow 2\ Hg + O_2$

10. Calcium metal is added to a solution of tin(II) chloride (SD)

    $Ca + SnCl_2 \longrightarrow CaCl_2 + Sn$

11. Zinc is reacted with iodine (Direct Combination)

    $Zn + I_2 \longrightarrow ZnI_2$

12. Hydrogen and oxygen make an explosive reaction. (Direct Combination)

    $2\ H_2 + O_2 \longrightarrow 2\ H_2O$

13. Copper reacts with a solution of silver nitrate (SD)

    $Cu + 2\ AgNO_3 \longrightarrow Cu(NO_3)_2 + 2\ Ag$

14. Zinc is added to hydrochloric acid (SD)

    $Zn + 2\ HCl \longrightarrow ZnCl_2 + H_2$

15. Magnesium metal is burned in the air. Both (Direct Combination)

    $2\ Mg + O_2 \longrightarrow 2\ MgO$

    $3\ Mg + N_2 \longrightarrow Mg_3N_2$

16. Solid europium is added to concentrated hydrofluoric acid. (S)
(Europium metal reacts to form a 3+ ion)

$$2\ Eu + 6\ HF \longrightarrow 2\ EuF_3 + 3\ H_2$$

17. Silicon is produced for chemical and electronics industries by the following reactions:
a.) Silicon dioxide reacts with pure carbon. (SD)
(Carbon dioxide is the other product)

$$SiO_2 + C \longrightarrow Si + CO_2$$

b.) Silicon tetrachloride is reacted with very pure magnesium metal. (SD)

$$SiCl_4 + 2\ Mg \longrightarrow Si + 2\ MgCl_2$$

18. Solid iron(III) oxide is added to a solution of nitric acid. (DD)

$$Fe_2O_3 + 6\ HNO_3 \longrightarrow 2\ Fe(NO_3)_3 + 3\ H_2O$$

19. Sodium carbonate is used to clean up a spill of nitric acid. (DD)

$$Na_2CO_3 + 2\ HNO_3 \longrightarrow 2\ NaNO_3 + H_2CO_3\ (H_2CO_3 = H_2O + CO_2)$$

20. A heavy olefin fuel $C_{152}H_{260}$ is combusted. (C)

$$C_{152}H_{260} + 141\ O_2 \longrightarrow 152\ CO_2 + 130\ H_2O$$