

NCERT/CBSE PHYSICS CLASS 11 textbook

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Solutions/Answers to NCERT/CBSE PHYSICS Class 11(Class XI)textbook

Exercise and Additional exercise

CHAPTER THIRTEEN

Kinetic Theory

EXERCISES

(For simplicity in numerical calculations, take $g = 10 \text{ m s}^{-2}$)

13.3 Figure 13.8 shows plot of PV/T

different temperatures.

versus P for $1.00 \times 10^{-3} \text{ kg}$ of oxygen gas at two

Y

$PV - 1$

T_2

(JK)

T

T_1

$P \times$

Fig. 13.8

- (a) What does the dotted plot signify?
(b) Which is true: $T_1 > T_2$ or $T_1 < T_2$?
(c) What is the value of PV/T where the curves meet on the y -axis?
(d) If we obtained similar plots for $1.00 \times 10^{-3} \text{ kg}$ of hydrogen, would we get the same value of PV/T at the point where the curves meet on the y -axis? If not, what mass of hydrogen yields the same value of PV/T (for low pressure high temperature region of the plot) ? (Molecular mass of $H_2 = 2.02 \text{ u}$, of $O_2 = 32.0 \text{ u}$, $R = 8.31 \text{ J mol}^{-1} \text{ K}^{-1}$.)

Q.13.3

- (a) Dotted line corresponds to the behaviour of ideal gas.
(b) $T_1 > T_2$, as the curve approaches the ideal gas curve as temperature is increased.

(c) mole of O_2 gas = $\frac{1 \times 10^{-3}}{32 \times 10^{-3}} = \frac{1}{32}$

So $\frac{DT}{T} = nR = \frac{1}{32} \times 8.31 = 0.26 \text{ JK}^{-1}$

- (d) No, as it depends on the molecular mass. The mass of H_2 which yields same value of

$$\frac{PV}{T}$$

$$\Rightarrow \frac{1}{32} \times 8.31 = \frac{m}{2.02 \times 10^{-3}} \times 8.31$$

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$$m = 6.32 \times 10^{-5} \text{ kg of H}_2.$$

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