

CHAPTER 06

HEAT

Units of Heat:

S.I Unit – Joule (J)

C.G.S Unit – Calorie (Cal)

“The amount of heat required to rise the temperature of 1g of water by 1°C is called Calorie”.

$$1 \text{ Cal} = 4.186 \text{ J}$$

Relationship between KE and Temperature:

It can be observed that average kinetic energy of molecules or particles of a hotter body is greater than that of colder body.

“The average KE of the molecules is directly proportional to the absolute temperature”.

$$\boxed{KE \propto T}$$

Specific heat of a substance:

“Specific heat of a substance is the amount of heat required to rise the temperature of unit mass of substance by one unit”.

The amount of heat (Q) absorbed by a body,

$$Q \propto \Delta T \quad (\text{When 'm' constant})$$

$$Q \propto m \quad (\text{When '}\Delta T\text{' constant})$$

$$Q \propto m\Delta T$$

$$\Rightarrow Q = mS\Delta T$$

S – Proportionality constant called specific heat of a substance.

$$S = \frac{Q}{m\Delta T}$$

S.I Unit: J/Kg – K

C.G.S Unit: Cal/g - °C

$$1 \text{ Cal/g} - ^\circ\text{C} = 420 \text{ J/Kg} - \text{K}$$

If specific heat is HIGH then rate of rise or fall in temperature is LOW for same quantity of heat supplied. This is the reason why oil gets heated earlier than water when they are heated at same temperature because specific heat of oil is less than specific heat of water.

Specific heat of a substance depends upon the nature of the substance. As we know $KE \propto T$, the molecules of system have different forms of energies such as linear KE, rotational KE, vibrational energy and PE. This energy together is called internal energy of the system when a heat is given to the system it will be shared by the molecules in the various forms. Its maximum share of heat energy is utilized in increasing linear KE, the temperature varies. That is why specific heat is different for different substances.