

EXAMPLE 1

Find the heat energy is needed to melt 150 g of ice at 0°C to water at the same temperature.
(Specific latent heat of fusion of water = 336 000 J/kg)

SOLUTION:

$$m = 0.15 \text{ kg}$$

$$Q = m l$$

$$= \quad \times$$

$$= \quad \text{J}$$

EXAMPLE 2

Find the heat energy is required to change 2 kg of ice at 0°C to water at 20°C.
(Specific latent heat of fusion of water = 336 000 J/kg
Specific heat capacity of water = 4200 J/kg°C)

SOLUTION:

ice

ice

water

$$Q = m l$$

$$+ m c \theta$$

$$= (\quad) (\quad) + (\quad) (\quad) (\quad)$$

$$= \quad \text{J}$$

@

$$= \quad \text{kJ} \times$$

EXAMPLE 3

Starting at 20°C, calculate how much heat is required to heat 0.3 kg of aluminum to its melting point and then to convert it all to liquid

Specific heat capacity of aluminium = 900 J kg⁻¹°C⁻¹

Specific latent heat of aluminium = 321,000 J kg⁻¹

Melting point of aluminium = 660°C

SOLUTION:


$$\begin{aligned} Q &= mc\theta + ml \\ &= (\quad)(\quad)(\quad) + (\quad)(\quad) \\ &= \quad \text{J} \\ &= \quad @ \quad \text{kJ} \end{aligned}$$

EXAMPLE 4

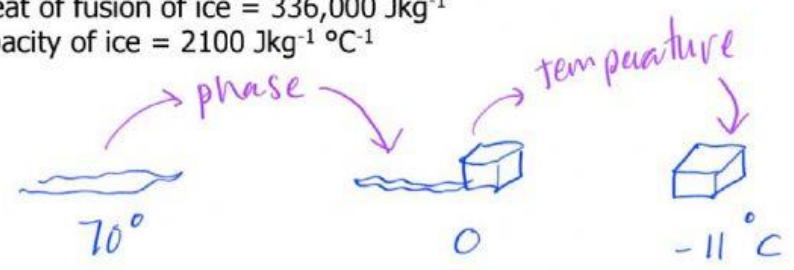
Calculate how much heat must be removed by a refrigerator from 2 kg of water at 70 °C to convert it to ice cubes at -11°C.

Specific heat capacity of water = 4200 J kg⁻¹ °C⁻¹

Specific latent heat of fusion of ice = 336,000 J kg⁻¹

Specific heat capacity of ice = 2100 J kg⁻¹ °C⁻¹

SOLUTION:


$$\begin{aligned} Q &= mc\theta + ml + mc\theta \\ &= (\quad)(\quad)(\quad) + (\quad)(\quad) + (\quad)(\quad)(\quad) \\ &= \quad \text{J} \end{aligned}$$