Pracovný list

Predmet: chémia
Názov tematického celku: Chemické reakcie, chemické rovnice
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Worksheet

Video: https://www.youtube.com/watch?v=aMU1RaRulSo

Chemical reaction, a process in which one or more substances, the ....., are converted to one or more different substances, the ..... A chemical reaction rearranges the constituent atoms of the reactants to create different substances as products.

Synthesis reactions

In general, a synthesis reaction is one in which ..... substances combine to form another more ..... one. H..... and o..... (which Lavoisier also renamed dephlogisticated air) combine in the presence of a spark to form water, summarized by the chemical equation shown below (for more on chemical equations see the section called **Anatomy of a chemical equation**), it represents a simple ..... reaction.

Equation 1

$$2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(l)}$$

Decomposition reaction

Decomposition reactions are often thought of as the ..... of synthesis reactions since they involve a compound being broken down into ..... compounds or even e.....s. In the case of Priestley's oxygen, he had broken down mercury (II) oxide (cinnabar) with heat into its individual elements. The reaction can be summarized in the following equation.

Equation 2

$$2HgO_{(s)} \rightarrow 2Hg_{(l)} + O_{2(g)}$$

Single replacement reactions

In chemical reactions, a single constituent can ..... for another one already joined in a chemical compound. The Daniell cell works because zinc can substitute for copper in

a solution of copper sulfate, and in so doing exchange electrons that are used in the battery cell. The reaction can be summarized as follows:

Equation 3

$$Zn_{(s)} + CuSO_{4(aq)} \rightarrow ZnSO_{4(aq)} + Cu_{(s)}$$

This particular single displacement is called a metal displacement since it involves one metal replacing another ....., and many types of batteries are based on metal replacement reactions. However, several other types of single replacement reactions exist, such as when a metal can replace hydrogen from an acid or from water, or a halogen can replace another halogen in certain salt compounds.

$Fe_{(s)} + H_2SO_{4(aq)} \rightarrow$

Double displacement reactions

Hard water contains magnesium or calcium ions in the form of a dissolved salt such as magnesium chloride or calcium chloride. When soap (sodium stearate) comes into contact with either of those salts, it enters into a double displacement reaction that forms the insoluble precipitate known as 'soap scum'.

A double displacement reaction (also known as a double replacement reaction) occurs when two ionic substances come together and both substances swap partners. In general:

Equation 7

$$AB + \rightarrow AD +$$

Where A and C are cations (positively charged ions), and B and D are anions (negatively charged).

In the case of the reaction of soap with calcium chloride, the reaction is:

Equation 8

$$CaCl_{2(aq)} + 2Na(C_{17}H_{35}COO)_{(aq)} \rightarrow 2NaCl_{(aq)} + Ca(C_{17}H_{35}COO)_{2(s)}$$

The solid calcium stearate is what we call soap scum, which is formed by the reaction of the solublesodium stearate salt (the soap) in a double replacement reaction with calcium chloride.

Acid-Base reactions

Acid-base reactions happen around, and even inside of us, all the time. From the classic elementary school baking soda volcano to the process of digestion, we encounter acids and bases on a daily basis. When a hydrogen atom loses its only electron, it forms a positive ion, H^+. This hydrogen ion is the essential component of all acids, and indeed one definition of an acid is that of a hydrogen ion donor. Compounds such as the citric acid in lemon juice, the ethanoic acid in vinegar, or a typical laboratory acid like hydrochloric acid, all give their hydrogen ions away in chemical reactions known as acid-base reactions. The chemical opposites of acids are known as bases, and bases can be defined as hydrogen ion acceptors. Whenever an acid donates a hydrogen ion to a base, an acid-base reaction has taken place, for example, when hydrochloric acid donates a hydrogen ion to a base such as sodium hydroxide:

Equation 9a

$$HCl_{(aq)} + NaOH_{(aq)} \rightarrow H_2O_{(l)} + NaCl_{(aq)}$$

Reduction-oxidation reactions

A redox reaction is one where reduction and oxidation take place together In one definition, oxidation is described as the process in which a species ..... electrons, and reduction is

a process where a species gains electrons. In this way, we can see how the pair must take place together

Redox reactions of this type can be summarized by a pair of equations – one to show the loss of electrons (the oxidation), and the other to show the gain of electrons (the reduction). Using the example of the Daniell cell above,

Equation 5

$$\text{.....}_{(s)} + \text{.....}SO_{4(aq)} \rightarrow ZnSO_{4(aq)} + Cu_{(s)}$$

Oxidation: $Zn \rightarrow Zn^{2+} + 2e^-$

Reduction: $Cu^{2+} + 2e^- \rightarrow Cu$