

2

(a)

The variation with pressure  $p$  of the volume  $V$  of a fixed mass of ideal gas as it undergoes a cycle ABCA of changes is shown in Fig. 2.1.

6

- 2 (a) State what is meant by *internal energy*.

.....  
.....  
..... [2]

- (b) The variation with volume  $V$  of the pressure  $p$  of an ideal gas as it undergoes a cycle ABCA of changes is shown in Fig. 2.1.

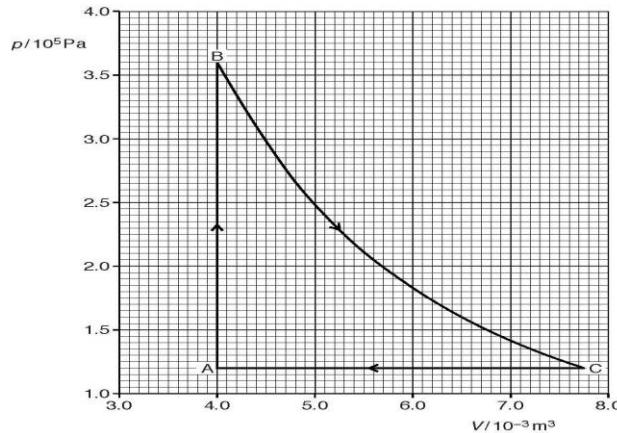


Fig. 2.1

The temperature of the gas at A is 290K. The temperature at B is 870K.

Fig. 2.1

The temperature of the gas at A is 290 K.

[REDACTED]

(i)

Calculate the amount of gas.

[REDACTED]

amount of gas = \_\_\_\_\_ mol

[2]

[REDACTED]

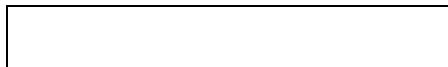
(ii)

Determine the temperature of the gas at C.

[REDACTED]

temperature = \_\_\_\_\_ K

[2]



(iii)

Determine the work done on the gas during the change from C to A.



work done = \_\_\_\_\_ J

[1]

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(b)

Explain whether heat is supplied to or removed from the gas during one complete cycle ABCA.

10.000-10.000

• [3]

**ANSWER** The answer is 1000.

(c)

After one complete cycle ABCA, the gas in the fixed volume cylinder leaks slowly so that, after a time of 3.00 days, the pressure has reduced by 4.00%. The temperature remains constant.

Calculate the average rate, in atoms per second, at which gas atoms escape from the cylinder.

**REFERENCES** 1. B. L. Kinsman, *Surface Waves*, Prentice-Hall, Englewood Cliffs, NJ, 1965.

rate = \_\_\_\_\_  $\text{s}^{-1}$

[3]

[Total: 11]