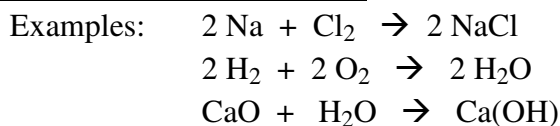


## TYPES OF REACTIONS:

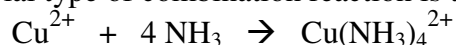
Almost all reactions can be described as one of four basic types, or combinations of these types:

### 1. COMBINATION REACTION (SYNTHESIS): $A + B \rightarrow AB$

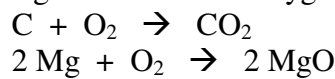


Whenever elements combine to make compounds, one element is oxidized (it loses electrons) and the other is reduced (it gains electrons). However, this is not always true when small compounds combine to make larger compounds (see the last example).

A special type of combination reaction is the formation of a complex ion:

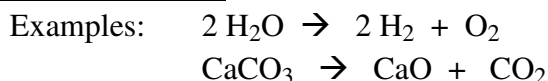


Another special type of combination reaction is a combustion, meaning a reaction in which something combines with oxygen and gives off heat and light:



Combustion of a compound includes break-up (decomposition) of the compound first.

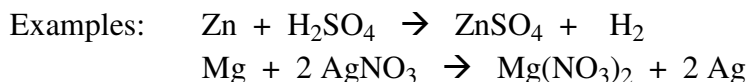
### 2. DECOMPOSITION: $AB \rightarrow A + B$



Decompositions are generally the opposite (reverse) of combination reactions, and they usually involve oxidation and reduction (but not in the last example).

### 3. SINGLE REPLACEMENT (also called DISPLACEMENT):

General form:  $A + BC \rightarrow AC + B$  ("A displaces B")



In these, a "more reactive" element displaces a "less reactive" one from a compound.

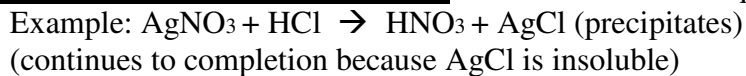
These reactions always involve oxidation and reduction.

### 4. DOUBLE REPLACEMENT REACTIONS: $AB + CD \rightarrow AD + CB$

"Changing partners"; "You balance 3 things, the 4<sup>th</sup> balances automatically"

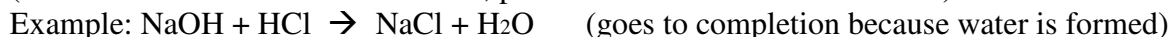
In theory, these reactions are reversible, EXCEPT FOR:

#### A. PRECIPITATION REACTIONS in which an insoluble precipitate forms

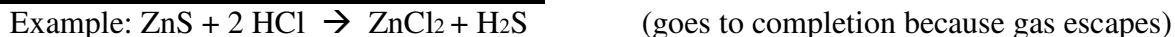


#### B. ACID-BASE REACTIONS and other reactions in which water is formed

(Reactants are an ACID and a BASE; products are a SALT and WATER)



#### C. Reactions in which A GAS IS FORMED



#### D. Reactions in which A PRODUCT REACTS FURTHER or BREAKS DOWN

Example:  $\text{CaCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + \text{H}_2\text{CO}_3$  followed by

