

Thermodynamic



Energy

Different form of energy- (interconvertible)

1. K.E

2. P.E

3. Heat energy (thermal energy)

4. Radiant energy (electromagnetic or light radiation)

5. Electrical energy

6. Chemical energy

Thermodynamics

- Thermo- heat and dynamic – motion.
- Branch of science which deals with the study of interconversion of different forms of energy and the quantitative relationship between them taking place in physical and chemical process.

Limitations

- Does not give info. Rate of physical or chemical process.
- Doesn't describe status, mechanism, history of the process.
- Only deals with microscopic systems.
- Thermodynamic is the only dynamics which does not consider time factor.

Chemical thermodynamics

Which gives a quantitative information of the energy change accompanying chemical process and explains chemical behavior,

Eg. Heat of reaction, effect of temperature on chemical reactions, etc.

System, Surrounding and Boundry

- **System**- the portion of the universe under thermodynamic consideration to study thermodynamic properties is called a system.
- Under universe portion is system.
- Here thermodynamics means P, V, T, n, E etc.
- System may be very large or very small.
- System is confined by a real or an imaginary boundry.
- Human, boil water, animal etc.

Surroundings

- **The remaining portion of the universe.**
- **It represent large stock of mass and energy.**
- **Can exchange energy with system when allowed.**
- **Eg. Universe, environment, earth etc.**

Boundary

- **The wall separating the system from its surrounding.**
- **Boundary may be real or imaginary.**
- **Boundary exchange heat, matter, between system and surrounding.**
- **Everything outside the boundary is surrounding.**
- **Eg. Hot water beaker wall of the beaker = real boundary. While open portion show imaginary boundary.**

Types of system

- **Open system**
- **Closed system**
- **Isolated system**
- **Homogeneous system**
- **Heterogeneous system**

Open system

- System which **exchange** both **matter** and **energy** with its surroundings.

Eg. Beaker containing water.

- **Exchange-** Water continuously absorbs energy from its surroundings and from vapour release it.

Closed system

- **Exchange energy not matter.**

Example- closed vessel containing hot water so that only heat is lost not matter.

Isolated system

- Can **neither** exchange energy **nor** matter.

Example- hot water filled in **thermally** insulated closed vessel like **thermos flask**.

- in actual perfect isolated system is not possible.
- Universe is an eg. Of isolated system.
- Universe has no boundary, surrounding.

Homogeneous system

- Only one phase system.
- Single **component** system – Zn, O, Water.
- **Solution** miscible **liquid**- water and alcohol or NaCl and water etc.
- Mixture of **gases**- H, N, O etc.

Heterogeneous system

- **Two separated** phase by boundary.
- Mixture of immiscible liquid- Water and benzen.
- Solid identical with liquid- ice and water.
- Liquid identical with vapour- water and vapour.