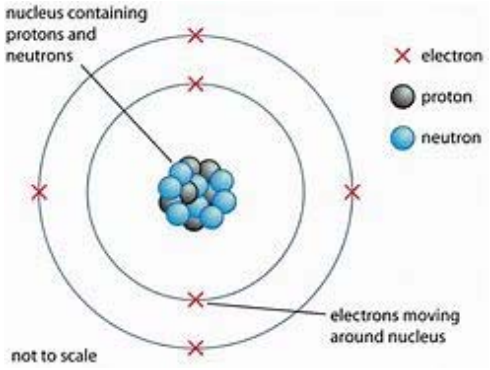
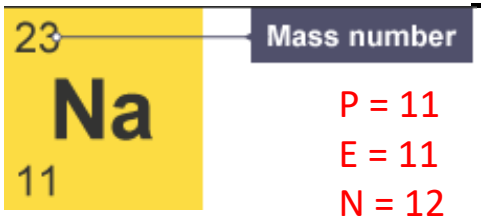
# C1 Knowledge Organiser – 4.1.1 - Atomic structure

## The atom 1




- Very small – $x10^{-10}m$.

## Elements 2




- **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

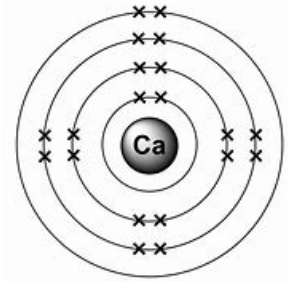
- RAM = The average value for the mass of an element
- Takes into account the abundance of the isotopes of each element

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

## Electron configurations 6

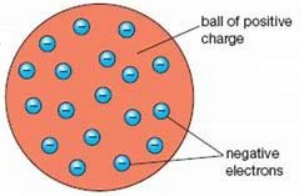
- First shell = 2
- Second shell = 8 max
- Third shell = 8 max
- Calcium = 2. 8. 8. 2

**Group number** = number of electrons on outer shell

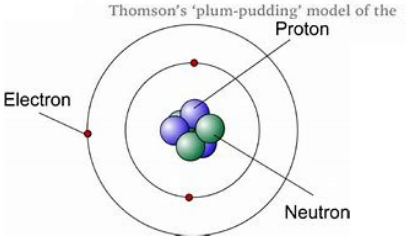



## Development of the atomic model – key diagrams 7

**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**

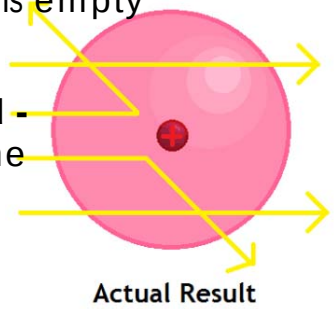



**Dalton** – atoms are small balls.
**Thomson** – plum pudding model.
**Rutherford** – atoms are like the solar system.
**Bohr** – electrons orbit atoms.

## Gold foil experiment 8

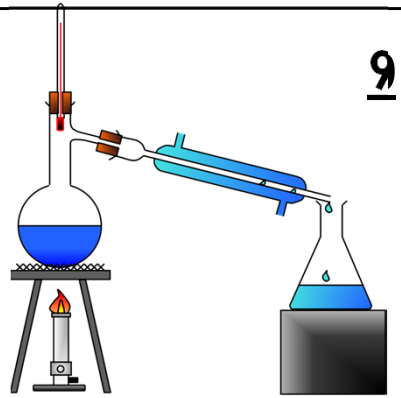

**Un-deflected** - Most of the atom is empty space

**Deflected** - Mass in the nucleus which is positive



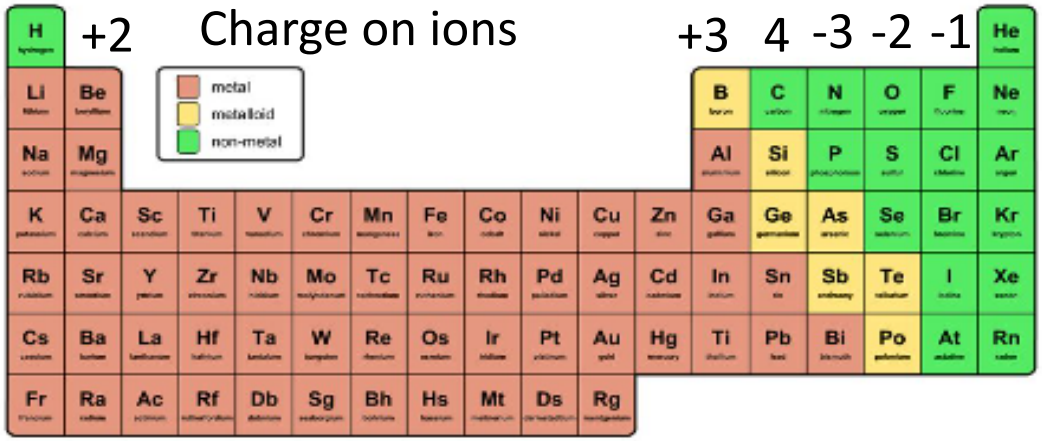

## Separating mixtures. 9

- **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




## 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 3

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

## Group 1 5

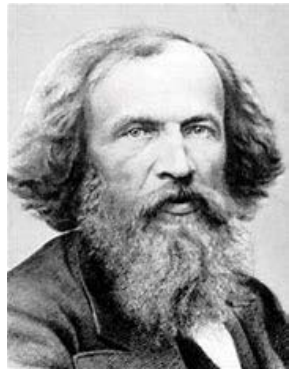
- Alkali metals,
- 1 electron in outer shell
- **More reactive as you go down the group**
- **More shielding, easier to lose outer electron**
- react with water, producing hydroxides and hydrogen gas

## Group 7 6

- 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**

## Development of the periodic table 7

- 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



## Metals 8

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


## Properties of transition metals (TRIPLE ONLY) 9

- 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