



## Chemical Foundations

### Atomic Structure

<b>Element:</b> A substance that cannot be broken down into simpler substances by chemical means.	<b>Atom:</b> The smallest unit of an element that retains the properties of that element.
<b>Proton:</b> Positively charged subatomic particle located in the nucleus.	<b>Neutron:</b> Neutral subatomic particle located in the nucleus.
<b>Electron:</b> Negatively charged subatomic particle located in electron shells around the nucleus.	<b>Nucleus:</b> The dense central part of an atom, containing protons and neutrons.
<b>Bohr-Rutherford Model:</b> A model of the atom with a nucleus at the center and electrons in orbits around it.	Sketch the structure showing nucleus and electron shells for elements Z=1-20.

### Collision Theory & Reaction Rates

#### Collision Theory

<b>Collision Theory:</b> For a reaction to occur, particles must collide with sufficient energy and correct orientation.
<b>Activation Energy:</b> The minimum energy required for a reaction to occur.
<b>Reaction Rate:</b> The speed at which reactants are converted into products.

### Enzymes & Practical Skills

#### Enzymes

<b>Enzymes:</b> Biological catalysts that speed up chemical reactions without being consumed.
<b>Induced Fit Model:</b> Enzymes change shape slightly to accommodate the substrate.
<b>Factors Affecting Enzyme Activity:</b> Temperature, pH, substrate concentration, and inhibitors.
<b>ATP Synthase:</b> An enzyme that creates the energy storage molecule ATP.

### Chemical Reactions

<b>Physical Reaction:</b> A change in the physical properties of a substance without changing its chemical composition.
<b>Chemical Reaction:</b> A process that leads to the transformation of one set of chemical substances to another.
<b>Law of Conservation of Mass:</b> Mass is neither created nor destroyed in a chemical reaction.
Balance chemical equations to demonstrate the conservation of mass.

#### Factors Affecting Reaction Rate

1. <b>Temperature:</b> Increases kinetic energy, leading to more frequent and energetic collisions.	2. <b>Concentration:</b> Higher concentration increases the chance of collisions.
3. <b>Surface Area:</b> More surface area increases the number of collisions.	4. <b>Catalysts:</b> Lower activation energy, increasing the rate of reaction.
5. <b>Pressure (for gases):</b> Increases the frequency of collisions.	Interpret Maxwell-Boltzmann and Energy profile graphs to understand temperature and catalysts' effects.

#### Practical Skills

<b>Data Presentation:</b> Correctly collect, organize, and present data in tables or graphs.	<b>Interpretation:</b> Analyze and explain experimental results.
<b>Plastic Pollution:</b> Discuss the environmental impact and the role of microbes in recycling.	<b>Enzymes in Recycling:</b> Explain the necessity of enzymes in breaking down plastics.