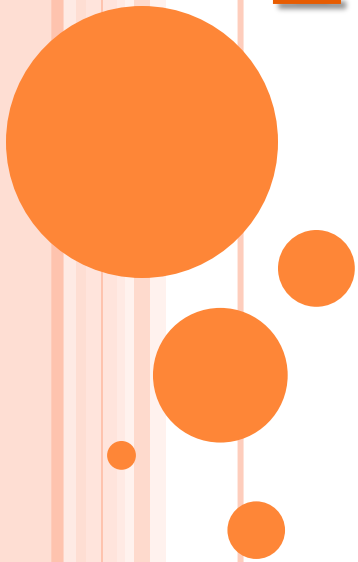


THERMODYNAMIC



Thermodynamic is a branch of science that deals with quantitative relationship between heat and other terms of energy .



FIRST LAW OF THERMODYNAMICS

:

The first law of thermodynamics states that this energy difference ΔE depends only on the initial and final states and in no way on the path followed between them. Both q and w have many possible values, depending exactly how the system passes from A and B, but their sum $q + w = \Delta E$.



THE SYSTEM AND SURROUNDING :

the part of the universe
chosen for thermodynamic
considerate the study the
effect of temperature ,
pressure is called **system** .



THE SYSTEM AND SURROUNDING :

The remaining portion of the universe excluding the system , is called **surrounding** .



SYSTEM TYPE :

Open system

Closed system

Isolated system



SYSTEM TYPE :

Open system : A system is said to be an open system if it can exchange both matter and energy with the surrounding.

For example some water is kept in an open vessel exchange of both matter and energy take place between the system and the surroundings



SYSTEM TYPE :

Closed system : if a system can exchange only energy with the surrounding but not matter its called closed system .

For example , if some water is placed in closed metallic vessel , then as the vessel is closed , no exchange of matter between the system and the surrounding can take place .



SYSTEM TYPE :

Isolated system : if a system can exchange neither matter nor energy with the surrounding .

For example water is placed in a vessel which is closed as well as insulated , no exchange of matter or energy can take place between the system and the surrounding .



THE GENERAL EXPRESSION FOR WORK :

Expansion work :

A- The work done when the system expands by against a pressure .

$$w = - p_{ex} dv$$



EXPANSION WORK :

B- Free expansion :

by free expansion we mean expansion against zero opposing force . it occurs when $p_{ex} = 0$ according $dw = 0$ for each stage of the expansion that is , no work is done when a system expands freely . expansion of this kind occurs when system expand in to vaccum .



EXPANSION WORK :

C- Expansion against constant pressure : now suppose that the external pressure is constant through the expansion . for example the piston may be pressed on by the atmosphere .



EXPANSION WORK :

D- Reversible expansion :

the pressure inside the system appears in this expression for the work it does so only because p_{ex} has been set equal to p to ensure reversibility . the total work of reversible expansion is therefore .



EXPANSION WORK :

E- Isothermal reversible expansion :

the expansion is made isothermal by keeping the system in thermal contact with its surroundings (with constant – temperature)

