

# CHEMISTRY PHYSICAL CHEMISTRY & THERMODYNAMICS

## Lesson 1

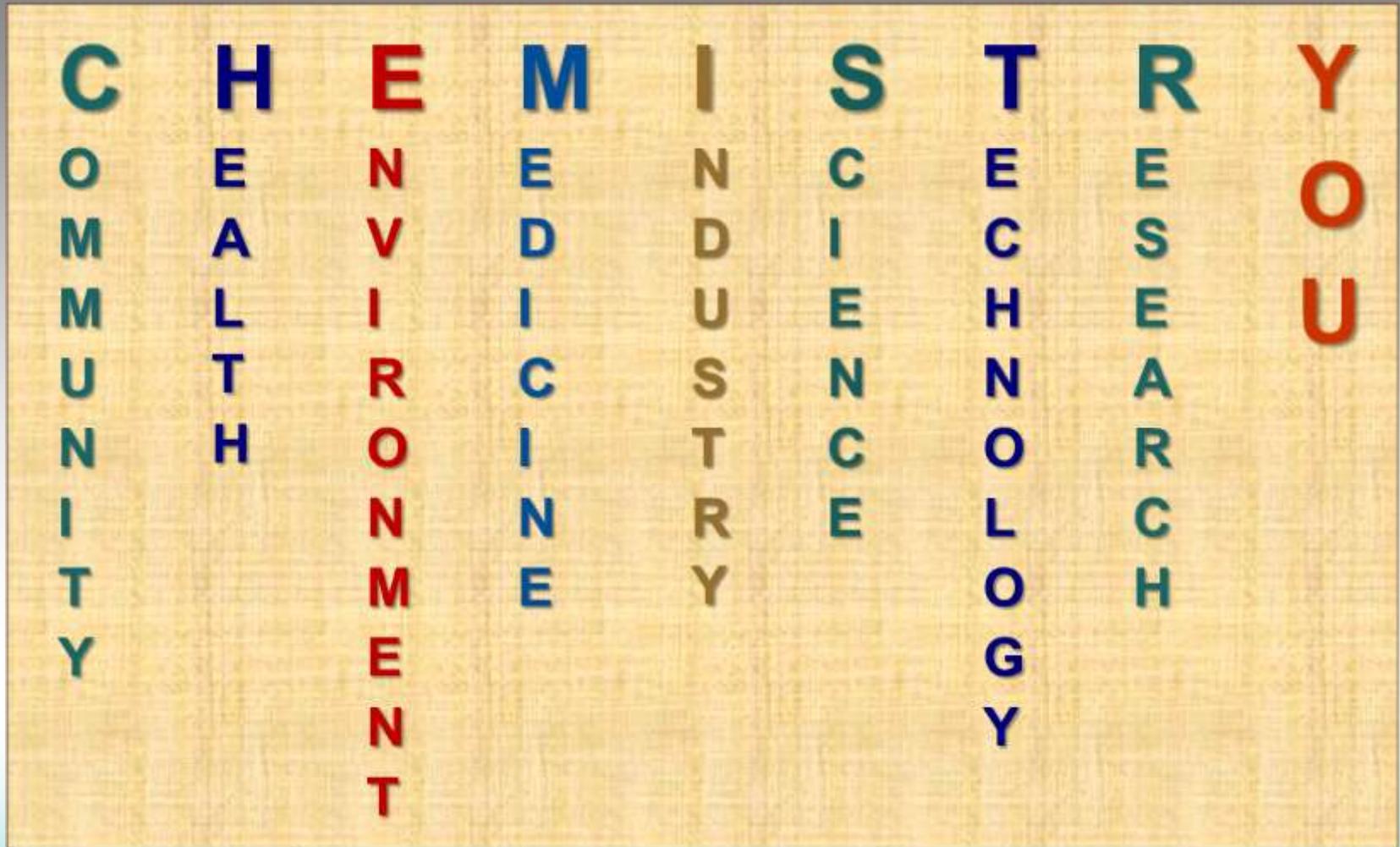
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# CHEMISTRY



*“Nothing is Lost, Nothing is Created, Everything is Transformed” Lavoisier*

# CHEMISTRY

**Chemistry:** A Branch of science that deals with the structure, properties, constituents and changes that takes place.

**Origin:** From “Chemes” meaning black color. Egyptian used to call black earth as “chemi”.

**Father:** Antoine Lavoisier [Paris, France] (August 26, 1743 - May 8, 1794) is known as the father of Modern Chemistry.

## Major Branches

**Physical Chemistry**  
**Organic Chemistry**  
**Inorganic chemistry**  
**Analytical Chemistry**  
**Bio-Chemistry**

# PHYSICAL CHEMISTRY

- ✓ The term was first coined by **MIKHAIL LOMONOSOV** long back in **1752**.
- ✓ It is the branch of Chemistry that deals with **principles and methodologies of both Chemistry and Physics** and deals with the **study on how chemical structure impacts physical properties of a substance**.
- ✓ The underlying physical principles that govern the properties and behavior of chemical systems are studied here and this can be done either from a **microscopic** or a **macroscopic** viewpoint.
- ✓ The **microscopic** viewpoint is based on the concept of molecules. This concept is used to study kinetic theory of gases, kinetics, statistics, quantum mechanics etc.
- ✓ The **macroscopic** viewpoint studies large-scale or bulk properties of matter without explicit use of the molecular concept. This concept is used to study thermodynamics mainly.

# MAIN BRANCHES OF PHYSICAL CHEMISTRY

**1. Thermodynamics:** It is a macroscopic science that studies the inter-relationships among various equilibrium properties of a system and also the changes in those equilibrium properties during any transformation; physical or chemical.

**2. Quantum Chemistry:** Molecules and the electrons, nuclei etc. that compose them do not obey classical mechanics. Instead, their motions are governed by the laws of quantum mechanics. Application of quantum mechanics to atomic structure, molecular bonding and spectroscopy gives us **quantum chemistry**.

**3. Statistical Mechanics:** The molecular and macroscopic level properties are related to each other by this branch of science. It gives insight into why the laws of thermodynamics hold and allow calculation of macroscopic thermodynamic properties from molecular properties.

**4. Kinetics:** It is the study of rate processes such as chemical reactions, diffusion, flow of charge in an electrochemical cell etc. Kinetics obviously uses relevant portions of thermodynamics, quantum chemistry and statistical mechanics too.

**THANK YOU!**

**ANY QUESTION ?**

