B.Sc. (Chemistry Hons)-I

2nd Lecture 01/04/2020

Thermodynamics

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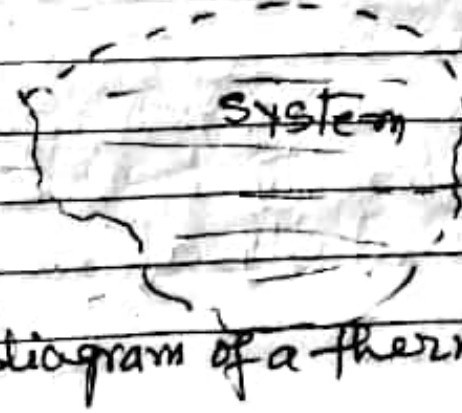
System or Surroundings

In order to avoid confusion, Scientists discuss thermodynamic values in reference to a system and surroundings: Everything that is not a part of the system constitutes its surroundings. The system and surroundings are seperated by a boundary. For example, if the system is one mole of a gas in container, then the boundary is simply the inner wall of the container itself. Everything outside of the boundary is considered surroundings which include the container itself.



A diagram of a thermodynamic system.

The boundary must be clearly defined so one can clearly say weather a given part of the world is in the system or in the surrounding. If the matter is not able to pass across boundary then the system is said to be closed otherwise it is open. A closed system may still exchange energy with the surroundings unless the system is an isolated one, in which case neither matter nor energy can pass across the boundary.

Second Law of Thermodynamics

Introduction :-

The Second Law of Thermodynamics says that when energy changes from one form to another form or matter moves freely, entropy (disorders) in a closed system increases.

Difference in temperature, pressure and density tend to even out horizontally after a while. Due to the force of gravity, density

and pressure do not even out vertically. Density and pressure on the bottom will be more than at the top.

Entropy is a measure of spread of matter and energy to every where they have access.

Example of Entropy:-

A campfire is an example of entropy. The solid wood burns and become ash, smoke and gas, all of which spread energy outwards more easily than the solid fuel. Ice melting, salt and sugar dissolving and boiling water for tea are processes with increasing entropy.

The most common wording for the Second Law of Thermodynamics is essentially due to Rudolf clausium :- It is impossible to construct a device that produces no other effect than transfer of heat from lower body temperature to higher temperature body.

In other words everything tries to maintain the same temperature

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overtime.

The second law only applies to large systems. The bigger the system then the more likely the second law will be true.

In a general sense the second law says that temperature differences between systems in contact with each other tend to even out and that work can be obtained from these non-equilibrium differences but loss of thermal energy occurs when work is done and entropy increases.

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