

CHAPTER 5

QUANTITATIVE ANALYSIS

5.1

Quantitative analysis

A method for measuring the quantity of the substance produced or required for a chemical reaction

Limiting reagent

The reactant that is completely used up in a chemical reaction

Excess reagent

A reactant that is present in more than the required quantity to complete the reaction.

5.3

BALANCING NUCLEAR REACTIONS

Nucleon

Any particle in the nucleus of an atom

Radioactive decay

- The spontaneous decomposition of large nucleus
- Leads to the formation of new elements
- The products formed tend to be more stable
- Atoms in which the N/P ratios is not maintained or are not in the stability belt undergo radioactive disintegration

Transmutation

- During radioactive disintegration one element changes into another
- This is called transmutation

Alpha particle - α

The nucleus of the helium atom

Alpha decay

${}^4_2\text{He}$ Has a charge of 2+ It is helium nucleus with no electrons

A nuclear reaction in which α - particles are emitted

Beta particle - β

Electrons are known as β particles

Beta decay

A nuclear reaction in which the electrons or β particles are produced is called a β decay

Gamma rays - γ

High energy electromagnetic radiation during a nuclear reaction

Artificial transmutation A nuclear reaction can be induced by bombarding a large molecule with small projectiles like neutron, protons, α - particles etc

Fusion Joining of two or more light nuclei to form a larger atom

Very high temperatures are required for these reactions

Also known as thermonuclear reaction

Fission Breaking down large molecules into smaller elements using projectiles

Half Life The time taken for the reactant to become 50% of its initial concentration

Radiocarbon dating The process of determining the age of fossils using the half life of carbon-14

Applications of Radioactivity

- Medicine
- Industry
- Power generation
- Chemistry
- Biology