Physicsaholics

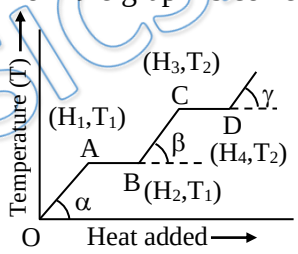
DPP – 2

Q 1. Ice at 0ºC is added to 200gm of water initially at 70°C in a vacuum flask. When 50 gm of ice has been added and has all melted, the temperature of flask and contents is 40ºC, When a further 80 gm of ice is added and has all melted, the temperature of whole becomes 10ºC. Neglecting heat lost to surroundings the latent heat of fusion of ice is :
(The specific heat of water is = 1 calorie/gram °C)
(A) 80 cal/gm (C) 90 cal/gm
(B) 70 cal/gm (D) 540 cal/gm

Q 2. Water of volume 2 litre in a container is heated with a coil of 1 kW at 27ºC. The lid of the container is open and energy dissipates at rate of 160 J/s. In how much time temperature will rise from 27ºC to 77ºC ?
[Given specific heat of water is 4.2 kJ/K-kg]
(A) 8 min 20 s (C) 6 min 2 s
(B) 7 min (D) 14 min

Q 3. 2 kg ice at – 20ºC is mixed with 5 kg water at 20ºC in an insulating vessel having negligible heat capacity. Calculate the final mass of water remaining in container.
Given sp. heat water = 4.186 kJ K^{-1} kg^{-1}
sp. heat Ice = 2.092 kJ K^{-1} kg^{-1}
Latent heat of fusion of ice = 334.7 kJ kg^{-1}
(A) 7 kg (C) 6 kg
(B) 4 kg (D) 2 kg

Q 4. The accompanying graph shows the variation of temperature (*T*) of one kilogram material with Heat (H) supplied to it. At O, the substance is in solid state. Which of the following interpretation from the graph is correct –

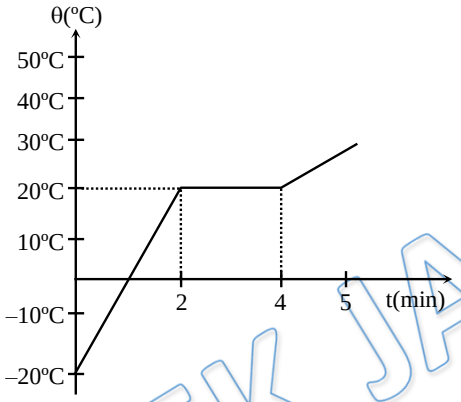


(A) T_2 is the melting point of the solid
(B) BC represents the change of state from solid to liquid.
(C) ($H_2 - H_1$) represent the latent heat of fusion of the substance.
(D) ($H_3 - H_1$) represents the latent heat of vaporisation of the liquid.

Q 5. Steam at 100ºC is passed into 1.1 kg of water contained in a calorimeter of water equivalent 0.02 kg at 15ºC, till the temperature of the calorimeter and its contents rises to 80ºC. The mass of steam condensed (in kg) is (Take latent heat of steam = 540 cal g^{-1}, sp. Heat of water = 4.2 kJ K^{-1} kg^{-1}) :
(A) 0.13 (C) 0.065
(B) 0.26 (D) 0.135

Q 6. When 10 gm of ice at –20 ºC is mixed with 10 gm of water at 50 ºC, the amount of ice melted is –
The latent heat of fusion for ice is 80 cal/gm, The specific heat of ice is 0.5 cal/gm°C, The specific heat of water is 1 cal/gm °C
(A) 2 gm (C) 3 gm
(B) 4 gm (D) 5 gm

Q 7. Heat is supplied to 2kg of solid (initially at –20ºC) at the constant rate of 5kJ/min. Temperature is plotted as a function of time as shown in the figure. Latent heat of fusion for solid is –

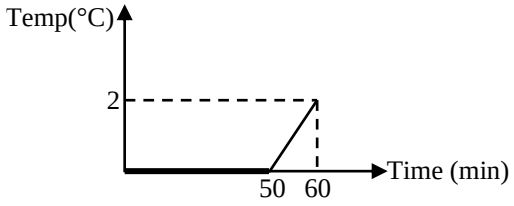


(A) 10 kJ/kg (C) 2.5 kJ/kg
(B) 5 kJ/kg (D) 7.5 kJ/kg

Q 8. An earthen pitcher loses 1 gm of water per minute due to evaporation. If the water equivalent of pitcher is 0.5 kg and pitcher contains 9.5 kg of water, calculate the time required for the water in pitcher to cool to 28ºC from original temperature of 30ºC. Neglect radiation effects. Latent heat of vaporization in this range of temperature is 580 Cal/gm and specific heat of water is 1 Cal/gmºC.
(A) 30.5 min (C) 41.2 min
(B) 38.6 min (D) 34.5 min

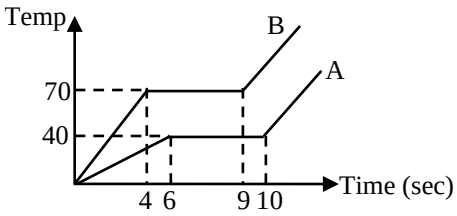
Q 9. A mixture of 250 gm of water and 200 gm of ice at 0°C is kept in calorimeter of water equivalent 50 gm. If 200 gm of steam at 100°C is passed through the mixture then the final amount of water in the mixture will be (Latent Heat of ice = 80 cal/gm, latent Heat of vaporisation of water = 540 cal/gm and specific heat of water = 1 cal/gm°C) -
(A) 450 gm (C) 622 gm
(B) 572 gm (D) 650 gm

Q 10. A bucket contains a mixture of water and ice and total mass of content is 10 kg. Now this mixture is provided heat at uniform rate. The temperature Vs time graph is plotted. The initial amount of ice in the bucket will be [specific heat of water = 4.2 kJ/kg-K and latent heat of ice = 340 kJ/kg] –



(A) 1.2 kg (C) 5 kg
(B) 2.4 kg (D) 3.6 kg

Q 11. Two solid bodies of equal masses are heated at the same rate under identical condition. The change in temperature is shown graphically as a function of time. The ratio of specific heat in solid form should be (S_A/S_B) –



(A) 4/3 (C) 21/8
(B) 15/8 (D) 3/4

Q 12. A body of mass 25 kg is dragged on a rough horizontal floor for one hour with a speed of 2 kmh^{-1}. The coefficient of friction for the surface in contact is 0.5 and half the heat produced is absorbed by the body. If specific heat of body is 0.1 cal g^{-1} ($^oC^{-1}$) and g = 9.8 ms^{-2}, then the rise in temperature of body is:
(A) 39 K (C) 59.5 K
(B) 84.5 K (D) 11.6 K

Answer Key

Q.1 c	**Q.2 a**	**Q.3 c**	**Q.4 c**	**Q.5 a**
Q.6 d	**Q.7 b**	**Q.8 d**	**Q.9 b**	**Q.10 a**
Q.11 c	**Q.12 d**			