

### Answer on Question #59827-Physics-Other

An electric heater raises the temperature of 120g of water in a thin light vessel through 10K IN 2min,when placed in 70g of water contained in a metal vessel of mass 0.55kg the temperature rises through 9K in the same time. Calculate from the above:

- i. The heat supplied in 2min by the heater
- ii. The power of the heater
- iii. The heat supplied to the metal vessel
- iv. The heat capacity of the vessel and the specific heat capacity of its materials.

[S.H.C of water =4.2Jg-1K-1]

### Solution

i.

$$Q = m_w c_w \Delta T_1 = 120 \cdot 4.2 \cdot 10 = 5040 \text{ J}$$

ii.

$$P = \frac{Q}{t} = \frac{5040}{120} = 42 \text{ W.}$$

iii.

$$Q_1 = Pt - m_w' c_w \Delta T_2 = Q - m_w' c_w \Delta T_2 = 5040 - 70 \cdot 4.2 \cdot 9 = 2394 \text{ J.}$$

iv.

$$C = \frac{Q_1}{\Delta T_2} = \frac{2394}{9} = 266 \frac{\text{J}}{\text{K}}.$$

$$c = \frac{C}{m} = \frac{266}{0.55} = 484 \frac{\text{J}}{\text{kgK}}.$$