Year 10 Chemistry Overview - Term 1

Unit 1: Atomic Structure and the Periodic Table.
Key topics include:

1. The Structure of the Atom
Subatomic Particles: Understanding the basic structure of the atom, including protons, neutrons, and electrons, and how they are arranged within the atom.

- Atomic Number and Mass Number: Learning about the atomic number (number of protons) and mass number (total number of protons and neutrons), and how to calculate the number of subatomic particles in atoms and ions.

- Isotopes: Exploring isotopes—atoms of the same element that have different numbers of neutrons—and how they affect the atomic mass.

2. Development of Atomic Models

- History of Atomic Models: Studying how scientific understanding of the atom has changed over time, from early models like Dalton's solid sphere model to more modern theories, such as Rutherford's nuclear model and Bohr's model of electron shells.

- The Discovery of the Electron and Nucleus: Investigating key experiments, such as J.J. Thomson's discovery of the electron and Rutherford's gold foil experiment.

3. The Periodic Table

- Organisation of the Periodic Table: Understanding how elements are arranged in the periodic table based on their atomic number, and how their position relates to their chemical properties.

- Groups and Periods: Exploring how elements in the same group (vertical columns) share similar chemical properties and how the period (horizontal row) reflects the number of electron shells.

- Trends in the Periodic Table: Investigating trends in reactivity, particularly in Group 1 (alkali metals) and Group 7 (halogens), and understanding the properties of noble gases (Group 0).

Unit 2: Bonding and Structure.

Key topics include:

1. Ionic Bonding

- How Ionic Bonds Form: Understanding how atoms transfer electrons to form ions, leading to the creation of ionic bonds between metals and non-metals.

- Properties of Ionic Compounds: Exploring the characteristics of ionic compounds, including high melting and boiling points, and their ability to conduct electricity when molten or dissolved in water.

Practical work will involve observing the properties of ionic compounds
and performing experiments to investigate their conductivity.

2. Covalent Bonding

- How Covalent Bonds Form: Learning how non-metals share electrons to form covalent bonds, which hold molecules Together.

- Simple Molecular Substances: Exploring the structure and properties of small molecules, including low melting and boiling points and poor electrical conductivity.

- Giant Covalent Structures: Examining giant covalent structures, such as diamond and graphite, and understanding how their bonding leads to unique properties like hardness or electrical conductivity in graphite.

3. Metallic Bonding

- The Metallic Bonding Model: Understanding how metals consist of a lattice of positive ions surrounded by a ‘sea’ of delocalised electrons, which explains their properties such as conductivity, malleability, and ductility.

- Properties of Metals and Alloys: Exploring how alloys (mixtures of metals) are used to enhance the properties of metals, such as increasing strength or resistance to corrosion.

4. States of Matter and Structure

- States of Matter: Revisiting the properties of solids, liquids, and gases and how particles are arranged in each state.

- Changes of State: Learning about melting, boiling, freezing, and condensation, and interpreting changes of state using particle models.

- Polymers and Nanoparticles: Introducing students to the structures and uses of polymers and the exciting field of nanotechnology, which involves the use of extremely small particles in modern materials.

5. Polymers and Nanoparticles

- Students will study synthetic and natural polymers, learning how covalent bonding in long-chain molecules affects their properties and applications.

- An introduction to nanotechnology will highlight the unique properties of nanoparticles and their increasing use in fields like medicine, electronics, and materials Science.

Practical work may include building models of molecules and experimenting with the properties of different substances to explore their bonding and structure.