CBSE

THERMAL PROPERTIES OF MATTER WS 5

Class 11 - Physics

Section A

1. 50 g of ice at 0°C is mixed with 50 g of water at 80 °C, final temperature of mixture of will be **[1]**

   a) 60^oC b) 0^oC

   c) 4^oC d) 40^oC

2. 10 g of ice cubes at 0^o C are released in a tumbler (water equivalent 55g) at 40^o C. Assuming that negligible heat is taken from the surroundings, the temperature of water in the tumbler becomes nearly (L = 80 call/g) **[1]**

   a) 31^oC b) 22^oC

   c) 19^oC d) 15^oC

3. Calorimeters are made of which of the following? **[1]**

   a) wood b) metal

   c) either glass or wood d) glass

4. A chef, on finding his stove out of order, decides to boil the water for his wife's coffee by shaking it in a thermos flask. Suppose that he uses tap water at 15°C and that the water falls 30 cm each shake, the chef makes 30 shakes each minute. Neglecting any loss of thermal energy by the flask, how long must he shake the flask until the water reaches 100 °C? **[1]**

   a) 4.00×10^3 min b) 3.97×10^3 min

   c) 5.25×10^3 min d) 2.25×10^3 min

5. A cowboy fires a silver bullet with a mass of 2.00 g and with a muzzle speed of 200 m/s into the pine wall of a saloon. Assume that all the internal energy generated by the impact remains with the bullet. What is the temperature change of the bullet? Specific heat of silver is $234J/Kg^oC$? **[1]**

   a) 83.5^oC b) 81.5^oC

   c) 85.5^oC d) 78.5^oC

6. A 1.50-kg iron horseshoe initially at 600^oC is dropped into a bucket containing 20.0 kg of water at 25.0^oC. What is the final temperature? (Neglect the heat capacity of the container and assume that a negligible amount of water boils away.) Specific heat of iron = $448J/Kg^oC$. **[1]**

   a) 29.6^oC b) 18.6^oC

   c) 30.6^oC d) 28.6^oC

7. 80 g of water at 30^o C are poured on a large block of ice at 0^o C. The mass of ice that melts is: **[1]**

a) 150 g b) 30 g

c) 80 g d) 1,600 g

8. If 10 g of ice is added to 40 g of water at 45^oC then temperature of the mixture (specific heat of water = 4.2×10 Jkg^{-1} K^{-1}, latent heat of water = 3.36×10^5 Jkg^{-1}) is **[1]**

a) 12^oC b) 10^oC

c) 15^oC d) 0^oC

9. A body of mass 2 Kg moving with a velocity of 6 m/s strikes inelastically another body of same mass at rest. The amount of heat evolved is **[1]**

a) 36 J b) 9 J

c) 18 J d) 3 J

10. As 6.00 kg of a liquid substance at its freezing point completely freezes, it gives off enough heat to melt 3.00 kg of ice at 0°C. The heat of fusion of the substance [Take latent heat of fusion of ice = 3.34×10^2kJ/kg] is **[1]**

a) 668 kJ/kg b) 2.05 kJ/kg

c) 167 kJ/kg d) 4.9 kJ/kgs

11. A vessel containing 100 g water is thermally isolated at 0°C. The air above the water is pumped out, some of the water freezes and some evaporates at 0°C itself. **[1]**

[Latent heat of vaporisation of water at 0°C = 2.10×10^6 Jkg^{-1}

Latent heat of fusion of ice = 3.36×10^6 Jkg^{-1}]

Mass left inside the vessel is

a) 103 g b) 86 g

c) 77 g d) 63 g

12. An aluminum calorimeter with a mass of 100 g contains 250 g of water. The calorimeter and water are in thermal equilibrium at 10.0°C. Two metallic blocks are placed into the water. One is a 50.0-g piece of copper at 80.0°C; the other block has a mass of 70.0 g and is originally at a temperature of 100°C. The entire system stabilizes at a final temperature of 20.0°C. Determine the specific heat of the unknown sample. **[1]**

Specific heat of aluminium is 0.215cal/gm^oC

Specific heat of copper is 0.0924cal/gm^oC

a) 0.465 cal/g. ^oC b) 0.455 cal/g. ^oC

c) 0.435 cal/g. ^oC d) 0.445 cal/g. ^oC

13. **State True or False:** **[1]**

(a) During calorimetry, it is assumed that no heat is allowed to escape to the surrounding. **[1]**

14. **Fill in the blanks:** **[1]**

(a) The principle of _____ states that total heat given by a hotter body equals to the total heat received by colder body. **[1]**

15. Calorimeters are made of metals, not glass Why? **[1]**

16. kg of ice at - 20°C is mixed with 5 kg of water at 20°C in an insulating vessel having a negligible heat capacity. Calculate the final mass of water remaining in the container. It is given that the specific heats of water and ice **[1]**

are 1 kcal/kg/°C and 0.5 kcal/kg/°C, while the latent heat of fusion of ice is 80 kcal/kg.

17. Define triple point of water. **[1]**

Section B

18. A fat man is used to consuming about 3000 kcal worth of food every day. His food contains 50 g of butter plus a plate of sweets every day, besides items that provide him with other nutrients (proteins, vitamins, minerals, etc.) in addition to fats and carbohydrates. The caloric value of 10 g of butter is 60 kcal and that of a plate of sweets is on average 700 kcal. What dietary strategy should he adopt to cut down his calories to about 2100 kcal per day? Assume the man cannot resist eating the full plate of sweets once it is offered to him! **[2]**

19. A piece of iron of mass 100 g is kept inside a furnace for a long time and then put in a calorimeter of water equivalent 10 g containing 240 g of water at 20°C. The mixture attains an equilibrium temperature of 60°C. Find the temperature of ice. Given specific heat of iron = 470 J kg^{-1} $°C^{-1}$. **[2]**

20. A metal rod of length 20 cm and diameter 2 cm is covered with non-conducting substance. One of its ends is maintained at 100° C, while the other end is put in ice at 0°C. It is found that 25 g of ice melts in 5 minutes. Calculate the coefficient of thermal conductivity of the metal. Given latent heat of ice = 80 cal g^{-1}. **[2]**

21. How many grams of ice at - 14°C are needed to cool 200 gram of water from 25°C to 10°C? Take specific heat of ice = 0.5 cal g^{-1} $°C^{-1}$ and latent heat of ice = 80 cal g^{-1}. **[2]**

Section C

22. What is calorimetry? Briefly explain its principle. **[3]**