

Lesson 14: Neutralization and Double replacement reactions

1. Neutralization

- Reaction in which an acid and a base react to form a salt and water. This type of chemical reaction is called a neutralization because the pH of the products is always much closer to neutral (pH 7) than either of the reactants.

- Generic Equation $\text{H-B} + \text{A-OH} \rightarrow \text{AB} + \text{H}_2\text{O}$
 - Acid + Base $\rightarrow$ Salt + Water
- Example: $\text{HCl} + \text{NaOH} \rightarrow \text{H}_2\text{O} + \text{NaCl}$

Rules:

1. Water will be one product.
2. The salt is determined by using the crossing over method. (remember to write the metal first).
3. Balance the equation.

Practice problems: *Students will determine the products and balance.*

- $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- $\text{H}_2\text{SO}_4 + \text{Mg(OH)}_2 \rightarrow \text{MgSO}_4 + 2\text{H}_2\text{O}$
- $3\text{KOH} + \text{H}_3\text{PO}_4 \rightarrow \text{K}_3\text{PO}_4 + 3\text{H}_2\text{O}$

Salts

Q: what is a salt?

A: any ionic compound.

- Salts are used in a wide range of roles including:
 - Table salt
 - Batteries
 - Road de-icing
 - Explosives

2. Double Replacement

- Reaction in which two compounds react to form two new compounds.

Orally: *The neutralization reaction works the same way as double replacement, except neutralization will always form water while this is not always the case with D.R.*

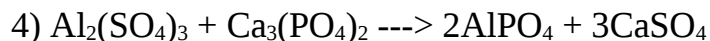
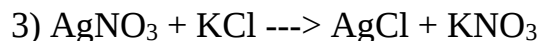
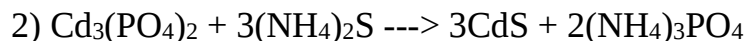
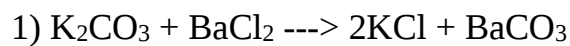
- Generic Equation $AX + BY \rightarrow AY + BX$
- Example: $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$

Rules for Double Replacement reactions:

1. Separate the reactants into cations and anions.
2. Swap the two metal cations to pair with a different non-metal.
3. Use the ion charge of the metals and non-metals to predict the new products.
4. Balance the equations.

Special note: While ammonium (NH_4^+) is not a metal, it is a cation. Memorize this one!

Practice Problems: *Students will determine the products and balance.*



Homework: Workbook 5.2 pages 91 and 92 (Question #1 from each page)