Department of Mining Engineering
-2nd-Class
College of Petroleum and Mining Engineering
University of Mosul

Thermodynamics
Lecture 3
Forms of Energy

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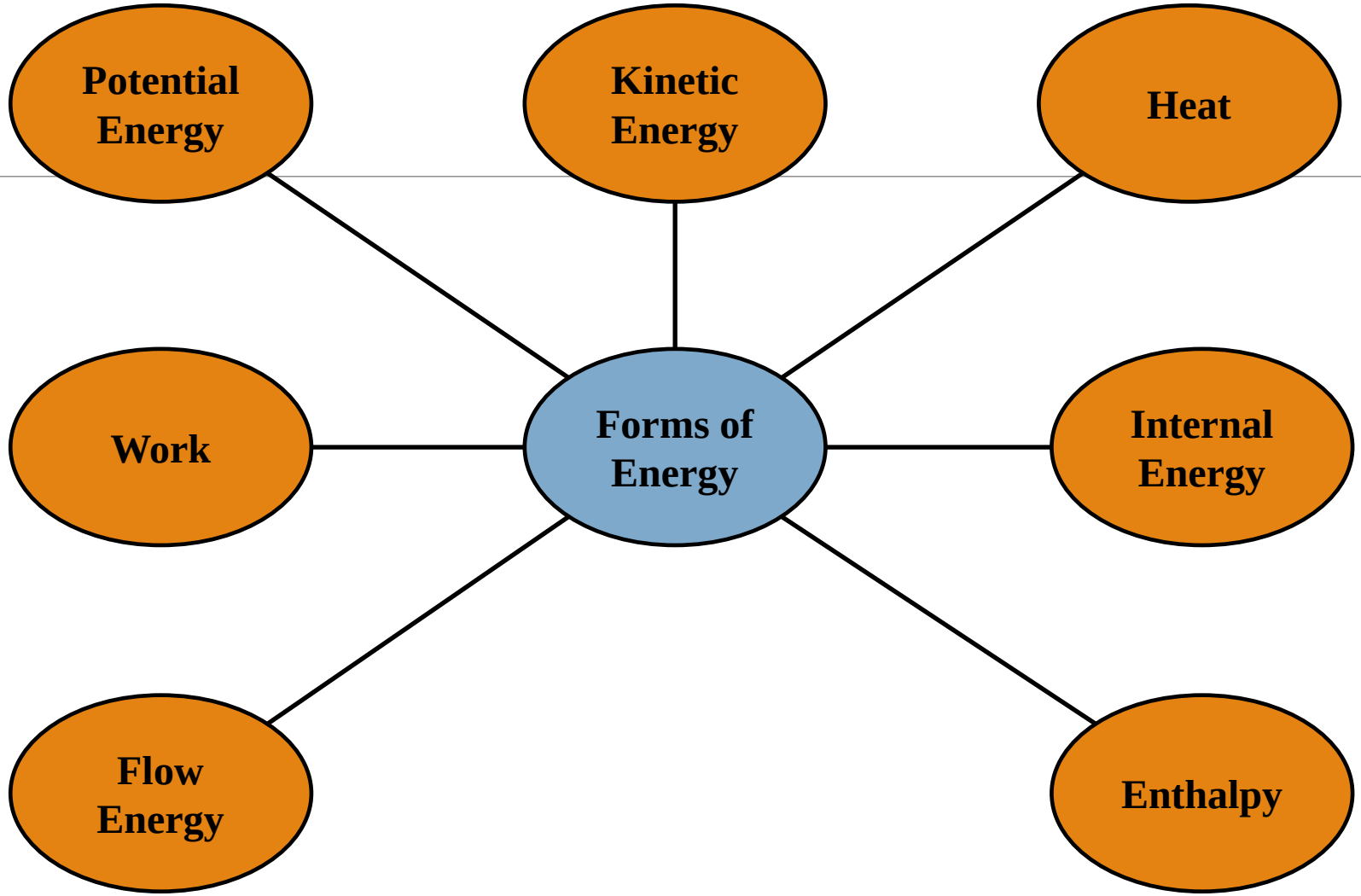

Potential Energy
Kinetic Energy
Heat
Work
Forms of Energy
Internal Energy
Flow Energy
Enthalpy

Types of Energy

Mechanical Energy

Thermal Energy

Nuclear Energy

Chemical Energy

Electromagnetic Energy

Sonic Energy

Gravitational Energy

Kinetic Energy

Potential Energy

Ionization Energy

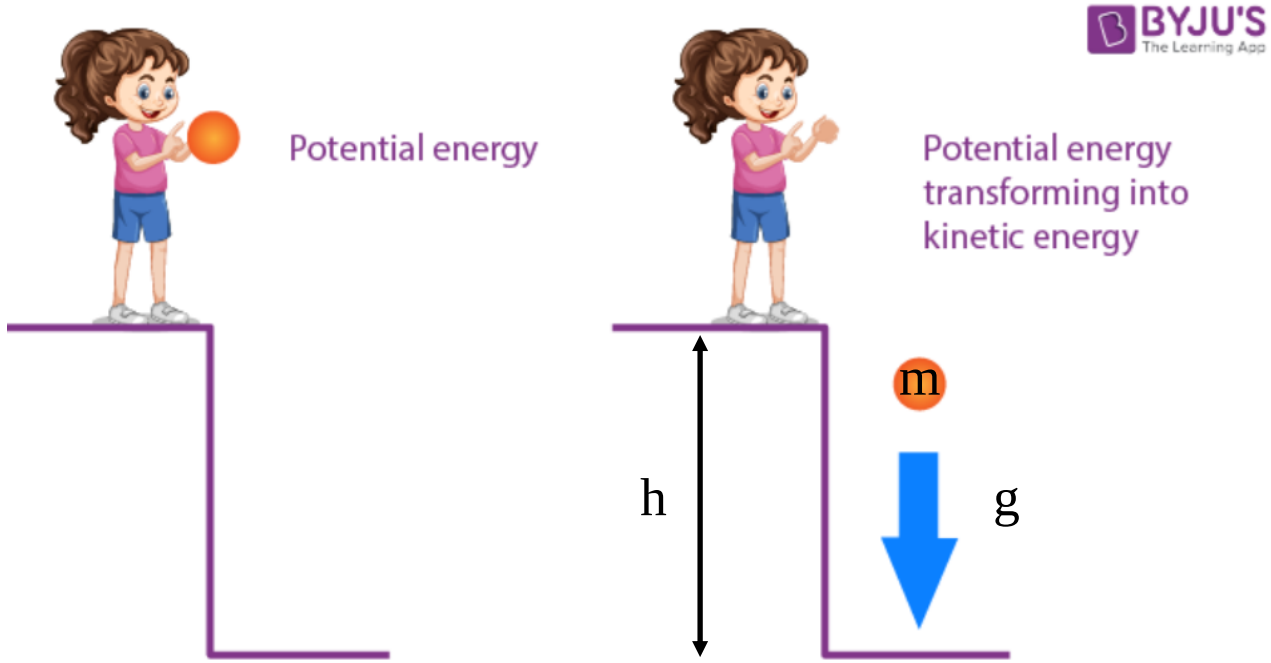
1- Potential Energy (P.E.)

It is the energy stored in a system due to its height from the earth's surface. Also, it is known as Gravitational potential energy.

$P.E. = mgh$

$= m$ (kg) g (m/s^2) h (m)

= N.m = J



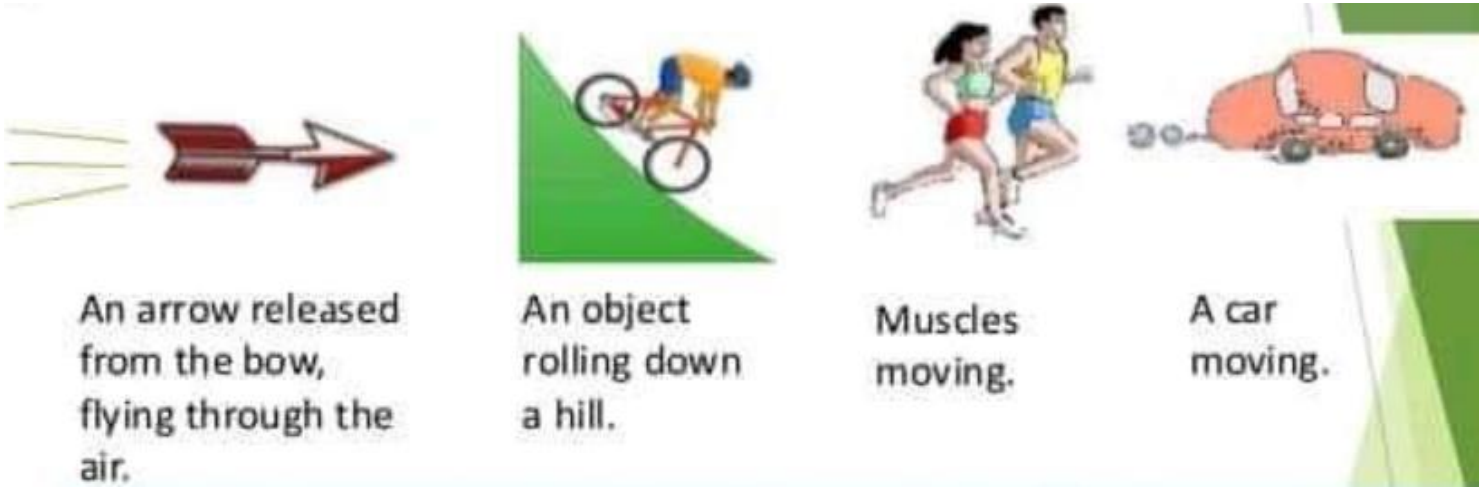
2- Kinetic Energy (K.E.)

It is the energy needed to move a mass at a given speed.

$$K.E. = \frac{1}{2}\, m\, C^2$$

$$= \frac{1}{2}\, m\, (kg)\, C^2\, (\frac{m^2}{s^2})$$

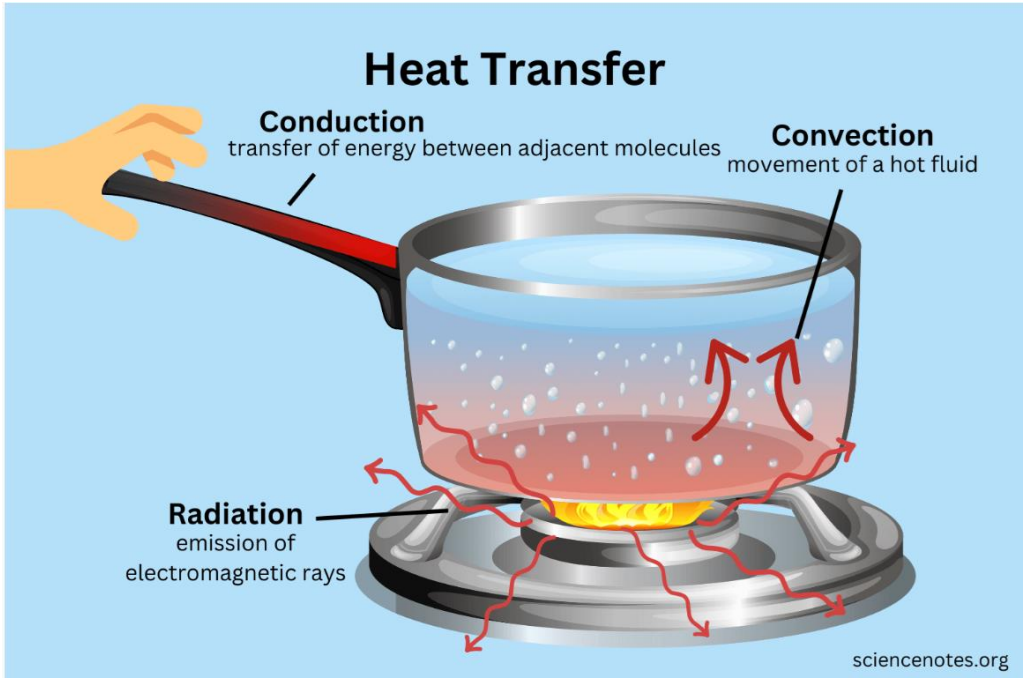
= N.m = J



3- Heat (Q)

It is the energy transfer across the system due to the temperature difference.

- Heat is taken (+), when heat is added to the system.
- Heat is taken (-), when heat is removed from the system.

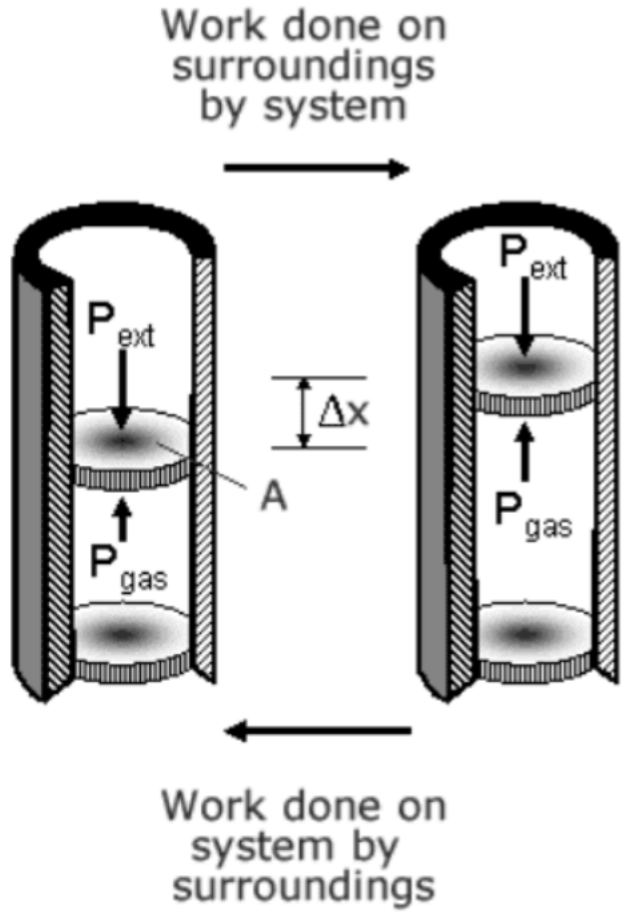


4- Work (W)

It is a mechanical energy transfer across the system.

$$W = F\ x$$
$$= F\ (N)\ x\ (m)$$

- Work is given (+), if it is done by the system on the surrounding.
- Work is given (-), if it is done on the system from the surrounding.



5- Internal Energy (U)

It is the energy stored in a mass of a system and appear only at a special action.

$$\Delta U = m\ Cv\ (T_2 - T_1)$$
$$= m\ (kg) Cv\ (\frac{J}{kg\ K})(T_2 - T_1)(K)$$

where Cv is a specific heat at a constant volume.

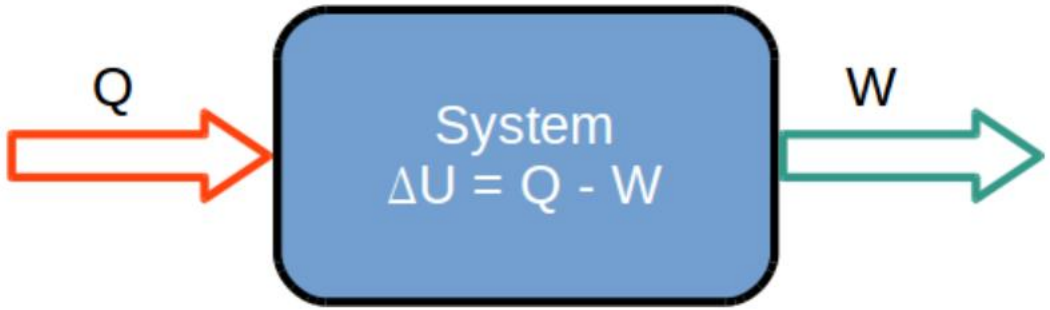


Image: Internal energy

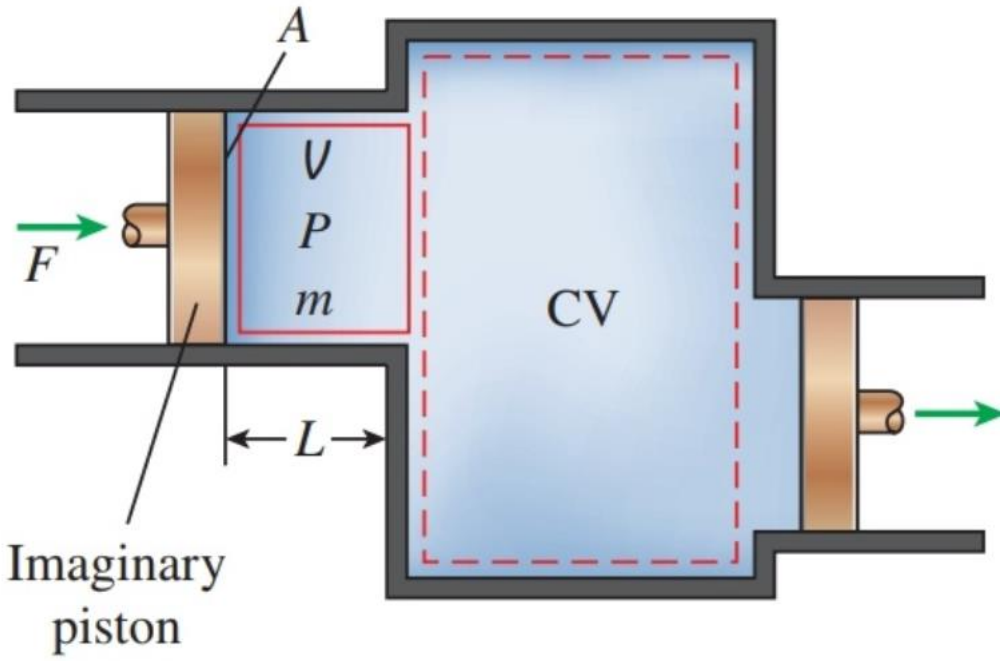
6- Flow Energy (F.E.)

It is the energy required to move gas at a steady rate without changing its state.

$$F.E. = p\ A\ L$$

$$F.E. = p\ V$$

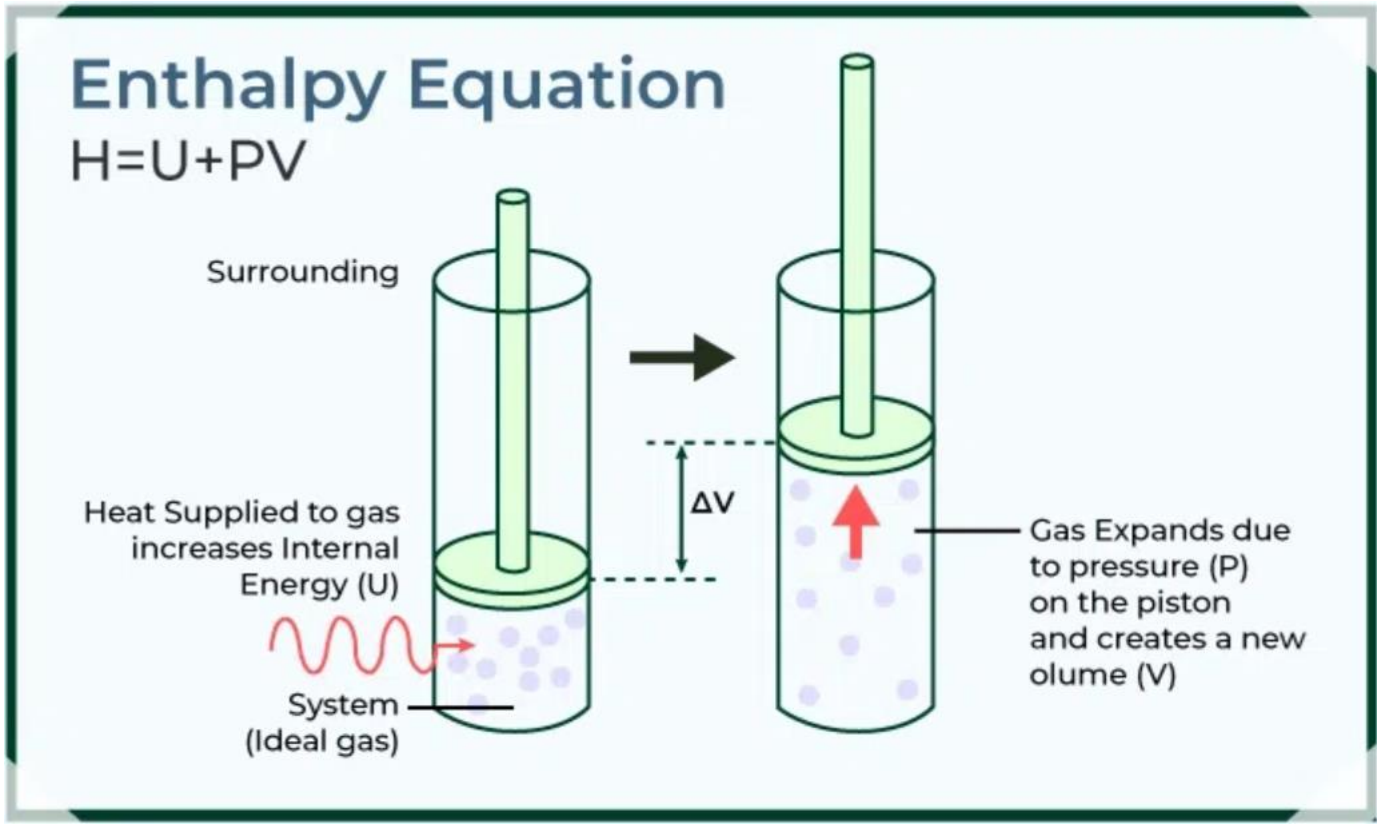
$$= p\ (\frac{N}{m^2})A\ (m^2)L$$



7- Enthalpy(H)

It is the energy that represents the summation of both flow and internal energies.

$H = U + PV$



Thank you for listening