1. Differentiate between heat and temperature.

Heat	Temperature
The kinetic energy due to random motion of the molecules of a substance is known as its heat energy.	The quantity which determines the direction of flow of heat between two bodies kept in contact is called temperature.
S.I. unit joule (J).	S.I. unit kelvin (K).
It is measured by the principle of calorimetry.	It is measured by a thermometer.

2. Define the term heat capacity and state its S.I. unit.

   Answer:

   The heat capacity of a body is the amount of heat energy required to raise its temperature by 1oC or 1K.

   S.I. unit is joule per kelvin (JK^{-1}).

3. Write the approximate value of specific heat capacity of water in S.I. unit.

   Answer:

   Specific heat capacity of water = 4200 Jkg–1K–1Jkg-1K-1.

4. Name three factors on which heat energy absorbed by a body depends and state how does it depend on them.

   Answer:

   The quantity of heat energy absorbed by a body depends on three factors :

   (i)Mass of the body - The amount of heat energy required is directly proportional to the mass of

   the substance.

   (ii)Nature of material of the body - The amount of heat energy required depends on the nature

   on the substance and it is expressed in terms of its specific heat capacity c.

   (iii)Rise in temperature of the body - The amount of heat energy required is directly proportional to the rise in temperature.

5. Same amount of heat is supplied to two liquid A and B. The liquid A and B. The liquid A shows a greater rise in temperature. What can you say about the heat capacity of A as compared to that of B?

   Answer:

   Heat capacity of liquid A is less than that of B.

   As the substance with low heat capacity shows greater rise in temperature.

6. What is a calorimeter? Name the material of which it is made of. Give two reasons for using the material stated by you.

   Answer:

   A calorimeter is a cylindrical vessel which is used to measure the amount of heat gained or lost by a body when it is mixed with other body.

   It is made up of thin copper sheet because:

   (i) Copper is a good conductor of heat, so the vessel soon acquires the temperature of its contents.

   (ii)Copper has low specific heat capacity so the heat capacity of calorimeter is low and the amount of heat energy taken by the calorimeter from its contents to acquire the temperature of its contents is negligible.

7. An electric heater of power 600 W raises the temperature of 4.0 kg of a liquid from 10.0 ℃ to 15.0 ℃ I 100 s. Calculate: (i) the heat capacity of 4.0 kg of liquid, (ii) the specific heat capacity of the liquid.

   Answer:

   Power of heater P = 600 W

   Mass of liquid m = 4.0 kg

   Change in temperature of liquid = (15 − 10)°C = 5°C(or 5 K)

   Time taken to raise its temperature = 100s

   Heat energy required to heat the liquid

   $\Delta Q = mc\Delta T$

   And

   $\Delta Q = P \times t = 600 \times 100 = 60000J$

   $c=\Delta Q m\Delta T=600004\times53000JKg-1K-1c=\Delta Q m\Delta T=600004\times53000JKg\text{-}1K\text{-}1$

   Heat capacity = c × m

Heat capacity = 4×3000JKg−1K−1=1.2×1044×3000JKg-1K-1=1.2×104 J/K

8. 200 g of hot water at 80°C is added to 300 g of cold water at 10°C. Neglecting the heat taken by the container, calculate the final temperature of the mixture of water. Specific heat capacity of water = 4200Jkg−1K−14200Jkg-1K-1

   Answer:

   Mass of hot water (m_1) = 200g

   Temperature of hot water (T_1) = 80°C

   Mass of cold water (m_2) = 300g

   Temperature of cold water (T_2) =10°C

   Final temperature (T) = ?

   m1c1(T1−T)=m2c2(T−T2)m1c1(T1-T)=m2c2(T-T2)

   c1=c2c1=c2

   T=m1T1 +m2T2m2+m1T=m1T1 +m2T2m2+m1

   T=200×80+300×10500T=200×80+300×10500

   T = 38 °C

9. Does the substance absorb or liberate any heat energy during the change of phase?

   Answer:

   Yes, the substance absorbs or liberates heat during the change of phase.

10. State the effect of presence of impurity on the melting point of ice. Give one use of it.

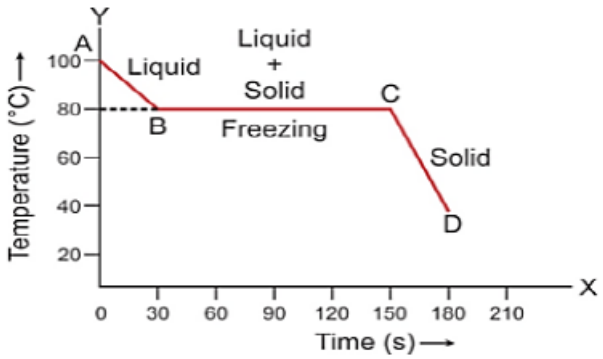
    Answer:

    The melting point of ice decreases by the presence of impurity in it.

    Use: In making the freezing mixture by adding salt to ice. This freezing mixture is used in preparation of ice creams.

11. The melting point of naphthalene, a crystalline solid is 80°C and the room temperature is 30°C. A sample of liquid naphthalene at 100°C is cooled down to the room temperature. Draw a temperature time graph to represent this cooling.

    Answer:



13. (a) Which requires more heat: 1 g ice at 0°C or 1 g water at 0°C to raise its temperature to 10°C? (b) Explain your answer in part (a).

Answer:

(a) 1 g ice at 0oC requires more heat because ice would require additional heat energy equal to latent heat of melting.

(b) 1 g ice at 0oC first absorbs 336 J heat to convert into 1 g water at 0oC.

14. Explain the following:

The surrounding become pleasantly warm when water in a lake starts freezing in cold countries?

Answer: The reason is that the specific latent heat of fusion of ice is sufficiently high, so when the water of lake freezes, a large quantity of heat has to be released and hence the surrounding temperature becomes pleasantly warm.

15. The amount of heat energy required to convert 1 kg of ice at – 10°C to water at 100°C is 7,77,000 J. Calculate the specific latent heat of ice. Specific heat capacity if ice= 2100Jkg−1K−12100Jkg-1K-1, Specific heat capacity of water = 4200Jkg−1K−14200Jkg-1K-1

Answer: Amount of heat energy gained by 1kg of ice at −10°C to raise its temperature to 0°C = 1 × 2100 × 10 = 21000 J

Amount of heat energy gained by 1kg of ice at 0°C to convert into water at 0°C = L

Amount of heat energy gained when temperature of 1kg of water at 0oC rises to 100°C = 1 × 4200 × 100 = 420000 J

Total amount of heat energy gained = 21000 + 420000 + L = 441000 + L.

Given that total amount of heat gained is = 777000J.

So,

441000 + L = 777000.

L = 777000 – 441000.

L=336000JKg−1L=336000JKg-1