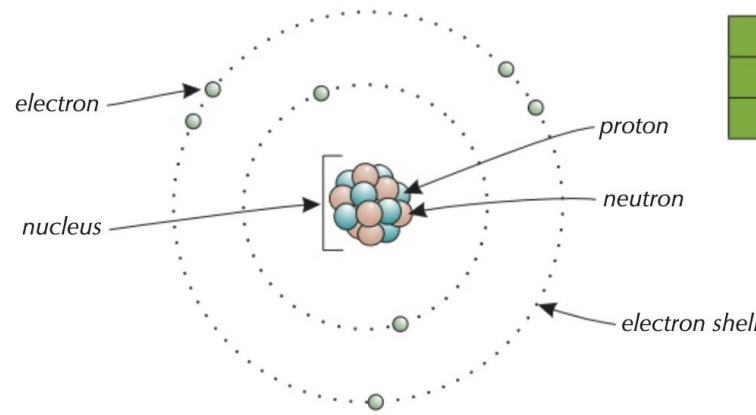


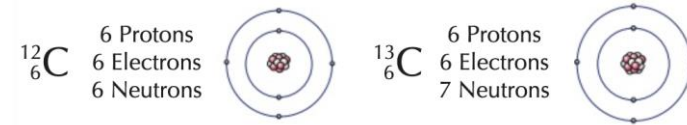
# Chemistry: Atomic structure and Elements

| Key word                  | Definition  |
|---------------------------|---|
| <b>Atom</b>               | The smallest object of a chemical element that can exist.   |
| <b>Nucleus</b>            | The positively charged centre of the atom consisting of protons and neutrons where all the mass is concentrated.    |
| <b>Shells</b>             | A grouping of electrons surrounding the nucleus of an atom  |
| <b>Subatomic particle</b> | An extremely small piece of matter that is smaller than an atom or found inside an atom (proton, neutron, electron) |
| <b>Element</b>            | Is made up of only one type of atom.  |
| <b>Isotope</b>            | Different forms of the same element with a different number of neutrons and same number of protons.                 |

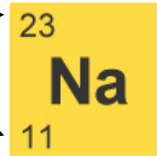


| Particle               | Proton | Neutron | Electron   |
|------------------------|--------|---------|------------|
| <b>Relative charge</b> | +1     | 0       | -1         |
| <b>Relative mass</b>   | 1      | 1       | Very small |

**Isotopes:**  
Different mass number and same atomic number



**Mass number:**  
Protons **and** neutrons

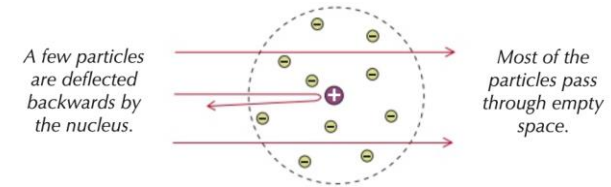


**Atomic number:**  
Protons **or** electrons

Rules for filling electrons in to shells: **2, 8, 8 (Maximum)**

$$\text{relative atomic mass } (A_r) = \frac{\text{sum of (isotope abundance} \times \text{isotope mass number)}}{\text{sum of abundances of all the isotopes}}$$

**Neutrons = mass number – atomic number**



A few particles are deflected backwards by the nucleus.

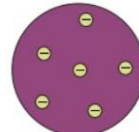
Most of the particles pass through empty space.

**Atomic theory** - Ideas about atoms have changed over time. Scientists developed new atomic **models** as they gathered new experimental evidence.



**Solid sphere model:**

- Dalton's proposed that the atom could not be divided into anything smaller.



**Plum pudding model:**

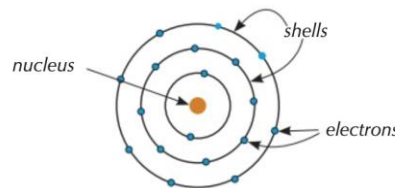
- Ball of positive charge.
- Negative electrons embedded within it.
- Mass spread evenly

**Alpha scattering experiment:**

- Positively charged alpha particles were fired at a thin sheet of gold foil.
- They expected the particles to go straight through.
- Some were deflected more than expected.
- This disproved the plum pudding model.

**Bohr's model:**

- Niel Bohr suggested that electrons orbit the nucleus in fixed shells.
- This is the model we use today.



**Nuclear model:**

- Tiny, positively charged nucleus at the centre where all the mass is concentrated.
- Cloud of negative electrons surrounding the nucleus.

