

A 2 kg iron block is taken from a furnace where its temperature was 650 centigrade and placed on a large block of ice at 0 centigrade. Assuming that all the heat given up by the iron is used to melt the ice , how much ice is melted.

Solution.

$$m_1 = 2 \text{ kg}, C = 450 \frac{\text{J}}{\text{kg} \cdot \text{°C}}, L = 334 \cdot 10^3 \frac{\text{J}}{\text{kg}}, t_1 = 650 \text{°C}, t_2 = 0 \text{°C};$$

$$m_2 - ?$$

Heat balance equation:

$$Q_1 = Q_2;$$

$$Q_1 = m_1 C |t_2 - t_1|;$$

$$Q_2 = L m_2;$$

$$m_1 C |t_2 - t_1| = L m_2;$$

$$m_2 = \frac{m_1 C |t_2 - t_1|}{L}.$$

$$m_2 = \frac{2 \cdot 450 \cdot |0 - 650|}{334 \cdot 10^3} = 1.75 \text{ (kg)}.$$

Answer: $m_2 = 1.75 \text{ kg}$.