Atomic Structure

Content 

Composition of an Atom

Subatomic Particle Name	Properties
Proton	- Has a relative charge of +1 - Has a relative mass of 1 - Represented by the symbol p
Neutron	- Has a relative charge of 0? - Has a relative mass of 1 - Is represented by the symbol n
Electron	- Has a relative charge of -1 - Has a relative mass of $\frac{1}{1836}$ - Represented by the symbol e

Note:
Use the acronym 'pen' to remember

Overall Charge of an Atom

- It carries no charge because
    a. The number of electrons = the number of protons
    b. The negative charges cancel out the positive charge and neutrons carry no charge

Proton Number and Nucleon Number

Proton Number

- Different atoms have different proton numbers

Nucleon Number

- Mass of an electron is negligible

Properties of Isotopes

Property	Explanation
Similar chemical properties	- Chemical reactions involve only the valence electrons and not the neutrons - Isotopes have the same number of protons and electrons
Different Physical Properties	- Physical Properties are affected by number of neutrons - Isotopes have different masses, therefore have different physical properties

Arrangement of Electrons in Atoms

How are electrons arranged in an atom?

- They start in the first shell on an atom (maximum of 2 electrons)
- The second shell onwards can hold up to 8 electrons, the 3rd shell holds 18 electrons (beyond Calcium) and so on

Note:
The general formula for calculating how many electrons can be present in a certain shell use the general formula: $2n^2$ where n is the electron shell number (Not in syllabus but a general idea to how electrons are arranged)

Periods and Groups

- Periods are defined as the 7 horizontal rows of elements
- Groups are defined as the 18 vertical columns of elements

Isoelectronic, Isotopic, and Isotonic (General Information as seen before)

- Isoelectronic means the same number of valence electrons and have the same structure
- Isotopic means same number of protons
- Isotonic (Not to be confused with biology) means same number of neutrons

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Test yourself 

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1. What are the 3 subatomic particles? State their
   i. Relative mass
   ii. Relative Charge
   iii. Symbol
2. Why are atoms electrically neutral?
3. What is a
   i. Proton Number
   ii. Nucleon Number
4. Define *Isotopes?* Why are isotopes have similar chemical properties but slightly different physical properties?
5. What is a valence shell?

Glossary of Terms

Proton Number	Defined as the number of protons in the atom
Nucleon Number	Defined as the total number of protons and neutrons
Isotopes	Defined as atoms of the same element with the same number of protons and electrons, but different numbers of neutron
Valence Shell	Shell furthest away from nucleus of atom
Valence Electrons	Electrons in the valence shell