2 **(a)** State what is meant by the *internal energy* of a system.

.....

.....

..... [2]

(b) The atoms of an ideal gas occupy a container of volume $2.30 \times 10^{-3}\,m^3$ at pressure $2.60 \times 10^5\,Pa$ and temperature 180 K, as illustrated in Fig. 2.1.

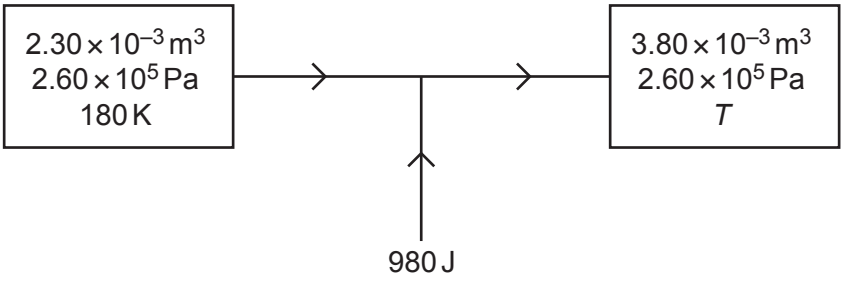

Fig. 2.1

The gas is heated at constant pressure so that its volume becomes $3.80 \times 10^{-3}\,m^3$ at a temperature T.

For the fixed mass of gas, calculate:

(i) the amount of substance, in mol

amount = ... mol [2]

(ii) the temperature T, in K.

T = ... K [2]

(c) During the change in **(b)**, the thermal energy supplied to the gas is 980 J.

(i) Determine the work done on the gas during this change. Explain your working.

work done = ... J [3]

(ii) Determine the change ΔU in internal energy of the gas.

ΔU = ... J [1]

[Total: 10]