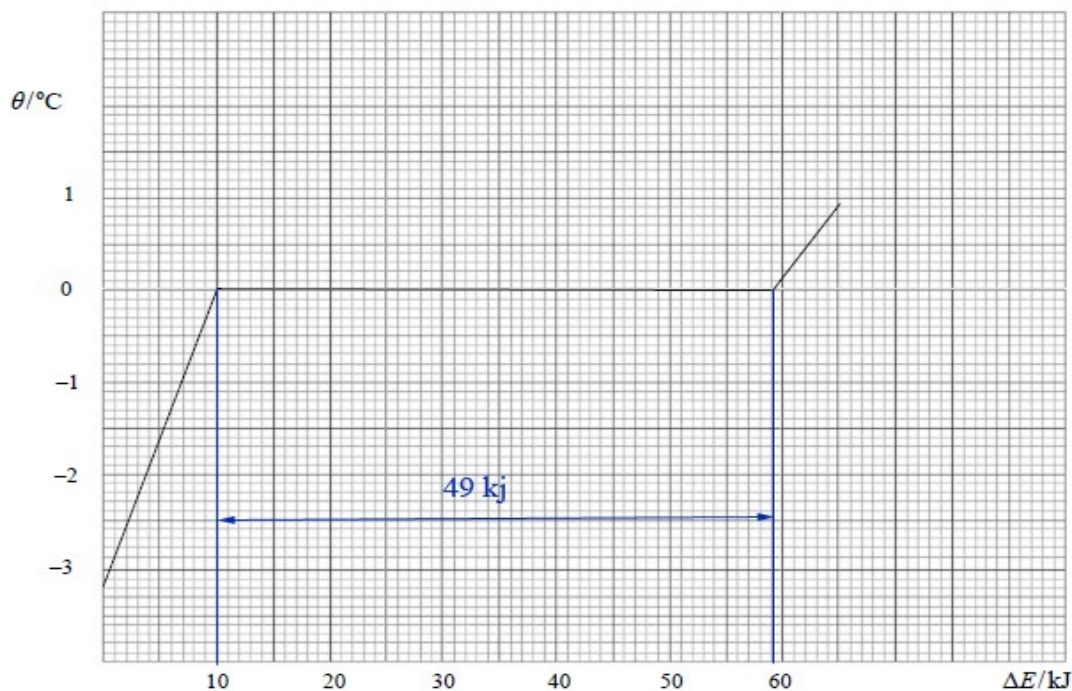


State Examination Commission – Physics Higher Level, 2012

Question 12 c

The graph shows the variation in temperature θ of 150 g of crushed ice when it was supplied with energy ΔE at a constant rate.



(i) Explain the shape of the graph. (12)

The ice, initially a little less than -3°C , rose steadily in temperature with heat provided, until it reached 0°C . The heat provided at that stage (latent heat) then went into changing the state of the ice to liquid water, and no temperature rise was recorded until all the ice had melted, whereupon the heat being supplied once again caused a rise in temperature.

(ii) Describe how energy could have been supplied at a constant rate. (6)

It could have been supplied by a heating coil connected to a variable power supply. The current would have been kept constant to ensure a steady delivery of heat.

(iii) Using the graph, estimate the specific latent heat of fusion of ice. (10)

150 g of ice required 49 kJ of energy to change state
=> 1000g would require $(49/150)1000 \text{ kJ} = 327 \text{ kJ}$
=> specific latent heat of fusion of ice = $3.27 \times 10^5 \text{ J kg}^{-1}$.