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TENDER HEART HIGH SCHOOL, SEC-33'B, CHD

CLASS - VII SUBJECT - PHYSICS

CHAPTER - 5 TEACHER - Charanjeet Kaur

Good Morning students!

This lesson is of Class - VII, for the subject of 'Physics', Chapter - 5 'Heat'. We will learn today about the topic of 'Heat and Temperature'.

INTRODUCTION TO HEAT - (as a form of energy)

Heat is a form of energy which flows from a hot body to a cold body when they are kept in contact.

FOR EXAMPLE - When we touch hot water, we feel warm. This happens because when we touch hot water, heat energy flows from hot water to our hand and when we touch an ice cube, we feel cold because in that case heat energy flows from our hand to the ice cube.

- S.I. unit of Heat is - **JOULE (J)**
- ★ The other common unit of heat are **CALORIE (cal)** and **KILOCALORIE (kcal)**.

1 cal = 4.2 J or, 1 J = 0.24 cal

- One calorie is defined as the heat energy required to raise the temperature of 1 g of water by 1°C.

TEMPERATURE: Temperature is a quantity which tells us the degree of hotness or coldness of a body. When a body is heated, its temperature rises and when it is cooled, its temperature falls. Heat always flows from high temperature to low temperature. Thus, temperature can be referred as a property which tells us the direction of heat flow.

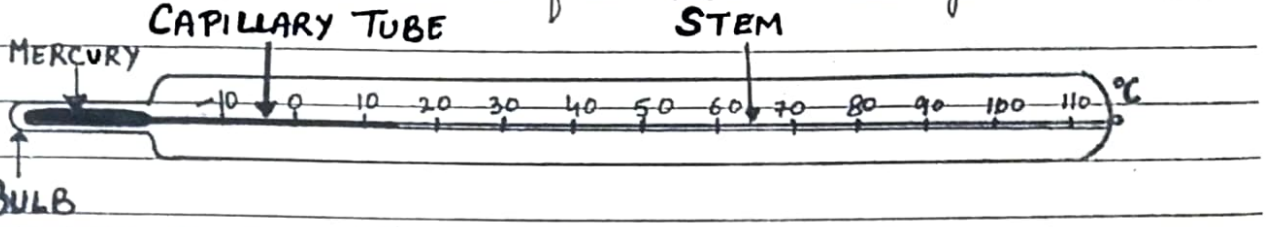
Temperature is measured in many units, namely:

(1) Degree Celsius (°C) (2) Degree Fahrenheit (°F)
(3) Kelvin (K)

- S.I. unit of temperature is **KELVIN (K)**

MEASUREMENT OF TEMPERATURE

Temperature of a body is measured by using a device called THERMOMETER. A thermometer works on the principle of thermal expansion of liquids. Mercury thermometer is the most common type of thermometer used in laboratory.
It consists of a glass capillary tube with a bulb at one end which is filled with mercury.



MEASURING THE TEMPERATURE – To measure the temperature of a body with the help of a thermometer, the bulb of the thermometer is kept in contact with the body. The mercury rises in the capillary (a silvery liquid). When the mercury gets stabilized at a level, the reading of the mark up to which the mercury has risen, gives the temperature of the body.

DIFFERENT SCALES OF TEMPERATURE:

a. THE CELSIUS SCALE (CENTIGRADE SCALE)

ICE POINT = 0°C (MELTING OR FREEZING POINT)
STEAM POINT = 100°C (BOILING POINT)
In this scale, the interval between ice point (0°C) and steam point (100°C) is divided into one hundred equal parts. Each division is called 1°C.

b. THE FAHRENHEIT SCALE

ICE POINT = 32°f (MELTING OR FREEZING POINT)
STEAM POINT = 212°f (BOILING POINT OF H_2O)
The interval between the ice point (32°f) and steam point (212°f) is divided into 180 equal parts.

c) **THE KELVIN SCALE:** ICE POINT = 273 K, STEAM POINT = 373 K. It is also called the absolute scale of temperature. This scale has no negative temperature. **0 K** is the lowest temperature. The interval between the icepoint and steam point is divided into 100 equal parts.

RELATIONSHIP BETWEEN THE THREE SCALES

i. Celsius (°C) converted to Kelvin (K)

$$t\,(°C) = (273 + t)\ K$$

For example: to convert 50°C into Kelvin, simply add 273 to 50 and then the conversion is done. i.e. 50°C = (273 + 50) K = 323 K

ii. Convert °C into Fahrenheit (°F)

$$F = \frac{9}{5}C + 32$$

For example: Convert 50°C into Fahrenheit (°F)

$$F = \frac{9}{5} \times 50°C + 32 = 9 \times 10 + 32 = 90 + 32$$

$$F = 122 \quad \text{i.e. } 50°C = 122°F$$

iii. Convert °F into Celsius (°C)

$$C = \frac{5}{9}(F - 32)$$

For example: Convert 104°F into Celsius (°C)

$$C = \frac{5}{9}(104 - 32) = \frac{5}{9} \times 72 = 5 \times 8 = 40$$

so, 104°F = 40°C

EFFECTS OF HEAT:

1. Change in temperature of the body
2. Change in size or shape of the body
3. Change in state of the body