

Classification of Compounds



Salts

<u>Salts</u> are ionic compounds that can be formed during the chemical reaction between an acid and a base.

 $\begin{array}{c} \text{Acid} + \text{Base} \rightarrow \text{Salt} + \text{Water} \\ \text{Example, HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O} \\ \end{array}$ Try writing the products of the following reactions, $3 \text{ H}_2\text{SO}_4 + 2\text{Al}(\text{OH})_3 \rightarrow \text{Al}_2(\text{SO}_4)_3 + 6 \text{ H}_2\text{O} \\ \text{Acid} + \text{Base} \rightarrow \text{Salt} + \text{Water} \\ 2 \text{ CH}_3\text{COOH} + \text{Mg}(\text{OH})_2 \rightarrow \text{Mg}(\text{CH}_3\text{COO})_2 + 2 \text{ H}_2\text{O} \\ \text{Acid} + \text{Base} \rightarrow \text{Salt} + \text{Water} \\ \end{array}$

Other Reactions with Acids that Produce Salts

Metals react with acids to produce salts and hydrogen gas, H₂.

 $\begin{array}{l} \text{Acid}_{(aq)} + \text{Metal}_{(s)} \rightarrow \text{Salt}_{(aq)} + \text{hydrogen}_{(g)} \\ \text{Example,} \quad 2 \quad \text{HCl}_{(aq)} + \text{Mg}_{(s)} \rightarrow \text{MgCl}_{2(aq)} + \text{H}_{2(g)} \end{array}$

Carbonates react with acids to produce salts and hydrogen gas, H₂. Acid + Carbonate \rightarrow Salt + water + carbon dioxide Example, H₂SO₄ + CaCO₃ \rightarrow CaSO₄ + H₂O + CO₂

Oxides

An <u>oxide</u> is a compound that contains at least one oxygen atom or ion along with one or more other elements.

<u>Metal oxides</u> contain oxygen bonded to a metal. > When placed in water, metal oxides form basic solutions. $Na_2O_{(s)} + H_2O_{(l)} \rightarrow 2NaOH_{(aq)}$ Metal oxide + water \rightarrow basic solution

 Non-metal oxides contain oxygen bonded to a non-metal.
➤ When placed in water, non-metal oxides form acidic solutions. 2SO_{2(s)} + H₂O_(l) → 2H₂SO_{3(aq)} Non-metal oxide + water → acidic solution
➤ Acid rain can from non-metal oxides and water,

Summary

Reactions involving acids and bases

Acid + Base \rightarrow Salt + Water

Neutralization reaction

 $Acid_{(aq)} + Metal_{(s)} \rightarrow Salt_{(aq)} + hydrogen_{(g)}$

 $Acid + Carbonate \rightarrow Salt + water + carbon dioxide$

Metal oxide + water \rightarrow basic solution

Non-metal oxide + water \rightarrow acidic solution

Metal and acid reaction

Carbonate and acid reaction

Metal oxide and water

Non-metal oxide and water