3 (a) (i) State what is meant by the internal energy of a system.

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..... [2]

(ii) As ice melts and becomes water, its internal energy increases even though its temperature remains constant.

Explain why the internal energy increases.

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..... [2]

(b) A glass beaker of mass 170 g is at a temperature of 28 °C. Ice of mass 120 g at a temperature of −15 °C is added to the beaker. Boiling water of mass 90 g is added to the beaker, as shown in Fig. 3.1.

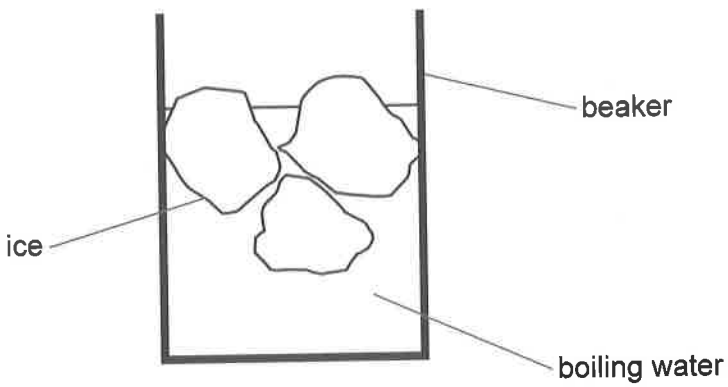

Fig. 3.1

The beaker and its contents are thermally insulated from the surroundings.

Data for the ice, water and glass are shown.

specific heat capacity of water = $4.18\,J\,g^{-1}\,°C^{-1}$
specific heat capacity of glass = $0.84\,J\,g^{-1}\,°C^{-1}$
specific heat capacity of ice = $2.05\,J\,g^{-1}\,°C^{-1}$
specific latent heat of fusion of water = $334\,J\,g^{-1}$

When thermal equilibrium is reached, there is both water and ice in the beaker.

Assume no water evaporates.

Calculate the mass, in g, of ice that melts during this process.

mass of ice = ... g [3]