

CHAPTER 06**HEAT****Example:**

If 20 gm of water at 50°C is mixed with 60 gm of water at 10°C.

Then final temperature of the mixture is

Sol.

$$\theta = \frac{m_1 s_1 \theta_1 + m_2 s_2 \theta_2}{m_1 s_1 + m_2 s_2} \quad (\text{Here } s_1 = s_2)$$

$$\theta = \frac{20 \times 50 + 60 \times 10}{20 + 60}$$

$$\theta = \frac{1600}{80}$$

$$\theta = 20^\circ\text{C}$$

Example:

A liquid of mass 'm' and specific heat 's' is at temperature θ .

Another liquid of mass '2m' and specific heat $s/2$ is at 3θ . If

these two liquids are mixed, the resultant temperature of the mixture is

Sol.

$$\text{Resultant temperature 't'} = \frac{m_1 s_1 \theta_1 + m_2 s_2 \theta_2}{m_1 s_1 + m_2 s_2}$$

$$= \frac{ms\theta + 2m\frac{s}{2}3\theta}{ms + 2m\frac{s}{2}}$$

$$= \frac{4ms\theta}{2ms}$$

$$= 2\theta$$

Example:

If 2 kg of steam at 100°C condenses into water at 40°C the energy evolved in calories is ($L = 540 \text{ cal/gm}$, $s = 1 \text{ cal gm}^{-1} \text{ }^\circ\text{C}^{-1}$).

Sol.

$$\text{Heat evolved} = mL + ms\theta$$

$$= m(L + s\theta)$$

$$= 2000 (540 + 60)$$

$$= 2000 \times 600 = 1200 \text{ Kcal}$$