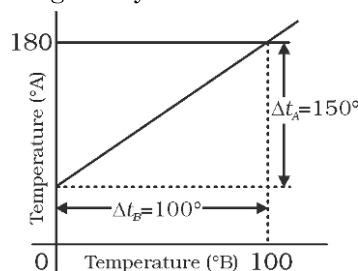


Properties of Matter

Date Planned : __ / __ / __	Daily Tutorial Sheet - 7	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level - 2	Exact Duration : _____
Topics covered : Calorimetry		

91. The graph between two temperature scales A and B is shown in figure. Between upper fixed point and lower fixed point there are 150 equal division on scale A and 100 on scale B . The relationship for conversion between the two scales is given by :



- (A) $\frac{t_A - 180}{100} = \frac{t_B}{150}$ (B) $\frac{t_A - 30}{150} = \frac{t_B}{100}$
 (C) $\frac{t_B - 180}{150} = \frac{t_A}{100}$ (D) $\frac{t_B - 40}{100} = \frac{t_A}{180}$

92. An iron rocket fragment initially at -100°C enters the earth's atmosphere almost horizontally and quickly fuses completely in atmospheric friction. Specific heat of iron is $0.11 \text{ kcal/kg } ^\circ\text{C}$, its melting point is 1535°C and the latent heat of fusion is 30 kcal/kg . The minimum velocity with which the fragment must have entered the atmosphere is :

- (A) 0.45 km/s (B) 1.32 km/s (C) 2.32 km/s (D) Zero

93. Four spheres A , B , C and D have their radii in arithmetic progression and the specific heat capacities of their substances are in geometric progression. If the ratios of heat capacities of D and B to that of C and A are as $8 : 27$, the ratio of masses of B and A is : (Assume same density for all spheres)

- (A) $8 : 1$ (B) $4 : 1$ (C) $1 : 8$ (D) $1 : 4$

94. A beaker contains 200 g of water. The heat capacity of the beaker is equal to that of 20 g of water. The initial temperature of water in the beaker is 20°C . If 440 g of hot water at 92°C is poured in it, the final temperature (Neglecting radiation loss) will be nearest to :

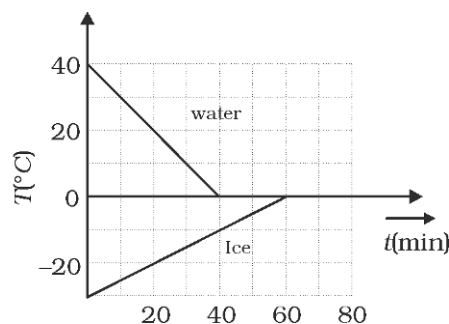
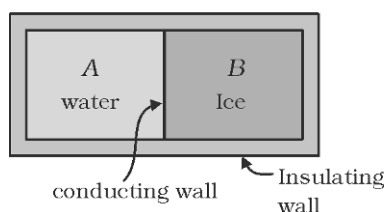
- (A) 58°C (B) 68°C (C) 73°C (D) 78°C

95. A liquid of density 0.85 g/cm^3 flows through a calorimeter at the rate of $8.0 \text{ cm}^3/\text{s}$. Heat is added by means of a 250 W electric heating coil and a temperature difference of 15°C is established in steady-state conditions between the inflow and the outflow points of the liquid. The specific heat for the liquid will be :

- (A) 0.6 kcal/kgK (B) 0.3 kcal/kgK (C) 0.5 kcal/kgK (D) 0.4 kcal/kgK

PARAGRAPH FOR QUESTIONS 96 - 98

A 0.60 kg sample of water and a sample of ice are placed in two compartments A and B separated by a conducting wall, in a thermally insulated container. The rate of heat transfer from the water to the ice through the conducting wall is constant P , until thermal equilibrium is reached. The temperature T of the liquid water and the ice are given in graph as functions of time t . Temperature of the compartments remain homogeneous during whole heat transfer process. Given specific heat of ice = 2100 J/kg-K , specific heat of water = 4200 J/kg-K , and latent heat of fusion of ice = $3.3 \times 10^5 \text{ J/kg}$.



96. The value of rate P is :
 (A) 42.0 W (B) 36.0 W (C) 21.0 W (D) 18.0 W
97. The initial mass of the ice in the container is equal to :
 (A) 0.36 kg (B) 1.2 kg (C) 2.4 kg (D) 3.6 kg
98. The mass of the ice formed due to conversion from the water till thermal equilibrium is reached is equal to :
 (A) 0.12 kg (B) 0.15 kg (C) 0.25 kg (D) 0.40 kg
99. In a container of negligible mass, ' m ' grams of steam at 100°C is added to 100 g of water that has temperature 20°C . If no heat is lost to the surroundings at equilibrium, match the items given in Column I with that in Column II.

Column I

Column II

- | | |
|---|-----------|
| (A) Mass of steam in the mixture, if $m = 20 \text{ g}$ (in g) | (P) 114.8 |
| (B) Mass of water in the mixture, if $m = 20 \text{ g}$ (in g) | (Q) 76.4 |
| (C) If $m = 20 \text{ g}$, final temperature of the mixture (in $^\circ\text{C}$) | (R) 5.2 |
| (D) If $m = 10 \text{ g}$, final temperature of the mixture (in $^\circ\text{C}$) | (S) 100 |

100. In two experiments with a continuous flow calorimeter to determine the specific heat capacity of a liquid, an input power of 16 W produced a rise of 10 K in the liquid. When the power was doubled, the same temperature rise was achieved by making the rate of flow of liquid three times faster. The power lost to the surrounding in each case is $x \text{ W}$. Find x .