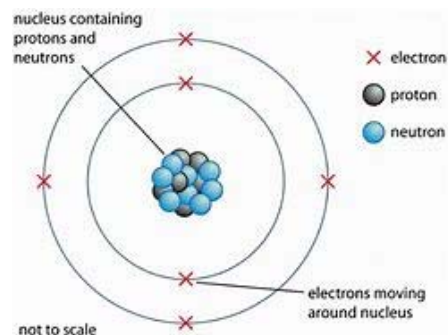


C1 Knowledge Organiser – 4.1.1 - Atomic structure



The atom 1



- Very small – $\times 10^{-10}\text{m}$.

Elements 2

$^{23}_{11}\text{Na}$

Mass number
Na
Atomic number

P = 11
 E = 11
 N = 12

- **Mass number** – Protons + neutrons
- **Atomic number** – Protons and electrons always balance – no overall charge

Sub-atomic particles 3

Particle	Symbol	Charge	Relative Mass
Electron	e^-	1-	0
Proton	p^+	1+	1
Neutron	n	0	1



Properties of metals 4

- High melting point
- Shiny
- Malleable
- Hard (high density)
- Conduct electricity
- Conduct heat

NON-METALS ARE THE OPPOSITE

Relative Atomic Mass 5

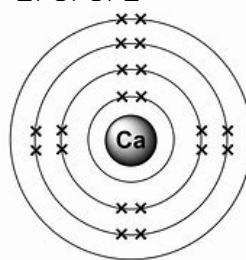
- RAM = The average value for the mass of an element
- Takes into account the abundance of the isotopes of each element

$$A_r = \frac{(\text{mass } 1 \times \text{abundance } 1) + (\text{mass } 2 \times \text{abundance } 2)}{100}$$

Electron configurations 6

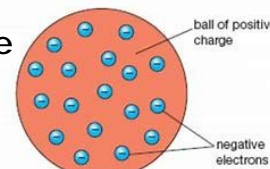
- First shell = 2
- Second shell = 8 max
- Third shell = 8 max
- Calcium = 2. 8. 8. 2

Group number = number of electrons on outer shell

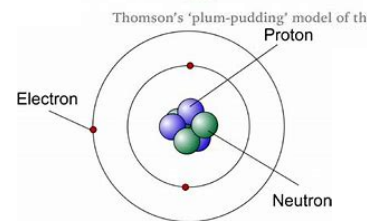


Development of the atomic model – key diagrams 7

- Plum pudding –
- P – ball of positive charge
 - E – Randomly scattered
 - N – No neutrons
 - N – No nucleus

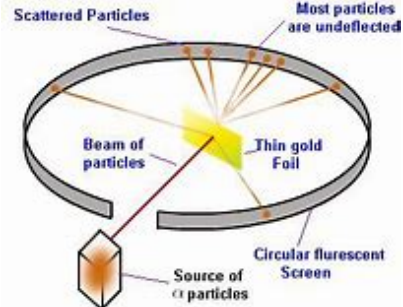


- Nuclear Model –
- P – In the nucleus
 - E – Orbit in shells
 - N – In the nucleus
 - N – Has a nucleus



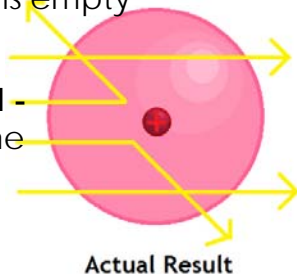
- Dalton** – atoms are small balls.
- Thomson** – plum pudding model.
- Rutherford** – atoms are like the solar system.
- Bohr** – electrons orbit atoms.

Gold foil experiment 8



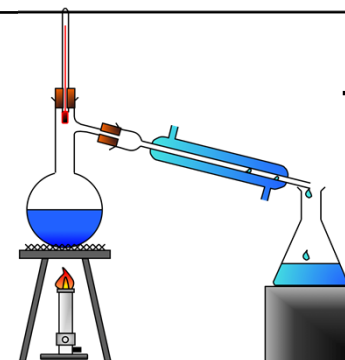
Un-deflected - Most of the atom is empty space

Deflected - Mass in the nucleus which is positive



Separating mixtures. 9

- **Filtration** – insoluble solid and liquid.
- **Crystallisation** – evaporate water forms crystalline solid.
- **Distillation** – 2 liquids based on boiling point.
- **Chromatography** – pigments.



C1 Knowledge Organiser – 4.1.2 – The Periodic table



The Periodic table +1

Charge on ions

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg							

Legend:
■ metal
■ metalloid
■ non-metal

1

Modern periodic table 2

- Arranged in order of atomic number
- **Group** – Column of elements that have similar chemical properties
- **Group number = number of electrons in the outer shell**
- **Period** – Row in the periodic table
- **Period = Number of shells**

Group 0

- Noble gases
- Unreactive / inert
- Stable arrangement of electrons
- Full outer shell
- Used in light bulbs – will not react with the metal filament
- Boiling point increases down the group

3

Group 1

- Alkali metals,
- 1 electron in outer shell
- **More reactive as you go down the group**
- **More shielding, easier to lose outer electron**
- react with water, producing hydroxides and hydrogen gas

5

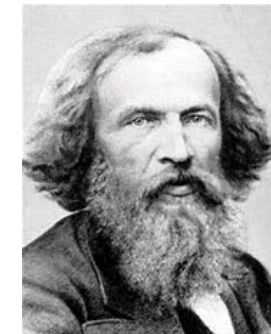
Group 7

- Halogens
- 7 electrons in outer shell
- their molecules each contain two atoms (they are diatomic)
- **Less reactive as you go down the group**
- **More shielding, harder to gain an electron**

6

Development of the periodic table

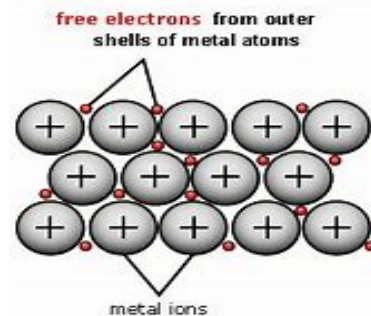
- Early Periodic Table arranged by atomic weight
- **Newland** – Law of Octaves – every 8th element placed in the same group – had metals and on-metals together
- **Mendeleev** – Left gaps for undiscovered elements



7

Metals

- High melting point
- Shiny
- Malleable
- Hard (high density)
- Conduct electricity
- Conduct heat



8

Properties of transition metals (TRIPLE ONLY)

- Good conductors
- High melting points
- High densities
- Very malleable and ductile
- Hard, strong
- Coloured compounds
- Used as catalysts
- Used for wires – conduct, ductile
- Used for pipes – Do not react with water



9