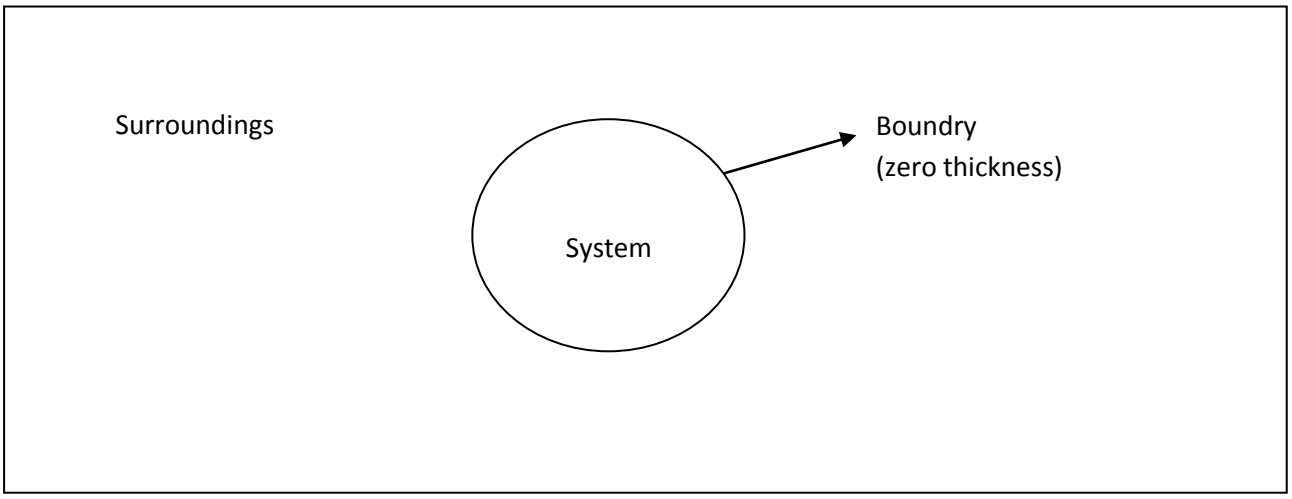
OPEN AND CLOSED SYSTEM

System is defined as a quantity of matter or region in space chosen for study. The region outside the system is surroundings and real or imaginary surface that seperates the system from sorrounding is called a boundry



Closed System: No mass can transfer between system and surround but energy transfred can possible.

Open System: Energy and mass can transfer between system and surround.

Isolated System: Energy and mass cannot transfer between system and surround.

Forms Of Energy

Energy can exist in numerousforms like as mechanical, kinetical etc. And sum of this type of energies defines as total enrgy € of a system.

Total energy of a system on a unit mass basis denoted by e and is defines as;

$$e = E/m \qquad (1)$$

Thermodynamic provides no information about the absolute value of the total energy. It deals with the change of the energy forms.

Kinetic Energy: Kinetic energy define the energy causes by motion.

$$KE = \tfrac{1}{2}\, m\, V^2 \qquad (2)$$

Potential Energy: Potential energy define as a result of its elevation.

$$PE = m\ g\ z \tag{3}$$

Internal energy: Internal energy define as sum of all microscopic types of energy causes by molecular behaviour of substances. Internal energy denoted as "U".

We have another types of energy such as electrical, magnetic etc. But generally we omit these type of energies because these energies represent a relatively small portion of total energy then the major types of energy.

The total energy of system expressed as;

$$E = KE + PE + U \tag{4}$$

$$e = ke + pe + u \text{ (in unit mass basis)} \tag{5}$$

In closed system no mass transfer allowed and we omit kinetical and potential energies. So, the total energy of system become;

$$E = U \tag{6}$$

Properties of System

Any charecteristic of a system is called property. Property is seperate one system to another. Most common properties are pressure (P), Temperature (T), volume (V) and mass (m). These properties are independent properties. But not all of the properites is independent, they derived in terms of other ones like derived (secondary) dimensions.

Density: Density is an example of derived properties and it's defined as mass per unit volume.

$$\rho = m/V \tag{7}$$

Specific Gravity: Specific gravity defined as the ratio of the density of a substance to the density of a standart substance at a specified temperature. Generally density of standart substance accepted as the density of water at 4 ℃. Specific gravity denoted as SG and expressed;

$$SG = \rho_a/\rho_s \tag{8}$$

Specific Volume: Specific volume is expressed the volume per unit mass. İt is practically reverse form of density. Reverse density generally more usable in thermodynamics rather then density. Specific volume define as;

$$v = V/m \tag{9}$$

In thermodynamics we divede properties in two groups.

Intensive Properties: Independent of the size of system such as Temperature (T), Pressure (P) and density (ρ).

Extensive Properties: Properties depend of the size of system such as volume (V) and mass (m).

Also, Extensive properties per unit mass is called speciific properties.