



CHEMISTRY

FOR BPSC

Prepared by:
Abhimanyu Kumar
B.Tech. (CS), IITD

ONE SHOT

www.iasvalley.com/learn
t.me/ias_valley

INDEX

Chapter 1: Structure of Atom.....	2
Chapter 2: Atomic & Mass Numbers, Isotopes, Isobars, Isotones.....	7
Chapter 3: States of Matter.....	9
Chapter 4: Mixtures and their Separation.....	11
Chapter 5: Phase Transitions.....	16
Chapter 6: Periodic Table.....	18
Chapter 7: Metals, Non-metals and Metalloids.....	22
Chapter 8: Physical and Chemical Changes.....	28
Chapter 9: Types of Chemical Reactions.....	29
Chapter 10: Acids and Bases.....	30
Chapter 11: pH Scale.....	32
Chapter 12: Ores.....	34
Chapter 13: Alloys.....	37
Chapter 14: Environmental Chemistry.....	40
Chapter 15: Chemistry in Everyday Life.....	42
Chapter 16: Polymers.....	45
Chapter 17 : Fuels and Combustion.....	48
Chapter 18: Chemical Compounds and Substances.....	49

Chapter 1: Structure of Atom

Early Philosophical Ideas

- **Democritus** (5th century BCE, Greek philosopher): Proposed all matter consists of very small, **indivisible particles** he called **atomos**, meaning "**uncuttable or indivisible**".
- **Maharishi Kanad** (~ 600 BCE, India)
 - First to theorize how **atoms combine to form molecules and compounds**.
 - Described these tiny, indivisible particles, which he called "**Parmanu**".

Antoine Lavoisier

- **Father of Modern Chemistry**.
- Law of **conservation of mass**.
- Established a system for **naming chemicals**, which is still used today.
- Named elements such as **carbon, hydrogen, and oxygen**.
- Discovered **oxygen theory of combustion** (debunked phlogiston theory).



John Dalton's Atomic Theory

- Formulated in **1808**
 - **Indivisible building blocks of matter**, called **atoms** → **beginning of modern chemistry**.
1. **Elements** are composed of extremely small particles called **atoms**.



Reaction with Hydrochloric Acid:

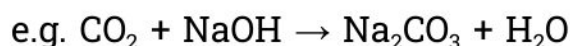
- $6\text{HCl} + \text{Al}_2\text{O}_3 \rightarrow 2\text{AlCl}_3 + 3\text{H}_2\text{O}$.
- Here, Aluminum oxide reacts with hydrochloric acid to form aluminum chloride and water.

Reaction with Sodium Hydroxide:

- $\text{Al}_2\text{O}_3 + 2\text{NaOH} \rightarrow 2\text{NaAlO}_2 + \text{H}_2\text{O}$.
- Aluminum oxide reacts with sodium hydroxide to form sodium aluminate and water.

Non-metal Oxides with Bases

Non-metallic oxides like carbon dioxide react with bases to form **salt and water**, showing their acidic nature.



Common Properties of Acids and Bases

- **Acids** produce **hydrogen ions (H^+)** in water, responsible for their acidic nature.
- **Bases** produce **hydroxide ions (OH^-)** in water, responsible for their basic nature.

Dissolution in Water

Acids and bases **only show their properties when dissolved in water** because they release ions in water. For example, hydrogen chloride gas doesn't act acidic until dissolved in water to form hydrochloric acid.