CRAB: Unit Review
TEST ON TUESDAY, DECEMBER 3, 2013

Counting Atoms
Directions: Count the atoms.
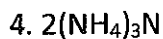
1. $4K_2CO_3$
K = _8_ C = _4_ O = _12_

2. $2Sr_3(PO_4)_2$
Sr = _6_ P = _4_ O = _16_

3. $3N_4O_{10}$
N = _12_ O = _30_

4. $2(NH_4)_3N$
N = _7_ H = _24_

5. $8Cl_2O$
Cl = _16_ O = _8_

6. $Ca(C_2H_3O_2)_2$
Ca = _1_ C = _4_ H = _6_ O = _4_

7. $12NaBr$
Na = _12_ Br = _12_

8. $4Al(OH)_3$
Al = _4_ O = _12_ H = _12_

9. $3NaHCO_3$
Na = _3_ H = _3_ C = _3_ O = _9_

10. $5Ga_2(Cr_2O_7)_3$
Ga = _10_ Cr = _30_ O = _105_

11. $7C_2S_2$
C = _14_ S = _14_

12. $4Fe_2O_3$
Fe = _8_ O = _12_

13. $6Ba(MnO_4)_2$
Ba = _6_ Mn = _12_ O = _48_

14. $3V_2O_5$
V = _10_ O = _15_

15. $2KNO_3$
K = _2_ N = _2_ O = _6_

16. $9MgSO_4$
Mg = _9_ S = _9_ O = _36_

17. $5Al_2(SiO_3)_2$
Al = _10_ Si = _10_ O = _35_

18. $4Au(IO_3)_3$
Au = _4_ I = _12_ O = _36_

19. $8SnCl_4$
Sn = _8_ Cl = _32_

20. $6Cu_2SeO_4$
Cu = _12_ Se = _6_ O = _24_

21. $3AsBr_3$
As = __3__ Br = __9__

31. $5Al(C_2H_3O_2)_2$
Al = __5__ C = __20__ H = __30__ O = __20__

22. $2H_2SO_4$
H = __6__ S = __2__ O = __8__

32. $3(NH_4)_2Cr_2O_7$
N = __6__ H = __24__ Cr = __6__ O = __21__

23. SBr_2
S = __1__ Br = __2__

24. $4Ca(OH)_2$
Ca = __4__ O = __8__ H = __8__

33. $5Fe_3(PO_4)_2$
Fe = __15__ P = __10__ O = __40__

25. $5Mg_3(PO_4)_2$
Mg = __15__ P = __10__ O = __40__

34. $2NH_4NO_3$
N = __4__ H = __8__ O = __6__

26. $12H_2O$
H = __24__ O = __12__

35. $5BaC_4H_4O_6$
Ba = __5__ C = __20__ H = __20__ O = __30__

36. $4Cu(HSO_3)_2$
Cu = __4__ H = __8__ S = __8__ O = __24__

27. $5N_2O_4$
N = __10__ O = __20__

37. $9Au(NO_2)_2$
Au = __9__ N = __18__ O = __36__

28. $3ClF$
Cl = __3__ F = __3__

38. $3K_2ZnO_2$
K = __6__ Zn = __3__ O = __6__

29. $7P_2O_5$
P = __14__ O = __35__

39. $3Sr(MnO_4)_2$
Sr = __3__ Mn = __6__ O = __24__

30. $2KrCl_6$
Kr = __2__ Cl = __12__
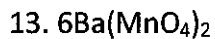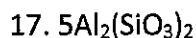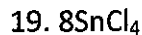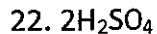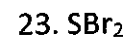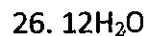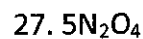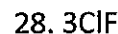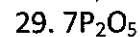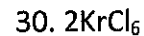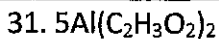
40. $4Al_2(CO_3)_3$
Al = __8__ C = __12__ O = __36__

Balancing Reactions:

Balance the following reactions. Use scratch paper if necessary.

1. $\underline{2}$ Fe + $\underline{3}$ H_2SO_4 $\longrightarrow$ $\underline{}$ $Fe_2(SO_4)_3$ + $\underline{2}$ H_2

2. $\underline{2}$ C_2H_6 + $\underline{3}$ O_2 $\longrightarrow$ $\underline{6}$ H_2O + $\underline{4}$ CO_2

3. $\underline{3}$ KOH + $\underline{}$ H_3PO_4 $\longrightarrow$ $\underline{}$ K_3PO_4 + $\underline{3}$ H_2O

4. $\underline{}$ SnO_2 + $\underline{2}$ H_2 $\longrightarrow$ $\underline{}$ Sn + $\underline{2}$ H_2O

5. $\underline{4}$ NH_3 + $\underline{5}$ O_2 $\longrightarrow$ $\underline{4}$ NO + $\underline{6}$ H_2O

6. $\underline{2}$ KNO_3 + $\underline{}$ H_2CO_3 $\longrightarrow$ $\underline{}$ K_2CO_3 + $\underline{2}$ HNO_3

7. $\underline{}$ B_2Br_6 + $\underline{6}$ HNO_3 $\longrightarrow$ $\underline{2}$ $B(NO_3)_3$ + $\underline{6}$ HBr

8. $\underline{2}$ BF_3 + $\underline{3}$ Li_2SO_3 $\longrightarrow$ $\underline{}$ $B_2(SO_3)_3$ + $\underline{6}$ LiF

9. $\underline{4}$ $(NH_4)_3PO_4$ + $\underline{3}$ $Pb(NO_3)_4$ $\longrightarrow$ $\underline{}$ $Pb_3(PO_4)_4$ + $\underline{12}$ NH_4NO_3

10. $\underline{}$ $SeCl_6$ + $\underline{}$ O_2 $\longrightarrow$ $\underline{}$ SeO_2 + $\underline{3}$ Cl_2

1. ____ CH_4 + _2_ O_2 → ____ CO_2 + _2_ H_2O

2. ____ Na^+ + ____ Cl^- → ____ $NaCl$ ✓

3. _4_ Al + _3_ O_2 → _2_ Al_2O_3

4. ____ N_2^+ + _3_ H_2 → _2_ NH_3

5. _8_ $CO(g)$ + _10_ $H_2(g)$ → ____ $C_8H_{18}(l)$ + _8_ H_2O

6. ____ $FeO_3(s)$ + _3_ $CO(g)$ → ____ $Fe(l)$ + _3_ $CO_2(g)$

7. _2_ H_2SO_4 + ____ $Pb(OH)_4$ → ____ $Pb(SO_4)_2$ + _4_ H_2O

8. _2_ Al + _6_ HCl → _2_ $AlCl_3$ + _3_ H_2

9. ____ $Ca_3(PO_4)_2$ + _2_ H_2SO_4 → _2_ $CaSO_4$ + ____ $Ca(H_2PO_4)_2$

10. ____ H_3PO_4 + _5_ HCl → ____ PCl_5 + _4_ H_2O

Name: _____ Period: _____ Date: _____

Classifying Chemical Reactions

S   D   SR   DR   C

Classify each reaction as synthesis, decomposition, single replacement, double replacement or combustion. The equations are **not** balanced.

1. $PbCl_2 + AgNO_3 \longrightarrow Pb(NO_3)_2 + AgCl$ _DR_

2. $NH_3 + HCl \longrightarrow NH_4Cl$ _S_

3. $AlCl_3 + Na_2SO_4 \longrightarrow Al_2(SO_4)_3 + NaCl$ _DR_

4. $Zn + S \longrightarrow ZnS$ _S_

5. $Al_2(SO_4)_3 + BaCl_2 \longrightarrow BaSO_4 + AlCl_3$ _DR_

6. $Al_2S_3 \longrightarrow Al + S$ _D_

7. $H_2SO_4 + Fe \longrightarrow H_2 + FeSO_4$ _SR_

8. $C_{12}H_{22}O_{11} + O_2 \longrightarrow CO_2 + H_2O$ _C_

9. $Mg(OH)_2 + H_2SO_4 \longrightarrow MgSO_4 + H_2O$ _DR_

10. $NaOH + CuSO_4 \longrightarrow Na_2SO_4 + Cu(OH)_2$ _DR_

11. $C_4H_{12} + O_2 \longrightarrow H_2O + CO_2$ _C_

12. $Fe + O_2 \longrightarrow Fe_2O_3$ _S_

13. $Mg_3(PO_4)_2 + H_2 \longrightarrow Mg + H_3PO_4$ _SR_

14. $NH_4NO_3 \longrightarrow N_2O + H_2O$ _D_
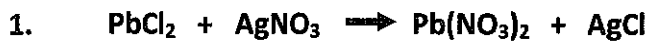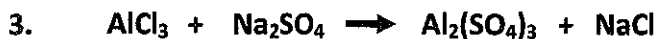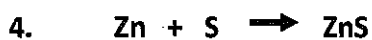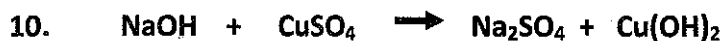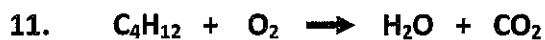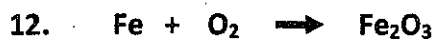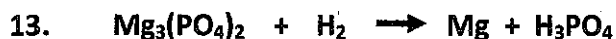
15. $Cl_2 + KBr \longrightarrow KCl + Br_2$ _SR_

Balance the following equations and indicate the type of reaction taking place:
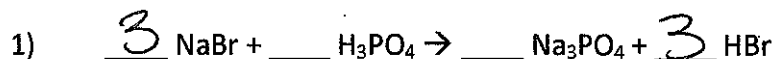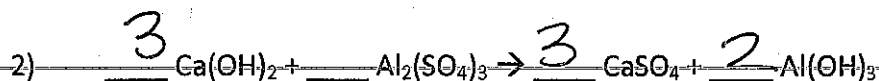
1)   **3** $NaBr +$ ____ $H_3PO_4 \rightarrow$ ____ $Na_3PO_4 +$ **3** HBr

                Type of reaction: _DR_
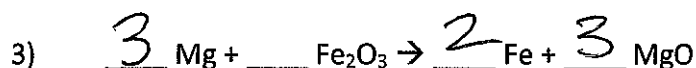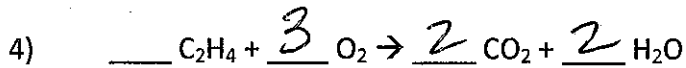
2)   **3** $Ca(OH)_2 +$ ____ $Al_2(SO_4)_3 \rightarrow$ **3** $CaSO_4 +$ **2** $Al(OH)_3$

                Type of reaction: _DR_

3)   **3** $Mg +$ ____ $Fe_2O_3 \rightarrow$ **2** $Fe +$ **3** MgO

                Type of reaction: _SR_

4) ___ C_2H_4 + _3_ O_2 → _2_ CO_2 + _2_ H_2O

Type of reaction: ___ C ___

5) _5_ $PbSO_4$ → _5_ $PbSO_3$ + _4_ O_2

Type of reaction: ___ D ___

6) _2_ NH_3 + _3_ I_2 → ___ N_2I_6 + _3_ H_2

Type of reaction: ___ SR ___

7) ___ H_2O + ___ SO_3 → ___ H_2SO_4 ✓

Type of reaction: ___ S ___

8) ___ H_2SO_4 + _2_ NH_4OH → _2_ H_2O + ___ $(NH_4)_2SO_4$
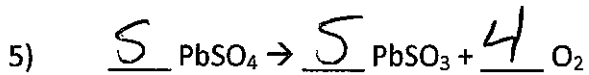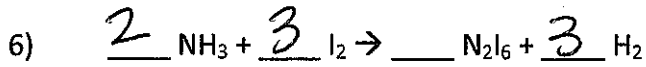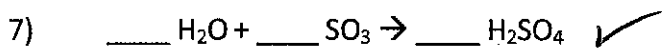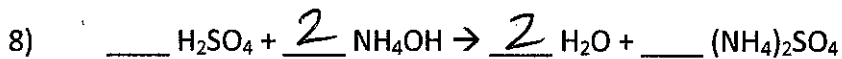
Type of reaction: ___ DR ___

Physical and Chemical Changes
Label each process as a physical (P) or chemical (C) change:

a. perfume evaporating on your skin   P

b. butter melting   P

c. wood rotting   C

d. charcoal heating a grill   P

e. autumn leaves changing color   C

f. a hot glass cracking when placed in cold water   P

g. melting copper metal   P

h. burning sugar   C

i. mixing sugar in water   P

j. digesting food   C

Name: _____ Period: _____ Date: _____

Law of Conservation of Mass

1. A sealed glass tube contains 2.25 g of copper and 3.32 g of sulfur. The mass of the tube and its contents is 18.48 g. Upon heating, a reaction forms copper(II) sulfide (CuS). All of the copper reacts, but only 1.14 g of sulfur reacts.

A. What is the mass of sulfur that does not react?

2.18 g

B. What is the mass of the copper(II) sulfide that is formed in the reaction?

4.47 g

C. What is the mass of the tube and its contents after the reaction is complete?

18.48 g

2. When heated, calcium hydroxide and ammonium chloride react to produce ammonia gas, water vapor, and solid calcium chloride. Suppose 5.00 g of calcium hydroxide and 10.00 g of ammonium chloride are mixed in a test tube and heated until no more ammonia is given off. The remaining material in the test tub has a mass of 10.27 g. What total mass of ammonia and water vapor was produced in the reaction?

4.73 g

3. When a solution of barium nitrate and a solution of copper(II) sulfate are mixed, a chemical reaction produces solid barium sulfate, which sinks to the bottom, and a solution of copper(II) nitrate. Suppose some barium nitrate is dissolved in 120.00 g of water and 8.15 g of copper(II) sulfate is dissolved in 75.00 g of water. The solutions are poured together, and a white solid forms. After the solid is filtered off, it is found to have a mass of 10.76 g. The mass of the solution that passed through the filter is 204.44 g. What mass of barium nitrate was used in the reaction?

12.05 g

4. A reaction between sodium hydroxide and hydrogen chloride gas produces sodium chloride and water. A reaction of 22.85 g of sodium hydroxide with 20.82 g of hydrogen chloride gives off 10.29 g of water. What mass of sodium chloride is formed in the reaction?

23.38 g