Flexiprep

Examrace 339K

Chemistry Class 11 NCERT Solutions: Chapter 5 States of Matter Part 6

Q: 18. 2.9 g of a gas at 95 ° C occupied the same volume as 0.184 g of dihydrogen at 17 °C, at the same pressure. What is the molar mass of the gas?

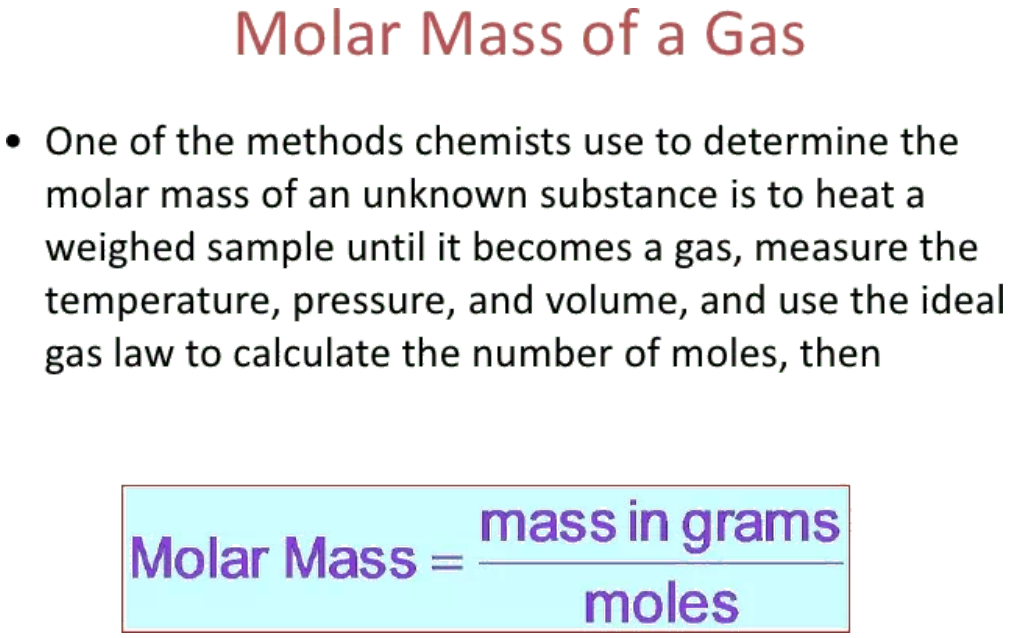

Image Showing Molar Mass of a Gas.

Answer:

Volume (V) occupied by dihydrogen is given by,

$$V = \frac{m}{M}\frac{RT}{p}$$

$$= \frac{0.184}{2} \times \frac{R \times 290}{p}$$

Let M be the molar of the unknown gas. Volume (V) occupied by the unknown gas can be calculated as: > $V = \frac{m}{M}\frac{RT}{p}$

$$= \frac{2.9}{M} \times \frac{R \times 368}{p}$$

According to the question,

$$\frac{0.184}{2} \times \frac{R \times 290}{p} = \frac{2.9}{M} \times \frac{R \times 368}{p}$$

$$\Rightarrow \frac{0.184 \times 290}{2} = \frac{2.9 \times 368}{M}$$

$$\Rightarrow M = \frac{2.9 \times 368 \times 2}{0.184 \times 290}$$

$$= 40\ g\ mol^{-1}$$

Hence, the molar mass of the gas is $40\ g\ mol^{-1}$.

Q: 19. A mixtures of dihydrogen and Dioxygen at one bar pressure contain 20% by weight of dihydrogen. Calculate the partial pressure of dihydrogen.

Answer:

Let the weight of dihydrogen be 20 g and the weight of Dioxygen be 80 g.

Then, the number of moles of dihydrogen, $n_{H2} = \frac{20}{2} = 10\ moles$ and the number of moles

Of Dioxygen, $n_{O2} = \frac{80}{32} = 2.5\ moles$

Given,

Total pressure of the mixture, $p_{total} = 1\ \text{bar}$

Then, partial pressure of dihydrogen,

$$p_{H_2} = \frac{n_{H2}}{n_{H2} + n_{O2}} \times P_{total}$$

$$= \frac{10}{10 + 2.5} \times 1$$

$$= 0.8\ \text{bar}$$

Hence, the partial pressure of dihydrogen is $0.8\ bar$.

Q: 20. What would be the SI unit for the quantity $\frac{pV^2T^2}{n}$?

Answer:

The SI unit for pressure, p is Nm^{-2}.

The SI unit for volume, V is m^3.

The SI unit for temperature, T is K.

The SI unit for the number of moles n is mol.

Therefore, the SI unit for quantity $\frac{pV^2T^2}{n}$ is given by,

$$= \frac{(\text{Nm}^{-2})(\text{m}^3)^2(\text{K})^2}{\text{mol}}$$

$$= \text{Nm}^4\text{K}^2\text{mol}^{-1}$$

Q: 21. In terms of Charles' law explain why $-273°C$ is the lowest possible temperature.

Answer:

Charles' law states that constant pressure, the volume of a fixed mass of gas is directly proportional to its absolute temperature.