

Synthesis Reactions

Synthesis reaction: A chemical reaction in which two or more reactants combine to produce a single compound.

Two Elements Forming a Binary Compound

- Univalent metals can react with non-metals to form ionic compounds

In this case since ionic compounds are so predictable, products can accurately be predicted.

Example: Beryllium combines with fluorine

Example: Potassium combine with sulphur.

- Multivalent metals react with non-metals to form various compounds

If a metal has more than one possible charge, you predict the product of a synthesis reaction and must consider all charges when predicting the possible product.

Example: Copper + Chlorine

Formation of Copper (I) Chloride

Formation of Copper (II) Chloride

- Two non-metals combine to form a molecular compound

Because electrons are being shared within molecular compounds, there is no way to accurately predict the products.

Example: carbon and oxygen combine to form carbon monoxide gas

Example: carbon and oxygen combine to form carbon dioxide gas

An Element and a Compound for a New Compound

Example: Sulfur dioxide gas combines with oxygen gas to create the gas trisulfur oxide.

Example: Liquid phosphorous trichloride combines with chlorine gas to create phosphorous pentachlorine. This is a reversible reaction.

Two Compounds Forming a New Compound

Synthesis reactions can happen between two compound. However, since it is required that the final product be a single compound, reacting compounds tend to be simple like oxides and water.

- Non-metal oxide reacting with water

Example: Carbon dioxide combines with water

Example: Gaseous sulfur trioxide combines with water

Both or these reactions occur naturally in the environment, and are the cause of acid rain.

Non-metal oxides react with water to form acids.

- A metal oxide reacts with water

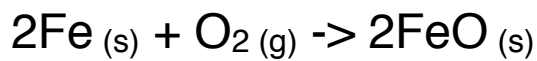
Example: Sodium oxide solid reacts with water

Metal oxides react with water to form bases.

Homework:

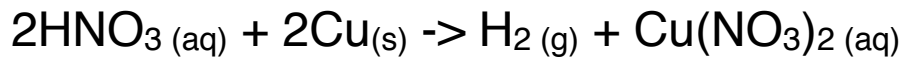
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1) A solid piece of iron oxidizes to form rust.



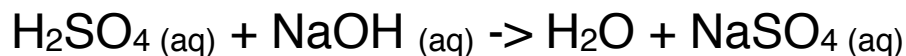
SYNTHESIS

2) A solution of nitric acid dissolves solid copper, forming a solution of copper (II) nitrate and hydrogen gas.



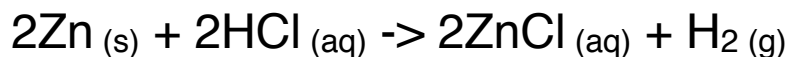
SINGLE DISPLACEMENT

3) Solution of sulphuric acid and sodium hydroxide neutralize each other



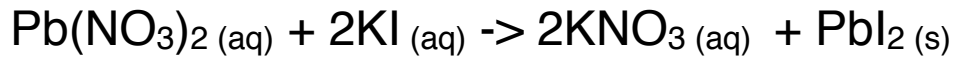
DOUBLE DISPLACEMENT

4) Zinc is dropped in hydrochloric acid



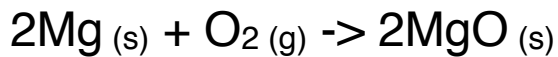
SINGLE DISPLACEMENT

5) Solution of lead (II) nitrate and potassium iodide are mixed



DOUBLE DISPLACEMENT

6) Magnesium is heated and oxidizes



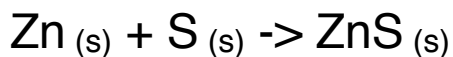
SYNTHESIS

7) Electric current passes through molten sodium chloride



DECOMPOSITION

8) Zinc and sulphur are mixed



SYNTHESIS

