Date:- August 5, 2024 TENDER HEART HIGH SCHOOL, SEC 33B, CHD.
Teacher:- CHARANJEET KAUR CLASS- IX
SUBJECT- PHYSICS
CHAPTER- 6 (HEAT and ENERGY)
6(A) :- Heat and temperature ; Anomalous Expansion Page-1

Q1 Define Heat. Write Various units of heat?
Ans Heat is a form of energy which is transferred between two bodies at two different temperatures when kept in contact.
Units of heat :- S.I unit of Heat is Joule
C.G.S " " " is Erg
Also 1 Joule = 10^7 erg
Additionally ; other units of Heat are Calorie (Cal) and Kilocalorie (KCal)
Also 1 kilocalorie = 1000 Cal
1 Cal = 4.186 J nearly ~~4.2~~ 4.2 J

Q2 :→ Define Temperature?
Ans Temperature determines the thermal state of a body. It also determines the direction of flow of heat when two bodies are at different temperatures are placed in Contact.

Q3 :→ Write S.I unit of temperature and other units.
Ans:- The S.I unit of temperature is kelvin (K).
The Other units are (°C) and (°F)

Q4:- On what factors does the Heat Energy of a body depends?
Ans:- It depends upon (a) Mass of a body
(b) Temperature of body
(c) Nature of material of the body

Q5 Write four differences between Heat and Temperature.

Ans:-

(Heat)	(Temperature)
1) It is a form of Energy Obtained due to random motion of molecules in a substance	1) It tells the degree of hotness or Coldness of a body.
2) Heat is measured by the principle of Calorimetry.	2) Temperature is measured by a thermometer.
3) Two bodies having same quantity of heat may differ in their temperature.	3) Two bodies at same temperature may differ in the quantities of heat Contained in them.
4) Heat measures the total Energy (Potential + kinetic) of the particles that make up a body	4) Temperature measures the average kinetic energy of the particles that make up a body.
5) The S.I unit of heat is Joule (J)	5) The S.I unit of temperature is Kelvin(K)

Q6:→ What is a thermal expansion?

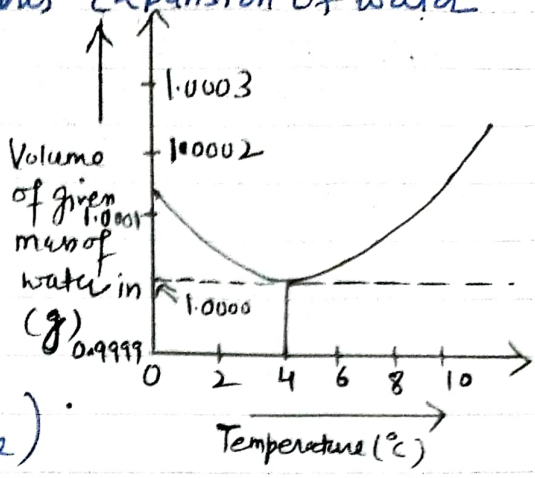
Ans:→ The property of expansion of matter (solid, liquid and gas) on heating is called thermal expansion.

Q7:→ Define Anomalous expansion of water.

Ans The expansion of water on cooling it in the temperature range 4°C to 0°C, is called anomalous expansion of water.

Q8:→ Draw a graph to show the variation of volume of water with temperature in the temp. range from 0°C to 10°C. Also explain in brief?

Ans 8:→ The graph shows the anomalous expansion of water



Water contracts on heating from 0°C to 4°C (i.e its volume decreases). The volume of water is thus minimum at 4°C. Or density is maximum at 4°C (1 gm/cm³) (∵ density = mass/volume). Water further expands on heating from 4°C to 10°C (or its volume increases)

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Q9:→ Write the maximum value of density of water at 4°C in S.I and C.G.S units?

Ans 9:→

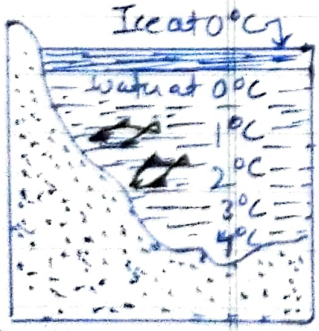
The maximum density of water at 4°C is

1 gm/cm³ [In C.G.S units]

1000 Kg/m³ [In S.I units]

Q.10:→ Fishes Survive in pond even temperature is below 0°C.

Ans:→ In winter when temperature of atmosphere drops below 0°C, the surface layer of a pond cools and Contracts (or density will increase). So, It continues to sink until the whole mass of water reaches a temperature of 4°C. Further cooling causes, top layer to expand and becomes less dense (Floats) and it does not go down (as volume increases and density decreases). Also, when temperature falls below 0°C, water loses heat and gradually freezes into ice. The layer of water in Contact with ice is at 0°C, while the layers below it gradually increase in temp up to 4°C. Ice acts an insulator, so prevents the heat transfer ∴ water under the ice layer remains at 4°C! So, even the top layer is frozen there is water underneath. Therefore fishes can survive in pond during severe winters.



(Fishes Survive in Pond due to Anomalous expansion of water)

Q11:→ Water pipes in cold countries often burst in winters?

Ans:→ In winters when temperature starts falling below 4°C, water in pipe lines expands and exerts large pressure on pipes ∴ causing them to burst.

Q12:→ A Hollow glass sphere which floats with its entire volume submerged in water at 4°C, sinks when water is heated above 4°C. Why is it so?

Ans The density of water decreases on heating the water above 4°C. Consequently, the upthrust of buoyant force that acts on water decreases or upthrust on a Hollow glass sphere will decrease, so it will sink.

Q13:→ A glass bottle completely filled with water and tightly closed at room temperature is likely to burst when kept in the freezer of a refrigerator.

Ans:→ Due to anomalous expansion of water it expands when temp. falls below 4°C inside the freezer. As the glass bottle is tightly closed, so there is no space for the water to expand and therefore the water bottle bursts.

Q14:→ Name three kinds of thermal expansion. Out of solids, liquids and gases which expands more?

Ans:—

(1) Linear Expansion
(2) Superficial expansion
(3) Cubical Expansion

On heating liquids expand more than solids and gases expand much more than liquids. So gases show more expansion.

Q15:→ What is thermal Equilibrium?

Ans:→ Two bodies are said to be in thermal Equilibrium when they do not exchange any heat on being put contact with each other