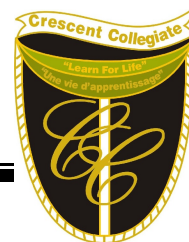


Science 1206
Unit 2: Chemical Reactions
Worksheet 12: Balancing Chemical Reactions



The most important point to remember when dealing with chemical equations is that the amount of an element on one side of the equation must equal the amount of that element on the other side of the equation. This is true for each element involved in the reaction. This rule is referred to as the law of conservation of mass.

When balancing chemical reactions you may add coefficients in front of the compounds to balance the reaction, but you can not change the subscripts. Changing the subscripts changes the compounds.



Steps for Balancing Equations:

There are four basic steps to balance a chemical equation:

- 1) Write the correct formula for the reactants and the products. **DO NOT TRY TO BALANCE IT YET!** You write the correct formulas first! Once you write them correctly, **DO NOT CHANGE THE FORMULAS!**
- 2) Find the number of atoms for each element on the left side . Compare against the number of the atoms of the same element on the right side.
- 3) Determine where to place coefficients in front of the formulas so that the left side has the same number of atoms as the right side for each element in order to balance the equation.
- 4) **CHECK YOUR ANSWER TO SEE IF:**
 - The number of atoms on both sides of the equation are now balanced
 - The coefficients are in the lowest possible whole ratios. (Reduce)

Here are some helpful hints for balancing:

- Take one element at a time, working from left to right except for Hydrogen (H) and Oxygen(O). Save H for next to last, and O until last.
- If everything balances except for O, and there is no way to balance O with a whole number, double all coefficients and try again. (Remember, O is diatomic as an element.
- Polyatomic ions that appear on both sides of the equation should be balanced as independent units.

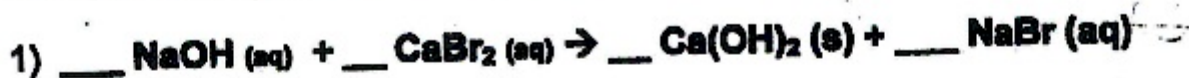
IDENTIFYING/BALANCING CHEMICAL REACTIONS

KEY

For each of the following:

- (a) Choose the correct responses for the balancing of each reaction.
(b) Identify the reaction type.

Write your answers on the summary sheet.



- A. 1,1,1,1
B. 2,1,1,2
C. 2,2,1,2

Type of reaction: _____

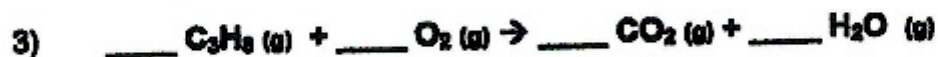
- A. synthesis
B. decomposition
C. single replacement
D. double replacement
E. combustion
-



- A. 1,3,2
B. 1,3,1
C. 1,2,1

Type of reaction: _____

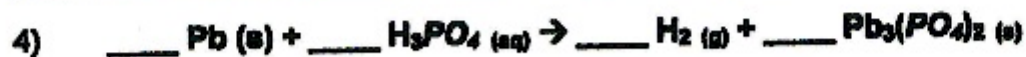
- A. synthesis
B. decomposition
C. single replacement
D. double replacement
E. combustion
-



- A. 1,3,3,4
B. 1,4,3,4
C. 1,5,3,4

Type of reaction: _____

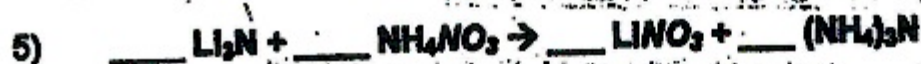
- A. synthesis
B. decomposition
C. single replacement
D. double replacement
E. combustion
-



- A. 3,2,3,1
B. 3,3,3,1
C. 3,4,3,1

Type of reaction: _____

- A. synthesis
B. decomposition
C. single replacement
D. double replacement
E. combustion
-



- A. 1,2,2,1
- B. 1,3,2,1
- C. 1,3,3,1

Type of reaction: _____

- A. synthesis
 - B. decomposition
 - C. single replacement
 - D. double replacement
 - E. combustion
-



- A. 3,1,1,1
- B. 3,1,3,1
- C. 3,1,2,1

Type of reaction: _____

- A. synthesis
 - B. decomposition
 - C. single replacement
 - D. double replacement
 - E. combustion
-



- A. 1,2,1
- B. 1,2,2
- C. 2,2,3

Type of reaction: _____

- A. synthesis
 - B. decomposition
 - C. single replacement
 - D. double replacement
 - E. combustion
-



- A. 1,2,1
- B. 2,1,2
- C. 2,2,1

Type of reaction: _____

- A. synthesis
 - B. decomposition
 - C. single replacement
 - D. double replacement
 - E. combustion
-



A. 2,1,2

B. 2,1,3

C. 2,2,1

Type of reaction: _____

A. synthesis

B. decomposition

C. single replacement

D. double replacement

E. combustion



A. 3,2,1,1

B. 2,1,1,1

C. 1,1,1,1

Type of reaction: _____

A. synthesis

B. decomposition

C. single replacement

D. double replacement

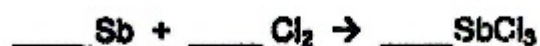
E. combustion

Chemistry: Balancing Chemical Equations

Directions: First, balance each of the chemical equations below. Then, classify each reaction as synthesis, decomposition, single-replacement, or double-replacement. To earn full credit, write the words of the classification when classifying.

Balance the equation...

...and classify it.



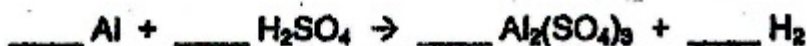




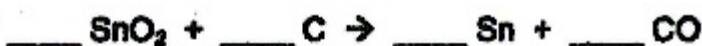


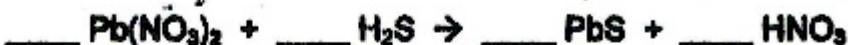


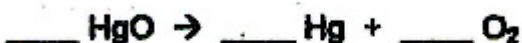




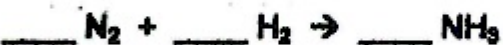




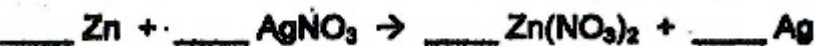


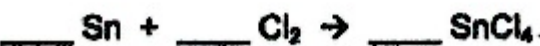














*****SCIENCE 1206 Section 2:**

For each of the following skeleton chemical equations:

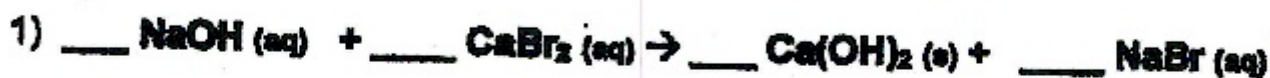
- a) **Identify the type of reaction.** Remember that the five identifiable types of reactions are synthesis (composition), decomposition, single displacement (replacement), double displacement (replacement), and hydrocarbon combustion.
- b) **Balance the equation.**
- 1) $\underline{\hspace{1cm}} \text{Na}_3\text{PO}_4 (\text{aq}) + \underline{\hspace{1cm}} \text{KOH} (\text{aq}) \rightarrow \underline{\hspace{1cm}} \text{NaOH} (\text{aq}) + \underline{\hspace{1cm}} \text{K}_3\text{PO}_4 (\text{aq})$
 - 2) $\underline{\hspace{1cm}} \text{MgCl}_2 (\text{aq}) + \underline{\hspace{1cm}} \text{Li}_2\text{CO}_3 (\text{aq}) \rightarrow \underline{\hspace{1cm}} \text{MgCO}_3 (\text{s}) + \underline{\hspace{1cm}} \text{LiCl} (\text{aq})$
 - 3) $\underline{\hspace{1cm}} \text{C}_8\text{H}_{12} (\text{l}) + \underline{\hspace{1cm}} \text{O}_2 (\text{g}) \rightarrow \underline{\hspace{1cm}} \text{CO}_2 (\text{g}) + \underline{\hspace{1cm}} \text{H}_2\text{O} (\text{g})$
 - 4) $\underline{\hspace{1cm}} \text{Pb} (\text{s}) + \underline{\hspace{1cm}} \text{FeSO}_4 (\text{aq}) \rightarrow \underline{\hspace{1cm}} \text{PbSO}_4 (\text{aq}) + \underline{\hspace{1cm}} \text{Fe} (\text{s})$
 - 5) $\underline{\hspace{1cm}} \text{CaCO}_3 (\text{s}) \rightarrow \underline{\hspace{1cm}} \text{CaO} (\text{s}) + \underline{\hspace{1cm}} \text{CO}_2 (\text{g})$
 - 6) $\underline{\hspace{1cm}} \text{P}_4 (\text{s}) + \underline{\hspace{1cm}} \text{O}_2 (\text{g}) \rightarrow \underline{\hspace{1cm}} \text{P}_2\text{O}_3 (\text{s})$
 - 7) $\underline{\hspace{1cm}} \text{RbNO}_3 (\text{aq}) + \underline{\hspace{1cm}} \text{BeF}_2 (\text{aq}) \rightarrow \underline{\hspace{1cm}} \text{Be}(\text{NO}_3)_2 (\text{aq}) + \underline{\hspace{1cm}} \text{RbF} (\text{aq})$
 - 8) $\underline{\hspace{1cm}} \text{AgNO}_3 (\text{aq}) + \underline{\hspace{1cm}} \text{Cu} (\text{s}) \rightarrow \underline{\hspace{1cm}} \text{Cu}(\text{NO}_3)_2 (\text{aq}) + \underline{\hspace{1cm}} \text{Ag} (\text{s})$
 - 9) $\underline{\hspace{1cm}} \text{C}_3\text{H}_8\text{O} (\text{l}) + \underline{\hspace{1cm}} \text{O}_2 (\text{g}) \rightarrow \underline{\hspace{1cm}} \text{CO}_2 (\text{g}) + \underline{\hspace{1cm}} \text{H}_2\text{O} (\text{g})$
 - 10) $\underline{\hspace{1cm}} \text{C}_6\text{H}_6 (\text{g}) + \underline{\hspace{1cm}} \text{Fe} (\text{s}) \rightarrow \underline{\hspace{1cm}} \text{Fe}(\text{C}_6\text{H}_5)_2 (\text{s})$
 - 11) $\underline{\hspace{1cm}} \text{SeCl}_6 (\text{s}) + \underline{\hspace{1cm}} \text{O}_2 (\text{g}) \rightarrow \underline{\hspace{1cm}} \text{SeO}_2 (\text{s}) + 3\text{Cl}_2 (\text{g})$
 - 12) $\underline{\hspace{1cm}} \text{MgI}_2 (\text{aq}) + \underline{\hspace{1cm}} \text{Mn}(\text{SO}_3)_2 (\text{aq}) \rightarrow \underline{\hspace{1cm}} \text{MgSO}_3 (\text{l}) + \underline{\hspace{1cm}} \text{MnI}_4 (\text{l})$
 - 13) $\underline{\hspace{1cm}} \text{O}_3 (\text{g}) \rightarrow \underline{\hspace{1cm}} \text{O} (\text{g}) + \underline{\hspace{1cm}} \text{O}_2 (\text{g})$
 - 14) $\underline{\hspace{1cm}} \text{NO}_2 (\text{g}) \rightarrow \underline{\hspace{1cm}} \text{O}_2 (\text{g}) + \underline{\hspace{1cm}} \text{N}_2 (\text{g})$

SCIENCE 1206 SUMMARY SHEET NAME: _____
IDENTIFYING CHEMICAL REACTION TYPE and
BALANCING CHEMICAL REACTIONS

For each of the following;

(a) Balance the skeleton equations and

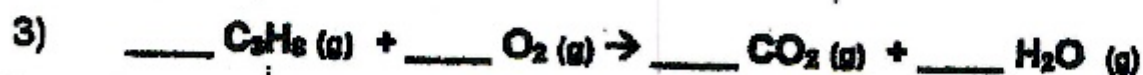
(b) Indicate which of the 5 types of chemical reaction is represented.



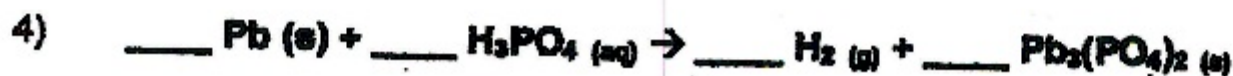
Type of reaction: _____



Type of reaction: _____



Type of reaction: _____



Type of reaction: _____



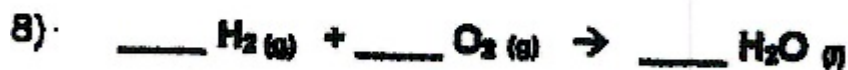
Type of reaction: _____



Type of reaction: _____



Type of reaction: _____



Type of reaction: _____



Type of reaction: _____