2 Fig. 2.1 shows a cylinder containing an ideal gas of pressure *P* and volume *V* enclosed by a movable piston. The cylinder is kept submerged in a large ice-water bath maintained at 0 °C.
The specific latent heat of fusion of the ice = 334 J g^{-1}.

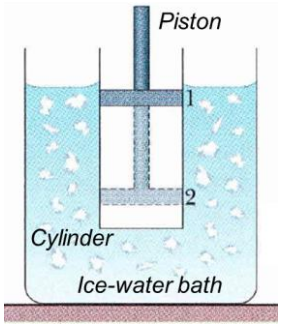

Fig. 2.1

The gas undergoes three processes in the following sequence:

Process A: Gas compressed quickly from position 1 to 2 (such that there is no heat transfer to and from gas).

Process B: Piston held at position 2 until the gas reaches the temperature of the ice-water bath.

Process C: Piston slowly raised back to position 1.

(a) The volume of gas when the piston is at position 1 and 2 are indicated as V_1 and V_2 respectively. The dot represents the state of gas in cylinder at the start of process A.

Sketch the 3 processes on the *P*-*V* diagram in Fig. 2.2. Label the processes clearly using A, B & C.

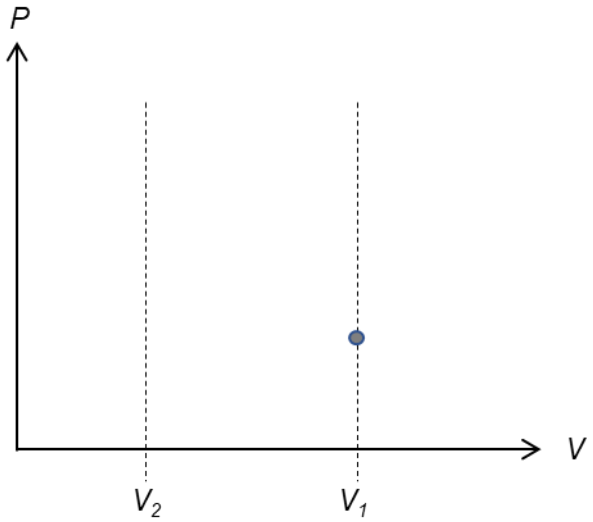

Fig. 2.2

[3]

(b) Identify process B.

…….. [1]

(c) At the end of process C, 100 g of ice has melted. There is no heat transfer between the ice and environment.

State whether net heat is transferred into or out of the gas cylinder.

…….. [1]

(d) Determine the net temperature change for the gas for one complete cycle.

net temperature change = …….. K [1]

(e) Calculate the net work done on the gas.

net work done on the gas = …….. J [2]

[Total: 8]