CHEMICAL TERMODYNAMIS (PHYSICAL THERMODYNAMICS)

It is the branch of physical chemistry which deals with the relation of heat with chemical , biochemical , and physio chemical process.

TERMINOLOGY OF THERMODYNAMICS

1. System:It is the small part of the universe that is under study in thermodynamics.
2. Surrounding :It is the part of universe except the system.
3. Boundary:It is the part that separate system and surrounding.

Nature of boundary

1. Boundary may be real or imaginary.
2. Boundary may be rigid or flexible.
3. Boundary may be conducting(diathrmic) or adiabatic(non-conducting).

TYPES OF SYSTEM

1. Open system : The system that exchange mass as well as energy to the surrounding is called open system.
2. Close system : The system that exchange energy with the surrounding but not mass is called close system.
3. Isolated system : The system that exchange neither mass nor energy to the system is called isolated system.

Extensive and Intensive property

The property that depends upon the quantity or size of the system is called extensive property.

For example heat ,energy enthalpy entropy gibb’s free energy , etc.

The property of a system that does not depends upon the quantity or a size of the system is called intensive property.

For example density, specific heat capacity,refractive index, temperature,pressure, etc.

State function and path function

The property or parameter that depends only upon initial and final state of a system but not the path followed by a system is called state function. For example temperature, pressure, volume, inthalpy, entropy, Gibbs free energy ,etc.

Mathematically

∆T=Tf-Ti

∆P=Pf-Pi

∆H=Hf-Hi

∆V=Vf-Vi

∆S=Sf-Si

∆G=Gf-Gi

The property or parameter that also depends upon path followed by the system is called path function. For example heat and work.

∆w≠wf-wi

q≠qf-qi

Thermodynamic process

1. Isothermal process
2. Isobaric process
3. Isochoric process
4. Adiabatic process
5. Cyclic process
6. Isothermal process

The process in which temperature remains constant is called isothermal process.

I.e ∆T=Tf-Ti

∆T=0

1. Isobaric process

The process in which pressaure remain constant is called isobaric process.

I.e ∆P=Pf-Pi

∆P=0

1. Isochoric process

The process in which volume remains constant is called isochoric process.

I.e ∆V=Vf-Vi

∆V=0

1. Adiabatic process

The proces in which heat remains constant is called adiabatic process.

I.e Q=0

1. Cyclic process

The process in which a system undergoes neumerous stapes and retuns to the original position is called cyclic process.

∆P=Pf-Pi

∆p=0

∆V=Vf-Vi

∆v=0

∆T=0

∆H=0

∆S=0

∆G=0

∆w≠0

q≠0

Reversible process and irreversible process

Reversible process

1. It is the process that takes place in infinitesimally small steps.
2. It is a slow process that completes in infinite time.,
3. It can be reversed
4. Reversible process is imaginary.

irreversible process

1. It is the process that takes place at once.
2. It is the fast process that completes in finite time.
3. It cannot be reversed.
4. All the naturally occuring process is irreversible.

EXCHANGE OF ENERGY IN BETWEEN SYSTEM AND SURROUNDING

1. IN THE FORM OF ENERGY

CASE 1;

Temperature of system > temperature of surrounding

(hot) (cold)

Here, heat flows from system to surrounding

i.e heat lost by system

Qsay=-ve

Case 2;

Tsystem < Tsurrounding

(cold) (hot)

Here , heat flows from surrounding to system

i.e heat gained by system

qsay=+ve

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