2 A constant mass of an ideal gas has a volume of $3.49 \times 10^3\,cm^3$ at a temperature of 21.0 °C. When the gas is heated, 565 J of thermal energy causes it to expand to a volume of $3.87 \times 10^3\,cm^3$ at 53.0 °C. This is illustrated in Fig. 2.1.

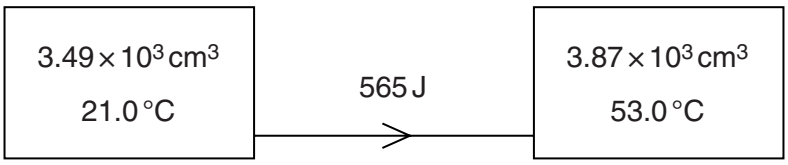

Fig. 2.1

(a) Show that the initial and final pressures of the gas are equal.

[2]

(b) The pressure of the gas is 4.20×10^5 Pa.

For this heating of the gas,

(i) calculate the work done by the gas,

work done = ... J [2]

(ii) use the first law of thermodynamics and your answer in **(i)** to determine the change in internal energy of the gas.

change in internal energy = ... J [2]

(c) Explain why the change in kinetic energy of the molecules of this ideal gas is equal to the change in internal energy.

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..... [3]