

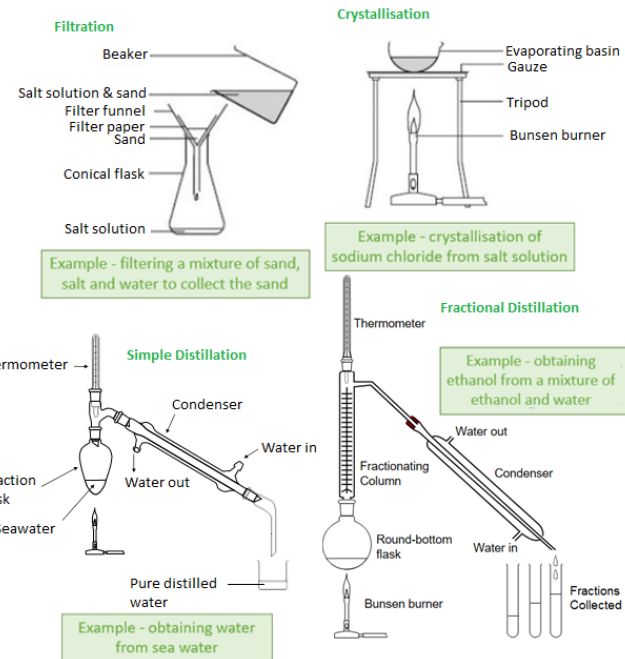
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Chemistry Topic C1 Atomic Structure and Periodic Table


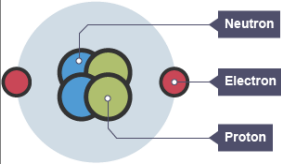
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Section 1: Key Terms

Atom	The smallest part of an element that can still be recognised as that element. No overall electrical charge. Very small , radius of 0.1nm.
Element	An element contains only one type of atom . Found on the Periodic Table. There are about 100 elements.
Compound	Two or more elements chemically bonded with each other.
Mixture	Contains two or more elements or compounds not chemically bonded . Can be separated using physical methods e.g. by filtration, crystallisation, distillation and chromatography.
Filtration	A process that separates mixtures of insoluble solids and liquids .
Crystallisation	A process that separates a soluble solid from a solvent by evaporating the liquid to leave crystals.
Distillation	A process that separates a mixture of liquids based on their boiling points .
Chromatography	A process that separates mixtures by how quickly they move through a stationary phase (e.g. paper chromatography)
Isotope	An atom of the same element with same number of protons but different numbers of neutrons .
Relative atomic mass	An average value of mass that takes account of the abundance of the isotopes of the element.



Section 2: Development of Atomic Model

<p>Plum Pudding</p> 	<p>Thompson's plum pudding model shows that the atom is a ball of positive charge with negative electrons embedded in it. Was incorrect.</p>
<p>Nuclear Model</p> 	<p>Rutherford's alpha particle scattering experiment found a central area of positive charge. The nuclear model has a positive nucleus and electrons in shells. Chadwick later discovered neutrons. Bohr discovered the arrangement of electrons in shells.</p>

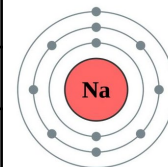
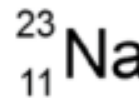
Mass number – the total number of **protons** and **neutrons**

Atomic number – the **number of protons** (the number of electrons is the same in an atom)

Electron configuration– Electrons fill the first energy level (shell) first. Maximum electrons: **2 electrons in first shell, 8 in the 2nd, 8 in the 3rd**.

Section 3: Properties of Sub-Atomic Particles

Sub-atomic particle	Mass	Charge	Position in Atom
Proton	1	+1	Nucleus
Neutron	1	0	Nucleus
Electron	Very small	-1	Orbiting in shells



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Section 4: Periodic Table

Group	Elements in the same vertical column are in the same group. Elements in the same group have the same number of electrons in their outer shell , and therefore similar properties .
Period	Elements in the same horizontal row . The atomic number increases by one moving across the period from left to right.
Metal	Elements that react to form positive ions (except Hydrogen). Left and centre of periodic table
Non-Metal	Elements that react to form negative ions. Right hand side of periodic table.
Mendeleev	Was able to make a relatively accurate periodic table by leaving gaps for undiscovered elements and re-arranging some elements (Mendeleev could only measure relative atomic mass, not atomic number). Hence he arranged the elements in order of mass number and predicted the properties of the elements in the gaps

Section 5: Groups of the Periodic Table

Sub-atomic particle	Properties	Trends	Reactions
Group 0 (Noble Gases)	Unreactive and do not form diatomic molecules .	Boiling point increases going down the group .	Very unreactive because they have full outer shells .
Group 1 (Alkali Metals)	Reactive because they can easily lose their one outermost electron. Always form ionic compounds Low density	Reactivity increases going down the group . Melting points and boiling point decrease going down the group .	With water: Metal + water → Metal hydroxide + hydrogen With oxygen: Metal + oxygen → Metal oxide With chlorine: Metal + chlorine → Metal chloride
Group 7 (Halogens)	Low melting points and boiling points. Poor conductors of heat and electricity. Form diatomic molecules	Reactivity decreases going down the group . Boiling point and melting point increase going down the group .	A more reactive halogen can displace a less reactive halogen from a solution of its salt. Chlorine + sodium bromide → sodium chloride + bromine

Elements in the modern periodic table are **arranged by atomic (proton) number**.

The periodic table shows elements arranged by atomic number (proton number). The table is organized into groups (vertical columns) and periods (horizontal rows). Elements are color-coded by groups: Group 1 (purple), Group 2 (blue), Groups 3-10 (orange), Groups 11-18 (green), and the f-block (red).

Group – Vertical column
Period – Horizontal Row
Metals are on the left, non-metals on the right.