



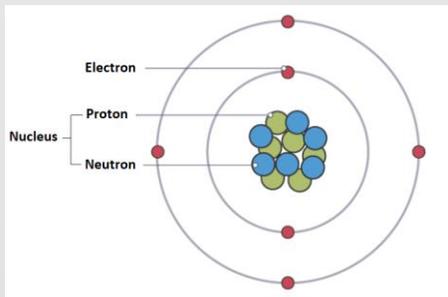
### 1) Particle Theory Review

All matter is made up of atoms. Matter can either be:

- Δ **Solid:** particles all touching in a regular pattern, particles vibrate on the spot but are not free to move.
- Δ **Liquid:** particles touching but not in a regular arrangement and can move freely past each other.
- Δ **Gas:** Particles are randomly far apart and can move freely past each other.

### 2) Structure of an Atom

Atoms have a central **nucleus** which contains the **protons** and **neutrons**. Moving around the nucleus are the **electrons** in their electron shells.



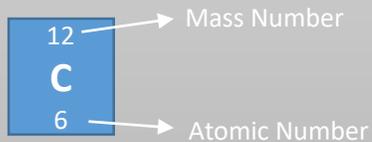
Atoms have no overall charge as they have the same number of protons as electrons.

Subatomic Particle	Relative Mass	Relative Charge
Proton	1	+1
Neutron	1	0
Electron	Very small	-1

Electrons are found in shells. The first shell can have up to 2 electrons inside it, then 8 in the second and third shell.

**Atomic Number and Mass Number:** The atomic number of an atom is the number of protons in its nucleus.

The mass number of an atom is the total number of protons and neutrons in its nucleus.



### 3) Elements

Elements are substances **made of only one type of atom**. Atoms of the same element will have the same number of protons (atomic number). All elements are shown on the periodic table. Each element is represented by their own chemical symbol which:

- Consists of one or two letters
- Always starts with a capital letter and the following letter is in lower case

O = oxygen      Mg = magnesium      Na = sodium

### 4) The Periodic Table

#### Mendeleev

In the late 1800s Dimitri Mendeleev arranged all the known elements in order of their **atomic weight**. He **left gaps** in the periodic table that he thought had not yet been discovered. Elements with properties predicted by Mendeleev were later discovered and filled the gaps.

#### Modern Periodic Table

The elements in the modern periodic table are arranged in order of **atomic number** so that elements with similar properties are in columns, known as groups.

Elements in the same group in the periodic table have the same number of electrons in their outer shell and this gives them similar chemical properties.

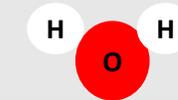
### 5) Compounds

Compounds are substances which **contain two or more different elements which are chemically joined together**. They are held together by chemical bonds and so are difficult to separate.

Examples include carbon dioxide (carbon and oxygen) and water (hydrogen and oxygen).



Carbon dioxide – CO<sub>2</sub>



Water – H<sub>2</sub>O

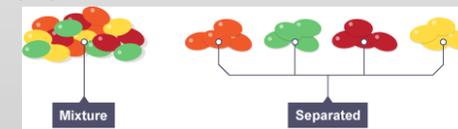
### 6) Rusting

Rust (a compound called iron oxide) forms when iron reacts with oxygen in the presence of water or moisture in the air.

- **Independent variable** – what you change
- **Dependent variable** – what you measure
- **Control variables** – what you keep the same

### 7) Mixtures

Mixtures contain **different elements and/or compounds that are not chemically joined together**. The substances in a mixture can be easily separated from each other, e.g. by evaporation, chromatography and distillation.



### 8) Metals & Non-Metals

Metals are found to the left of the periodic table and non-metals to the right.

#### Properties of Metals

- Shiny
- Malleable
- Conduct heat
- Conduct electricity
- Solid at room temp.

#### Properties of Non-Metals

- Dull (non-lustrous)
- Brittle
- Poor conductor of heat
- Poor conductor of electricity
- Not always solid at room temp.