

THERMODYNAMICS - 1

DEFINITION

- The branch of science which deals with the transformation of energy into various forms is called as thermodynamics.

TERMS INVOLVED IN THERMODYNAMICS

- System –The specific portion of the universe which is under thermodynamic consideration is called as system.
- Surroundings- The remaining part of the universe other than system is called as surroundings.
- System+ Surroundings = Universe

TYPES OF SYSTEM

- Open System –The system in which can exchange both energy and matter with the surroundings is called as open system.
- For Ex.-water boiling in a beaker.
- Closed System -The system in which can exchange energy but not the matter with the surroundings is called as closed system.
- For Ex. –Closed container containing hot water.

- Isolated system : the system which can not exchange neither energy nor matter with the surroundings is called as an isolated system.
- For Ex.-Hot tea in thermos flask.
- Properties of system-
- Extensive Properties –The properties whose value depend upon the amount of matter present in the system are called as extensive properties.
- For ex. Mass, volume, internal energy

- Enthalpy, entropy, free energy, heat capacity, no. of moles etc.
- Intensive Properties –The properties of the system whose values are independent of matter present in the system are called as intensive properties.
- For ex.-Pressure, temperature, density, viscosity, refractive index, surface tension.

THERMODYNAMIC PROCESSES

- Isothermal Process –The process which is carried out at constant temperature is called as isothermal process.
- Adiabatic Process –The process in which heat can not be exchanged with the surrounding by the system is called as adiabatic process.
- Isobaric Process – The process carried out at constant pressure is called as isobaric process.

- Isochoric Process –The process carried out at constant volume is called as isochoric process.
- Cyclic Process –The process in which the system undergoes a series of changes in state and returns to its initial state is called as cyclic process.

REVERSIBLE PROCESS -

The process which is carried out infinitesimally

slowly and the direction can be reversed at any step by slightly changing the conditions is called as reversible process.

Irreversible process – The process in which direction can not be reversed and occurs relatively fast is called as irreversible process.

STATE FUNCTION

The function which only depends on the state of the system and is independent of the path achieved is called as state function.

For ex.-enthalpy, entropy, internal energy.

Path function – The functions which depend on path by which state of the system has been achieved is called path function.

For ex.- Work done

DIFFERENCE BETWEEN REVERSIBLE AND IRREVERSIBLE PROCESS

- Reversible process –
- It takes place in both the direction.
- It takes place infinitesimally slowly.
- There is equilibrium at every stage.
- Work done is maximum.
- It is nonspontaneous.
- Its efficiency is maximum.
- Ex. Fusion of ice.

IRREVERSIBLE PROCESS

- It takes place in only one direction.
- It takes place in relatively faster.
- There is equilibrium only at the end.
- Work done is not maximum.
- It is spontaneous.
- Its efficiency is minimum.
- For ex. Diffusion of gas