

Chemistry Revision Notes – Particles And Bonding

1. All atoms consist of **protons**, **electrons** and **neutrons**:

<i>Particle</i>	<i>Charge</i>	<i>Mass</i>
<i>Proton</i>	Positive	1
<i>Neutron</i>	Neutral	1
<i>Electron</i>	Negative	Negligible

2. The number of protons in an atom is its **atomic number**.
3. The number of protons is equal to the number of electrons in an atom – to give a **neutral charge**.
4. Electrons are arranged into **shells** or **orbitals** (e.g. Argon = 2:8:8 or 2,8,8).
5. All atoms strive to gain a **full outer shell**, as it is the most stable form.
6. **Ionic bonding** is the donating and accepting of electrons to achieve a full outer shell (e.g. NaCl), giving rise to ionic compounds with the following properties:
- They are **solid**.
 - They are **crystalline**.
 - They have **very high melting and boiling points**.
 - They **don't conduct electricity** when **solid**, but they **do** when **molten** or **in solution**.
7. **Covalent bonding** is when atoms share electrons so as to achieve a full outer shell (e.g. CH₄), giving rise to covalent compounds with the following properties:
- They are mainly **liquids, gases, and soft waxes**.
 - They have **low melting and boiling points**.
 - They **don't dissolve in water** (usually).
 - They **never conduct electricity**.
8. **Metallic bonding** is when metals bond together to form a lattice of positive nuclei in a sea of electrons from the outer orbital (e.g. Fe), giving rise to metals with the following properties:
- They are always **metals** bonding together.
 - They **always conduct electricity**.
9. **Allotropy** is when the same element has different forms. The allotropes of carbon are:
- **Graphite** – Three covalent and one (weak) van der Waals bond from each carbon atom.
 - **Diamond** – Four covalent bonds from each carbon atom.
 - **Fullerenes** – Four covalent bonds from each carbon atom, to form 'bucky-balls' (C₆₀).
10. The following are **hazard warning signs**:
- **Oxidising**.
 - **Harmful**.
 - **Irritant**.
 - **Toxic**.
 - **Corrosive**.
 - **Explosive**.
 - **Flammable**.
 - **Radioactive**.