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CHEMISTRY

FOR BPSC

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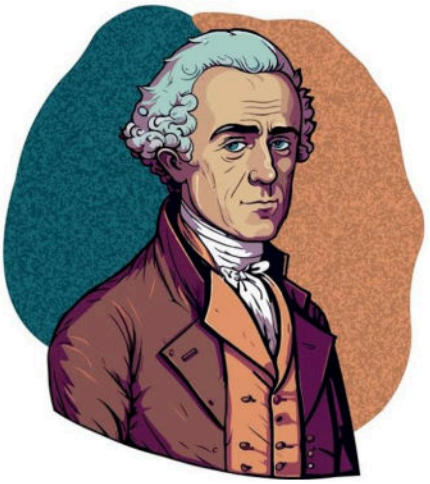
Chapter 1: Structure of Atom

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:

- $6\,HCl + Al_2O_3 \rightarrow 2AlCl_3 + 3H_2O$.
- Here, **Aluminum oxide** reacts with **hydrochloric acid** to form **aluminum chloride** and **water**.

Reaction with Sodium Hydroxide:

- $Al_2O_3 + 2NaOH \rightarrow 2NaAlO_2 + H_2O$.
- **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.

e.g. $CO_2 + NaOH \rightarrow Na_2CO_3 + H_2O$

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.