M grams of steam at 100°C is mixed with 200 g of ice at its melting point in a thermally insulated container. If it produced liquid water at 40°C [heat of vaporization of water is 540 cal/g and heat of fusion of ice is 80 cal/g] the value of M is ____ (JEE MAIN 2020)

Heat lost by water $= m_w s \Delta T$

$= \frac{(200)}{(1000)} (4200)(25-0)$

(Here m_w is converted to Kg because all other quantities are in Kg)

Let 'm' mass of ice is melted by heat lost by water

$\therefore mL_{ice} = \left(\frac{200}{1000}\right)(4200)(25)$

$\Rightarrow m = \frac{20 \times 42 \times 25}{3.4 \times 10^5}$

$\Rightarrow m = 0.0617 \text{ kg} \Rightarrow 61.7 \text{ grams}$

$\therefore \boxed{m = 61.7 \text{ gm}}$