

Thermodynamics

1- INTRODUCTION

The word thermodynamics is a combination of two words 'therm' and 'dynamics'. 'Therm' means heat and 'dynamics' means motion.

Thermodynamics means motion of heat and its interconversion into work, it may be defined as the branch of science which deals with the quantitative relationships between heat and other forms of energy. It is pure mathematical science and based upon some generalization called "law of thermodynamics".

Importance:

These are following important application of thermodynamics:

- 1- In predicting the feasibility of a process. It can predict whether a particular process (physical and chemical) is possible or not under a given set of conditions.
- 2- In predicting the yields of the product. The thermodynamics relationship help to predict extent of a possible reaction till the equilibrium is attained.
- 3- In generating experimental results. By these laws one can generate the result of many different experiments.
- 4- In deducing some generalization of physical chemistry. The laws of thermodynamics can be used to deduce some important generalizations of physical chemistry like law of chemical equilibrium, distribution law, phase rule, Raoult's law of relative lowering in vapour pressure, depression in freezing point, etc.

Limitations :-

Following are the limitations of thermodynamics:

- 1- Its laws apply only to matter in bulk and not to individual atoms or molecules.
- 2- It can only predict the possibility of a process but not its success.
- 3- It does not tell anything about the reaction rate.
- 4- It does not explain the mechanism of a process.

② Some important Common thermodynamics terms.

1- System

The part of the universe selected for thermodynamics study is called system. For example, boiling of water in a beaker.

2- Surroundings.

The remaining part of the universe around the system which is not under study is called surroundings. For example, boiling of water in a beaker is an example of system and everything else around the beaker is the surroundings.

3- Boundary.

The region separating the system from the surroundings is called the boundary, for example wall of a beaker act as boundary wall ~~of the system~~ because it separates the system and surroundings. The boundary may be real or imaginary.

Types of Boundary:-

These are of following types:

- * Permeable boundary. It allows the passage of mass and energy both from the system to surroundings.
- * Impermeable or diathermal boundary. It prevents the passage of matter but allows the flow of energy through it.
- * An adiabatic boundary. It does not allow the passage of matter or energy through it.

4- Types of System.

Generally system may be classified into three categories:-

(i) open system. A system which can exchange matter as well as energy with its surrounding called an open system.

For example, boiling of water in an open beaker -

(ii) Closed system. A system which may exchange energy but not matter with surroundings is called a closed system, For example steam remains inside the vessel.

(iii) Isolated system. A system which can neither exchange matter nor energy with the surroundings is called an isolated system.