

Internal Energy (U)



- ❖ Internal energy is defined earlier as the sum of all the microscopic forms of energy of a system.
- ❖ It is related to the molecular structure and the degree of molecular activity, and can be viewed as the sum of the kinetic and potential energies of the molecules.
- ❖ The total energy of a system, can be contained or stored in a system, and thus can be viewed as the static forms of energy.

Internal Energy (U)



- ❖ U can only repose at the microscopic level of atoms and molecules, essentially in the form of translational, vibrational and rotational energies.
- ❖ To this may be added the potential energy of intermolecular interactions
- ❖ The internal energy is also associated with various binding forces between the molecules of a substance, between the atoms within a molecule, and between the particles within an atom and its nucleus.



Calculating Enthalpy

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$$H(T, P) = \left(\frac{\partial H}{\partial T} \right)_P dT + \left(\frac{\partial H}{\partial P} \right)_T dP$$

Joules Thomson Effect (JT Effect)

$$C_p = \left(\frac{\partial H}{\partial T} \right)_P$$

$$Q = n\Delta H = n \int_{T_1}^{T_2} C_p dT$$

$$dH = C_p dT + \left(\frac{\partial H}{\partial P} \right)_T dP$$