Thermodynamics Basics for NET, IAS, State-SET (KSET, WBSET, MPSET, etc.), GATE, CUET, Olympiads etc. 2023

Thermodynamics: Laws Of Thermodynamics And Heat Transfer Processes (Environmental Science) [https://youtu.be/AxrkpIClILE]

It a branch of science which d changes in energy that accompa or chemical changes in m

1.Establish feasibility of the reaction	1.Applicable process
2. Extent of reaction after feasibility is establishes	2. It predicts process but n
3. Deduce generalisations of physical chemistry	3. It does mechanism o

Laws of Thermodynamics

- First Law:

Stated by Mayer and Helmholtz

Energy can neither be created nor destroyed by any physical or chemical change. It may change from one form to another.

$$\Delta U = q + w$$

Where, U = Energy of the system

q = amount of heat

w = Work done by the system

- Second Law:

According to Kelvin, it is impossible to take heat from a cold reservoir and convert it into work without at the same time transferring heat from a hot to cold reservoir.

- Third Law:

It is not possible to reduce the temperature of any system to absolute zero by any method involving finite number of operations, however, the ideal method may be.

Heat Transfer Processes

- Planck's Law

Every object emits over the entire electromagnetic spectrum.

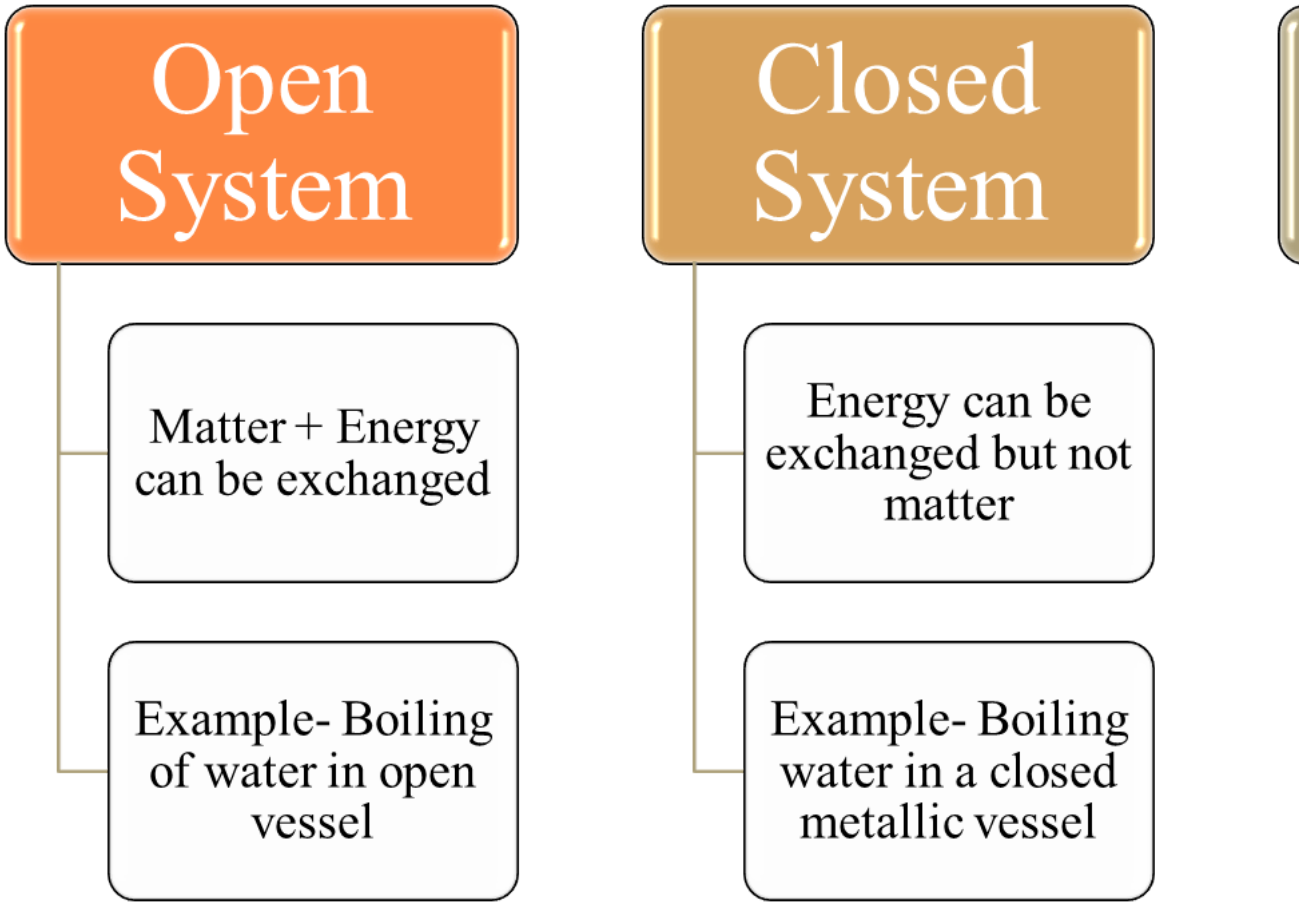
- Stefan-Boltzmann Law

Total energy emitted by a black body is directly proportional to fourth power of its temperature.

- Wien's Displacement Law

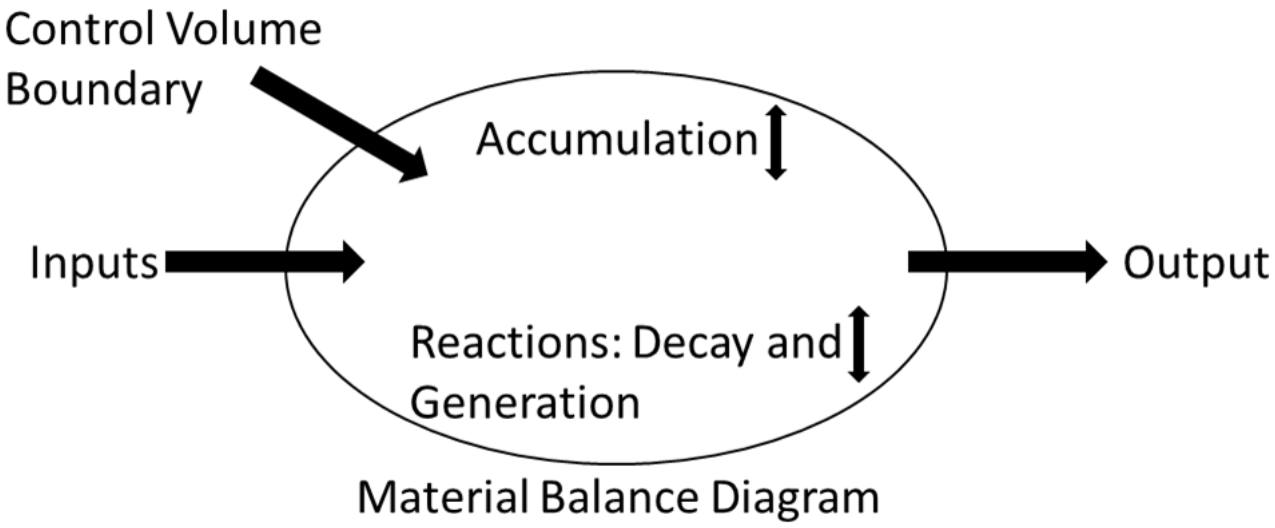
The product of peak wavelength and temperature of a blackbody radiator is constant.

Mass and Energy Transfer Across Various Interfaces


Open System
Matter + Energy can be exchanged
Example- Boiling of water in open vessel
Closed System
Energy can be exchanged but not matter
Example- Boiling water in a closed metallic vessel

Material Balance

- Also known as Mass balance.
- Used to find the accumulation of a contaminant/pollutant/substance in a particular region.
- Those particular region are also called as control volume.



Material Balance Diagram

Mass Balance Equation

Accumulation rate = Input rate – Output rate + Reaction rate

- **For Steady-State conservation Systems**

Input rate = Output rate

#Thermodynamics

#UGC NTA NET

#Fundamentals of Environmental science

#Laws of thermodynamics

#Thermodynamicprocess

#Mass and energy transfer across interfaces

#Material balance

✍ Mayank