TENDER HEART HIGH SCHOOL, SEC-33B, CHD 19.8.24

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CLASS - X SUBJECT - PHYSICS

CHAPTER - 11 TEACHER - charanjeet ~~kaur~~

REVISION ASSIGNMENT

1) 0.50 kg of lead at 327°C is cooled to 27°C, when it gives off 22500 calories of energy. Calculate the specific heat capacity of lead in (i) Calories, (ii) Joules.

Solution: $Q = m\,c\,\Delta T$

$22500 = 0.50 \times c \times (327 - 27)$

Find, $c = ?$ and then use $1\ cal = 4.2\ J$

[$c = 150\ cal/kg\,°C$ or $630\ J/kg\,°C$]

2) 272 calories of heat is required to heat 0.02 kg of a metal of specific heat capacity 170 cal/kg °C to a temperature T. If the initial temperature of the metal is 20°C, calculate the final temperature T.

Solution: $Q = m\,c\,\Delta T$ $\quad (\Delta T = T_f - T_i)$

$272 = 0.02 \times 170\,(T - 20)$

$T - 20 = \dfrac{272}{0.02 \times 170} = 80$

$T = 20 + 80 = 100°C$

3) 3.75×10^5 calories of heat is given out by 5 kg of water at 100°C. Calculate the temperature of cooled water, ($c_{H_2O} = 1000\ cal/kg\,°C$).

Solution $Q = m\,c\,\Delta T$ $\quad (\Delta T = T_{High} - T_{low})$

$5 \times 1000\,(100 - T) = 3.75 \times 10^5$

Solving, $T = 100 - 75 = 25°C$

4) A heater, rated 1000 W, is used to heat 1.5 kg of water at 40°C to its boiling point. Calculate the time in which the water starts to boil ($c_{H_2O} = 4200\ J/kg\,°C$).

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Solution

Heat energy = Electrical Energy

$m c \Delta T = P \times t$

$15 \times 4200 \times (100-40) = 1000 \times t$

$t = 378$ seconds.

TRY YOURSELF

5) 20 g of hot water at 80°C is poured into 60 g of cold water, when the temperature of cold water rises by 20°C. Calculate the initial temperature of cold water. (0°C)

6) 50 g of a hot solid at specific heat capacity 0.25 J/g °C and at 100°C is placed in 80 g of cold water, when the temperature of cold water rises by 3°C. Find the initial temperature of cold water. (16.36 °C)

7) A solid of mass 0.15 kg and at 100°C is placed in 0.25 kg of water, contained in a copper calorimeter of mass 0.12 kg at 10°C. If the final temperature of the mixture is 20°C, calculate the specific heat capacity of solid ($c_{H_2O} = 4200$ J/kg K, $c_{Cu} = 400$ J/kg K) (915 J/kg K)

8) You are required to make a water bath of 50 kg at 45°C, by mixing hot water at 90°C, with cold water at 20°C. Calculate the amount of hot water required.

HINT: Let amount of hot water = x, and amount of cold water = (50 - x)

If there is no heat loss to the surroundings, then according to principle of calorimetry:

Heat loss by hot water = Heat gained by cold H_2O

$x \times 4200 \times (90-45) = (50-x) \times 4200 \times (45-20)$

$x = \frac{1250}{70} = 17.871$ kg.

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Q9) What is the approximate specific latent heat of melting of ice? State why for cooling bottled soft drinks, ice at 0°C is better than the same mass of iced-water at 0°C

Q10) a) How can a temperature in degree celsius be converted into S.I. unit of temperature?

b) A liquid X has the maximum specific heat capacity and is used as a coolant in car radiators. Name the liquid X.

Q11) a) Heat supplied to a solid changes it into liquid. What is this change in phase called?

b) During the phase change does the average kinetic energy of the molecules of the substance increase?

c) What is the energy absorbed during the phase change called?

Q12) Give three differences between 'specific heat capacity' and 'Heat Capacity'.

Q13) The specific heat capacity of a substance A is 3,800 J/Kg K and that of a substance B is 400 J/Kg K. Which of the two substances is a good conductor of heat? Give reason for your answer.

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