

# Types of Reactions

Reactants  $\longrightarrow$  Products

TYPE 1

**SYNTHESIS**  
2  $\longrightarrow$  1

Element + Element  $\longrightarrow$  Compound



NOTES

Honors Chemistry  
Chapters 6 & 7

TYPE 2

**DECOMPOSITION**  
1  $\longrightarrow$  2

- |                    |                   |                |   |         |
|--------------------|-------------------|----------------|---|---------|
| a) binary compound | $\longrightarrow$ | element        | + | element |
| b) metal hydroxide | $\longrightarrow$ | metal oxide    | + | $H_2O$  |
| c) metal chlorate  | $\longrightarrow$ | metal chloride | + | $O_2$   |
| d) metal carbonate | $\longrightarrow$ | metal oxide    | + | $CO_2$  |



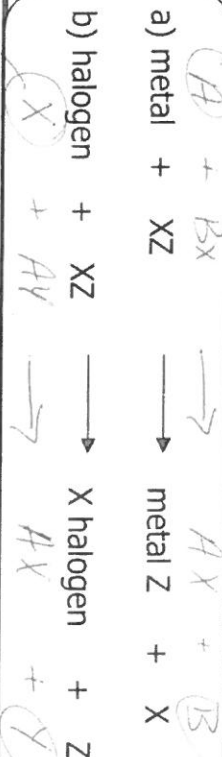
TYPE 3

**COMBUSTION**  
Hydrocarbon +  $O_2$

- hydrocarbon +  $O_2$*
- a) complete combustion  $\longrightarrow CO_2 + H_2O$
- b) incomplete combustion  $\longrightarrow CO + H_2O$   
*(use in college)*

TYPE 4

**SINGLE REPLACEMENT**  
Element + Compound



*metal*

*nonmetal*

- Necessary*
- s = solid
  - l = liquid
  - g = gas
  - aq = aqueous (water solution)

TYPE 5

**DOUBLE REPLACEMENT**  
Compound + Compound



*Snortak*

*Pachaus*

**Diatomic Molecules**

- $H_2$
- $O_2$
- $N_2$
- $F_2$
- $Cl_2$
- $Br_2$
- $I_2$

Type of Reaction	Reactant Characteristic(s)	Product Characteristic(s)	Other Possible Types
Synthesis/Composition	2 or more	only 1	redox, combustion
Decomposition	only 1	2 or more	redox
Single Replacement/Displacement	1 element + 1 compound	new element + new compound	redox
Double Replacement/Displacement	2 compounds	switch, 2 new compounds	precipitation, acid-base
Combustion	fuel + O <sub>2</sub>	CO <sub>2</sub> + H <sub>2</sub> O	redox, synthesis
Redox/Oxidation-Reduction	O <sub>2</sub> possible, metal loses electrons, nonmetal gains electrons	O <sub>2</sub> possible, metal loses electrons, nonmetal gains electrons	synthesis, combustion, single replacement
Precipitation	2 aqueous compounds	1 solid and 1 aqueous compound	acid-base, double replacement
Acid-Base	H = acid, OH = base	salt + water	double replacement, precipitation

Type of Reaction	General Equation	Helpful Hints
Synthesis/Composition	$A + X \rightarrow AX$	check charges of ions
Decomposition	$AX \rightarrow A + X$	gas usually produced
Single Replacement/Displacement	$A + BX \rightarrow AX + B$	use the activity series
Double Replacement/Displacement	$AX + BY \rightarrow BX + AY$	positives bond with negatives
Combustion	Hydrocarbon + O <sub>2</sub> → CO <sub>2</sub> + H <sub>2</sub> O	no CO <sub>2</sub> for flammable gases or metals
Redox/Oxidation-Reduction	<p>metal - e<sup>-</sup> → metal<sup>+ charge</sup></p> <p>metal<sup>+ charge</sup> - e<sup>-</sup> → metal<sup>more + charge</sup></p> <p>nonmetal + e<sup>-</sup> → nonmetal<sup>- charge</sup></p> <p>nonmetal<sup>- charge</sup> + e<sup>-</sup> → nonmetal<sup>more - charge</sup></p>	OIL RIG: oxidation is the loss of electrons, reduction is the gain of electrons
Precipitation	2 aqueous compounds → solid compound + aqueous compound	use the solubility chart
Acid-Base	$HX + AOH \rightarrow AX + H_2O$	look for H and OH as reactants

## Types of Reactions Worksheet

Balance the following equations and indicate the type of reaction taking place:



Type of reaction: \_\_\_\_\_



Type of reaction: \_\_\_\_\_



Type of reaction: \_\_\_\_\_



Type of reaction: \_\_\_\_\_



Type of reaction: \_\_\_\_\_



Type of reaction: \_\_\_\_\_



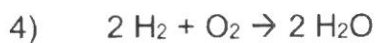
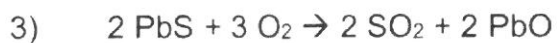
Type of reaction: \_\_\_\_\_



Type of reaction: \_\_\_\_\_

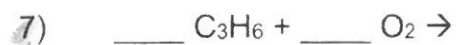
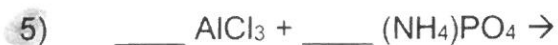
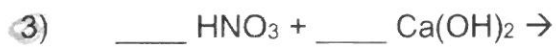
## Oxidation and Reduction Practice

In each of the following equations, indicate the element that has been oxidized and the one that has been reduced. You should also label the oxidation state of each before and after the process:



## Fun With Predicting Reaction Products

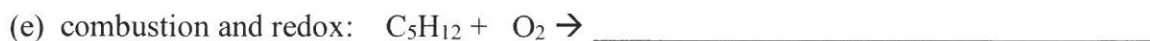
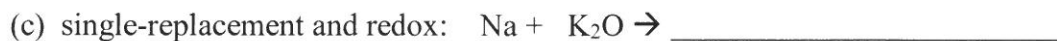
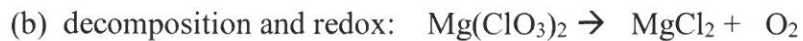
Predict the products of each of the following chemical reactions. If a reaction will not occur, explain why not:



Name \_\_\_\_\_  
 Teacher \_\_\_\_\_  
 Class \_\_\_\_\_ Block \_\_\_\_\_  
 Date \_\_\_\_\_

### Types of Reactions WS

1. Complete and balance each of the following reactions identified by the type:



2. Classify each of the following reactions as synthesis (S), decomposition (D), single-replacement (SR), double-replacement (DR), combustion (C), redox (R), precipitation (P), or acid/base (A/B) by circling the correct answer:



3. Complete and **balance** each of the following equations and identify each type of reaction.



(Hint: See number 1b above)

