Unit 5. Chemical Reactions

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1 Changes in matter

A change is a variation in the properties of an object. **Matter** to change requires **energy**.

Changes can be physical or chemical.

- In **physical** changes, matter change without be converted in a new substance, because the chemical composition stays the same. Usually, physical changes are **reversible**.
- In **chemical** changes, matter is converted in a new substance, because there is a change in the chemical composition. Most chemical changes are **irreversible**.

2 Chemical reaction characteristics

1. One or more substances are converted into new substances.
   - **Reactants** are the initial substances.
   - **Products** are the new formed substances.
     Reactants $\longrightarrow$ Products
2. During a chemical reaction energy is released or absorbed.
   - Reactions that release energy are called **exothermic**
   - Reactions that absorb energy are called **endothermic**
3. **Law of the conservation of mass**. In a chemical reaction the total mass of the reactants is equal to the total mass of the products
4. The **speed** of a reaction is the **rate** at which reactants are transformed into products.

Example

56 g of iron (Fe) react with 32 g of sulphur (S) to make 88 g of iron sulphide. Check:

1. The law of conservation of mass
2. If 28 g of iron react with 16 g of sulphur, how much iron is obtained?
3. How much sulphur is needed to react with 42 g of iron if 66 g of iron sulphide is obtained?

$$\mathrm{Fe} + \mathrm{S} \xrightarrow{\text{heat}} \mathrm{FeS}$$

mass (g) of Fe	mass (g) of S	mass (g) of FeS
56	32	88
28	16	?
42	?	66

Explaination

1. Check if the law of conservation of mass is obeyed

$$56\ g + 32\ g = 88\ g$$

2. Add the mass of reactants

$$28\ g + 16\ g = 44\ g$$

3. Apply the law of conservation of mass

$$42 + x = 66 \Longrightarrow x = 66 - 42 = 24\ g$$

3 Atomic interpretation of a chemical reaction

4 Chemical equations

5 Basic laws of chemical reactions

6 Chemistry in society