

Notes on Heat and Thermodynamics



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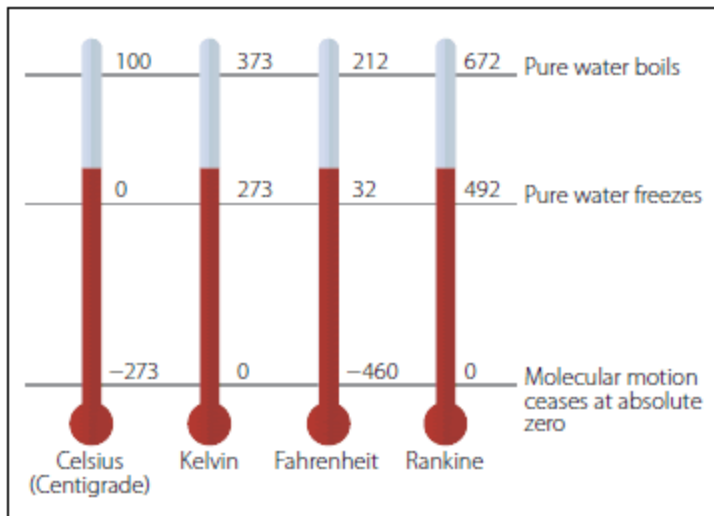
► Heat

- Heat is a form of energy, which measures the sensation or perception of warmth or coldness of a body or environment
- Its unit is a calorie, kilocalorie or joule.
- 1 calorie = 4.18 joule.

► Temperature

- Temperature is the measurement of the hotness or coldness of a body.
- When two bodies are placed in contact, heat always flows from a body at a higher temperature to the body at a lower temperature.
- An instrument used to measure the temperature of a body is called a thermometer.
- The normal temperature of a human body is 37°C or 98.4°F
- -40° is the temperature at which Celsius and Fahrenheit's thermometers read the same.
- The clinical thermometer reads from 96°F to 110°

- The white roof keeps the house cooler in summer than the black roof because a white roof reflects more and absorbs fewer heat rays whereas the black roof absorbs more and reflects fewer heat rays.
- Ice wrapped in a blanket does not melt away quickly because the woollen blanket is a bad conductor of heat.
- Silver is the best conductor of heat.
- Cooking utensils are made of aluminium, brass, and steel because these substances have low specific heat and high conductivity.



► Thermal Expansion

- Thermal expansion is the increase in the size of heating.
- A solid can undergo three types of expansions-
 - (i) Linear expansion
 - (ii) Superficial expansion
 - (iii) Cubical expansion
- The relation between the coefficient of linear expansion (α), the coefficient of superficial expansion (β), the coefficient of cubical expansion (γ)

$$\alpha: \beta: \gamma = 1: 2: 3$$
- Telephone wires are kept loose to allow the wires for contraction in winter.

- A gap is provided between two iron tracks of the railway track so that rails can easily expand during summer and do not bend.

► Specific Heat

- The amount of heat required to raise the temperature of a unit mass of a substance through 1°C , is called its specific heat.

- When the temperature of the water is increased from 0°C , then its volume decreases up to 4°C , becomes a minimum at 4°C and then increases.

- This behavior of water around 4°C is called the anomalous expansion of water.

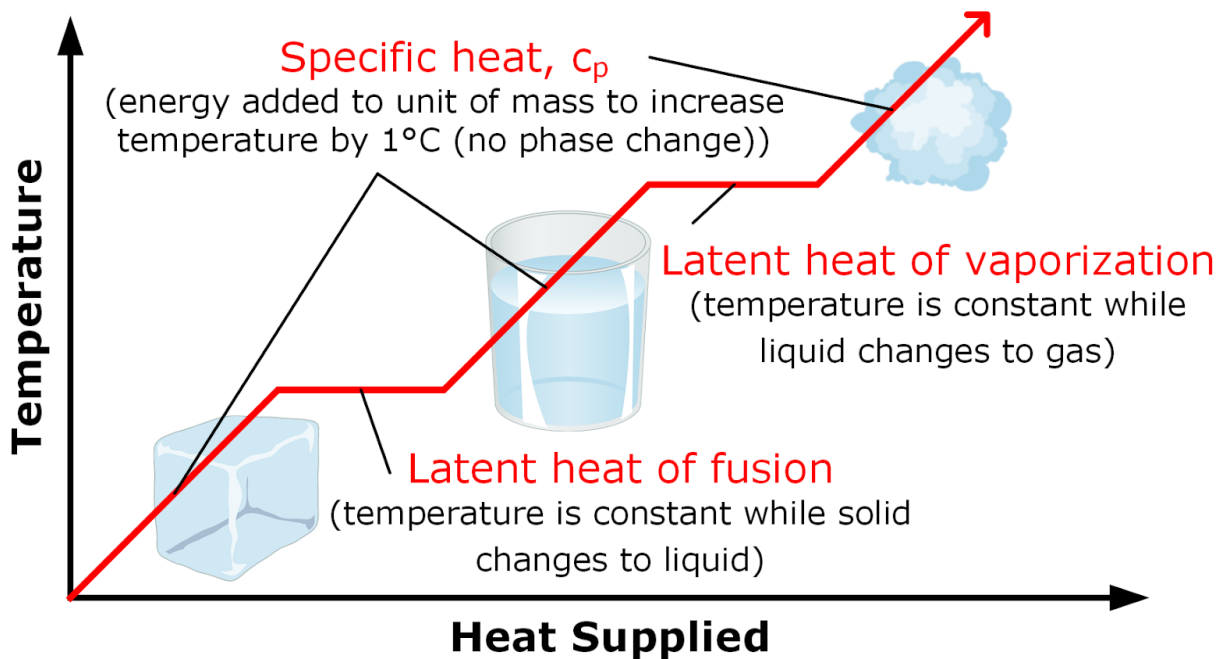
► Latent Heat

- The heat energy absorbed or released at constant temperature per unit mass for a change of state is called the latent heat.

- The latent heat of fusion of ice is 80 cal/g .

- Latent heat of vaporization of steam is 536 cal/g .

- Hot water burns are less severe than that of steam burns because steam has high latent heat.



► Evaporation

- It is the slow process of a conversion of a liquid into its vapour even below its boiling temperature.
- The amount of water vapour in the air is called humidity.
- The relative humidity is measured by the hygrometer.
- Relative humidity increase with the increase of temperature.

► Transmission of Heat

- Transfer of heat from one place to another place is called the transmission of heat.
- In solids, the transmission of heat takes place by the conduction process.
- In liquids and gases, the transmission of heat takes place by convection process. In-the room, ventilators are provided to escape the hot air by convection.
- The heat from the Sun reaches the Earth by radiation.

Heat Transfer

Conduction, Convection and Radiation

