Name: _____

UNIT 6 - CHEMICAL REACTIONS

Date	Agenda	Homework
Wed 1/18	Balancing and identifying reaction types	Read p 203-210 Worksheet #1
Thurs 1/19	Go over homework Balancing equations with words	Read p 212-221 Worksheet #2 Study for quiz
Fri 1/20 **(1/2 Day)**	Go over homework Quiz - balancing equations Worksheet #3 predicting products for a reaction	Read p 222-224 Worksheet #4 Study for quiz
Mon 1/23	Quiz-balancing with names Lab - Reaction Types	
Tues 1/24	Finish lab - reaction types	p 224 problems #22 and 23 Study for quiz
Wed 1/25	Go over lab Quiz - reaction types and balancing equations	
Thurs 1/26	Go over Quiz Introduce solubility rules	Read p 225-228 Problem #28 p 228
Fri 1/27	Discuss precipitate reactions	Problem #29-31 p 228
Mon 1/30	Lab - Predicting Precipitates	Problems #39, 43, 48, 50 p 232
Tues 1/31	Finish working on lab Review Worksheet #5	Write net ionic equations due tomorrow
Wed 2/1	Review for test – questions on review?	Study for test
Thurs 2/2	Test-Chemical Reactions	

Worksheet #1

Classification and Balancing of Chemical Reactions

Balance the following equations.

1. $2\,H_2 + 1\,O_2 \rightarrow 2\,H_2O$ synthesis

2. $2\,H_2O \rightarrow 2\,H_2 + 1\,O_2$ decomposition

3. $1\,Zn + 1\,H_2SO_4 \rightarrow 1\,ZnSO_4 + 1\,H_2$ single displacement

4. $2\,CO + 1\,O_2 \rightarrow 2\,CO_2$ synthesis

5. $2\,HgO \rightarrow 2\,Hg + 1\,O_2$ decomposition

6. $2\,KBr + 1\,Cl_2 \rightarrow 2\,KCl + 1\,Br_2$ single displacement

7. $1\,CaO + 1\,H_2O \rightarrow 1\,Ca(OH)_2$ synthesis

8. $1\,Ag(NO_3) + 1\,NaCl \rightarrow 1\,AgCl + 1\,Na(NO_3)$ double displacement

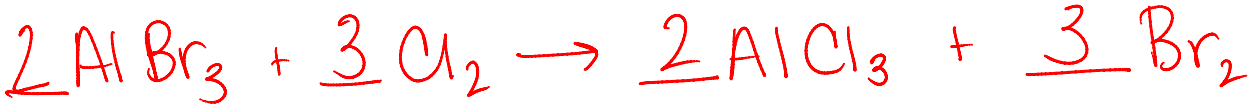
Worksheet #2

Chemical Reactions with Balancing

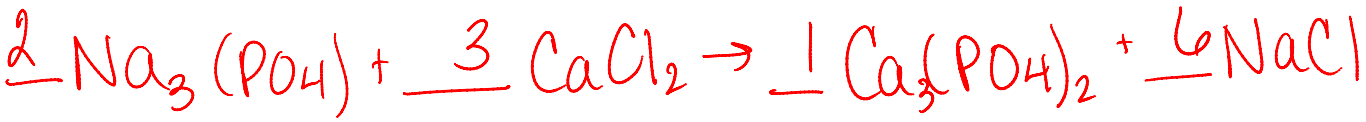
Write the word equations below as chemical equations and balance. Identify the reaction type.

1. zinc and lead II nitrate yields zinc nitrate and lead

2. aluminum bromide and chlorine yields aluminum chloride and bromine

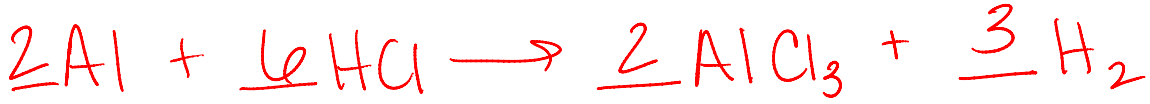


3. sodium phosphate and calcium chloride yields calcium phosphate and sodium chloride



4. potassium chlorate when heated yields potassium chloride and oxygen

5. aluminum and hydrochloric acid yields aluminum chloride and hydrogen



6. calcium hydroxide and phosphoric acid yields calcium phosphate and water

$3\,Ca(OH) + 1\,H_3(PO_4) \rightarrow 1\,Ca_3(PO_4) + 3\,H_2O$

7. calcium and oxygen yields calcium oxide

$2\,Ca + 1\,O_2 \rightarrow 2\,CaO$

8. hydrogen and nitrogen monoxide yields water and nitrogen

$2\,H_2 + 2\,NO \rightarrow 2\,H_2O + 1\,N_2$

9. sulfur and oxygen yields sulfur trioxide

$1\,S_2 + 3\,O_2 \rightarrow 2\,SO_3$

10. calcium carbonate yields calcium oxide and carbon dioxide

$1\,Ca(CO_3) \rightarrow 1\,CaO + 1\,CO_2$

Worksheet #3

More Balancing

Write and balance the following equations. Identify the reaction type.

1. magnesium and hydrogen chloride produce hydrogen and magnesium chloride

$1\,Mg + 2\,HCl \rightarrow 1\,H_2 + 1\,MgCl_2$

single displacement

2. calcium hydroxide and lithium chloride produce lithium hydroxide and calcium chloride

$1\,Ca(OH)_2 + 2\,LiCl \rightarrow 2\,Li(OH) + 1\,CaCl_2$

double displacement

3. decompose copper (II) oxide into copper and oxygen

$2\,CuO \rightarrow 2\,Cu + 1\,O_2$

decomposition

4. aluminum and iron (III) oxide produce iron and aluminum oxide

$2\,Al + 1\,Fe_2O_3 \rightarrow 2\,Fe + 1\,Al_2O_3$

single displacement

5. combustion of butane (C_4H_{10}) in air to produce carbon dioxide and water

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

combustion

Worksheet #4
Types of Reactions, Balancing and Predicting Products

Balance the following equations and also tell what type they are: single displacement, double displacement, synthesis, decomposition or combustion.

1. 1 CaO + 1 H_2O → 1 $Ca(OH)_2$

   Reaction type: synthesis

2. 1 $AgNO_3$ + 1 NaCl → 1 AgCl + 1 $NaNO_3$

   Reaction type: double displacement

3. 2 H_2 + 1 O_2 → 2 H_2O

   Reaction type: Synthesis

4. 2 HgO → 2 Hg + 1 O_2

   Reaction type: decomposition

5. 2 H_2O_2 → 2 H_2O + 1 O_2

   Reaction type: decomposition

6. 1 $AgNO_3$ + 1 NaCl → 1 AgCl + 1 $NaNO_3$ (repeat)

Reaction type: double displacement

7. 2 KBr + 1 Cl_2 → 2 KCl + 1 Br_2

Reaction type: single displacement

8. 1 Zn + 1 H_2SO_4 → 1 $ZnSO_4$ + 1 H_2

Reaction type: single displacement

9. 1 $C_6H_{12}O_6$ + 6 O_2 → 6 H_2O + 6 CO_2

Reaction type: combustion

10. 1 CH_4 + 2 O_2 → 2 H_2O + 1 CO_2

Reaction type: combustion

(Continued on the next page...)

Identify the type of reaction, predict the products, write and balance the chemical reaction

11. magnesium and hydrogen chloride

$1\,Mg + 2\,HCl \rightarrow 1\,MgCl_2 + 1\,H_2$

single displacement

12. copper and silver nitrate

$1\,Cu + 2\,Ag(NO_3) \rightarrow 1\,Cu(NO_3)_2 + 2\,Ag$

single displacement

13. sodium chloride and silver nitrate

$1\,NaCl + 1\,Ag(NO_3) \rightarrow 1\,AgCl + 1\,Na(NO_3)$

double displacement

14. decomposition of water

$2\,H_2O \rightarrow 2\,H_2 + 1\,O_2$

decomposition

15. magnesium and oxygen

$2\,Mg + 1\,O_2 \rightarrow 2\,MgO$

synthesis

16. Calcium hydroxide and hydrogen sulfate

$1\ Ca(OH)_2 + 1\ H_2(SO_4) \rightarrow 1\ Ca(SO_4) + 2\ H_2O$

double displacement

17. Iron (III) chloride + sodium hydroxide

$1\ FeCl_3 + 3\ NaOH \rightarrow 1\ Fe(OH)_3 + 3\ NaCl$

double displacement

18. Chlorine + potassium bromide

$1\ Cl_2 + 2\ KBr \rightarrow 2\ KCl + 1\ Br_2$

single displacement

19. Lead (II) chloride and lithium sulfate

$1\ PbCl_2 + 1\ Li_2(SO_4) \rightarrow 1\ Pb(SO_4) + 2\ LiCl$

double displacement

20. Magnesium and nitrogen

$3\ Mg + 1\ N_2 \rightarrow 1\ Mg_3N_2$

synthesis

LAB: REACTION TYPES

This activity will allow you to experiment with each of the five types of chemical reactions. You will follow the procedures given below and then write a balanced chemical equation for each reaction. No formal lab report will be due for this lab. Make sure to include detailed observations and a balanced chemical equation for each experiment.

Section 1: Synthesis Reaction

1. Obtain a small piece of magnesium ribbon from your teacher.
2. Light a Bunsen Burner, making sure to adjust the flame so a bright blue cone is visible
3. Using crucible tongs, hold the magnesium ribbon directly over the blue cone of the flame.
4. Make observations and a balanced equation.
5. Clean up your area.

Observations:

1.
2.
3.

Balanced Equation:

Section 2: Decomposition Reaction

1. Place 10 ml of peroxide in a test tube
2. Add a small piece of potato to the peroxide. There is a chemical in the potato that will increase the rate of decomposition of peroxide.
3. Make observations and a balanced equation.
4. Clean up your area.

Observations:

1.
2.
3.

Balanced Equation:

Section 3: Single Displacement Reaction

1. Place 10 ml of sulfuric acid (hydrogen sulfate) in a flask.
2. Add a small amount of zinc metal into the sulfuric acid.
3. Make observations and a balanced equation.
4. Clean up your area.

Observations:

1.
2.
3.

Balanced Equation:

Section 4: Double Displacement Reaction

1. On a watch glass, place 5 drops of potassium iodide solution.
2. ***Do Not Mix The Droppers up!!!
3. To the potassium iodide, add 5 drops of lead II nitrate.
4. Make observations and a balanced equation.
5. Clean up your area.

Observations:

1.
2.
3.

Balanced Equation:

Section 5: Combustion Reaction

1. Add 5 drops of isopropanol (C_3H_7OH) to a watch glass.
2. Carefully light the isopropanol with a match, using tongs to keep your hands away from the flame.
3. Make observations and a balanced equation.
4. Clean up your area.

Observations:

1.
2.
3.

Balanced Equation:

Precipitate Lab

	Silver Nitrate	Lead II Nitrate	Copper II Sulfate	Magnesium Sulfate	Iron III Chloride
Sodium Chloride	1	2	X	X	X
Potassium Iodide	3	4	X	X	X
Sodium Hydroxide	5	6	7	8	9
Sodium Carbonate	10	11	12	13	14
Sodium Phosphate	15	16	17	18	19

Worksheet #5
Review

Balance the following equations. If it is already balanced, write AB.

1. 1 H_2 + 1 Br_2 → 2 HBr

2. 1 P_4 + 5 O_2 → 2 P_2O_5

3. 1 $Ni(ClO_3)_2$ → 1 $NiCl_2$ + 3 O_2

4. 1 H_2SO_4 → 1 H_2O + 1 SO_3 AB

5. 1 C_7H_{16} + 11 O_2 → 7 CO_2 + 8 H_2O

Identify each of the following reactions as synthesis, decomposition, single replacement, double replacement, or combustion.

6. Synthesis $2Ag + S \rightarrow Ag_2S$
7. single disp. $2LiI + Cl_2 \rightarrow 2LiCl + I_2$
8. combustion $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$
9. decomposition $2H_2O \rightarrow 2H_2 + O_2$
10. double disp. $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$

Write the chemical formulas for the following compounds.

11. sodium chloride NaCl
12. lead II nitrate $Pb(NO_3)_2$
13. zinc hydroxide $Zn(OH)_2$
14. silver nitrate $Ag(NO_3)$
15. zinc chloride $ZnCl_2$

These will help you on the next section.

For each of the following:

- **Write and balance the chemical equations.**
- **Classify the reaction type.**

16. sodium chloride and lead II nitrate yield lead II chloride and sodium nitrate

Equation: $2NaCl + 1Pb(NO_3)_2 \rightarrow 1PbCl_2 + 2NaNO_3$

Reaction Type = double displacement

17. zinc hydroxide yields zinc oxide and water

Equation: $1Zn(OH)_2 \rightarrow 1ZnO + 1H_2O$

Reaction Type = decomposition

For each of the following:

- **Predict the products.**
- **Balance the chemical equations.**
- **Classify the reaction types.**

18. $2Mg + 1O_2 \rightarrow 2MgO$

Reaction Type = synthesis

19. $1Ba_3(PO_4)_2 + 6NaClO_4 \rightarrow 3Ba(ClO_4)_2 + 2Na_3(PO_4)$

Reaction Type = double displacement

20. $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$

Reaction Type = combustion

For each of the following:

- **Predict the products.**
- **Write and balance the chemical reactions.**
- **Classify the reaction type.**

21. potassium + bromine → potassium bromide

Equation: $2K + 1Br_2 \rightarrow 2KBr$

Reaction Type: synthesis

22. silver nitrate + zinc chloride → silver chloride + zinc nitrate

Equation: $2AgNO_3 + 1ZnCl_2 \rightarrow 2AgCl + 1Zn(NO_3)_2$

Reaction Type: double displacement

Part 5: Predict the products for the following reactions and balance the equation

23. Calcium hydroxide and hydrogen sulfate

$1\ Ca(OH)_2 + 1\ H_2(SO_4) \rightarrow 1\ Ca(SO_4) + 2\ H_2O$

double displacement

24. Iron (III) chloride + sodium hydroxide

$1\ FeCl_3 + 3\ Na(OH) \longrightarrow 1\ Fe(OH)_3 + 3\ NaCl$

double displacement

25. Chlorine + potassium bromide

$1\ Cl_2 + 2\ KBr \longrightarrow 2\ KCl + 1\ Br_2$

single displacement

26. Lead (II) chloride and lithium sulfate

$1\ PbCl_2 + 1\ Li_2(SO_4) \rightarrow 1\ Pb(SO_4) + 2\ LiCl$

double displacement

27. Magnesium and nitrogen

$3\ Mg + 1\ N_2 \longrightarrow 1\ Mg_3N_2$

synthesis

Write the balanced, molecular equation for the reaction. A precipitate may not form in all cases. If a precipitate, does form, please write the complete ionic and net ionic equation.

28. $NaI_{(aq)} + AgNO_{3(aq)} \rightarrow$ $NaNO_{3(aq)} + AgI_{(s)}$

$Na^+_{(aq)} + I^-_{(aq)} + Ag^+_{(aq)} + NO_3^-{}_{(aq)} \rightarrow Na^+_{(aq)} + NO_3^-{}_{(aq)} + AgI_{(s)}$

$I^-_{(aq)} + Ag^+_{(aq)} \rightarrow AgI_{(s)}$

29. $BaCl_{2(aq)} + Na_2SO_{4(aq)} \rightarrow$ $BaSO_{4(s)} + 2NaCl_{(aq)}$

$Ba^{+2}_{(aq)} + 2Cl^-_{(aq)} + 2Na^+_{(aq)} + SO_4^{-2}{}_{(aq)} \rightarrow BaSO_{4(s)} + 2Na^+_{(aq)} + 2Cl^-_{(aq)}$

$Ba^{+2}_{(aq)} + SO_4^{-2}{}_{(aq)} \rightarrow BaSO_{4(s)}$

30. $Pb(NO_3)_{2(aq)} + 2KCl_{(aq)} \rightarrow$ $PbCl_{2(s)} + 2KNO_{3(aq)}$

$Pb^{+2}_{(aq)} + 2NO_3^-{}_{(aq)} + 2K^+_{(aq)} + 2Cl^-_{(aq)} \rightarrow PbCl_{2(s)} + 2K^+_{(aq)} + 2NO_3^-{}_{(aq)}$

$Pb^{+2}_{(aq)} + 2Cl^-_{(aq)} \rightarrow PbCl_{2(s)}$

31. $3NaOH_{(aq)} + Fe(NO_3)_{3(aq)} \rightarrow$ $3NaNO_{3(aq)} + Fe(OH)_{3(s)}$

$3Na^+_{(aq)} + 3OH^-_{(aq)} + Fe^{+3}_{(aq)} + 3NO_3^-{}_{(aq)} \rightarrow 3Na^+_{(aq)} + 3NO_3^-{}_{(aq)} + Fe(OH)_{3(s)}$

$3OH^-_{(aq)} + Fe^{+3}_{(aq)} \rightarrow Fe(OH)_{3(s)}$

32. $2NaOH_{(aq)} + K_2SO_{4(aq)} \rightarrow$ $Na_2SO_{4(aq)} + 2KOH_{(aq)}$

NO reaction

all ions are spectators