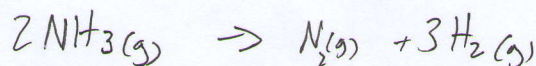


4. A sample of ammonia (NH_3) gas is completely decomposed to nitrogen and hydrogen gases over heated iron wool. If the total pressure is 866 mmHg, calculate the partial pressures of N_2 and H_2 .



$$PV = nRT$$

$$n_T = \frac{P_T V}{RT}$$

$$n_T = n_{\text{N}_2} + n_{\text{H}_2}$$

$$3n_{\text{N}_2} = n_{\text{H}_2}$$

$$n_T = n_{\text{N}_2} + 3n_{\text{N}_2}$$

~~$$n_T = 4n_{\text{N}_2}$$~~

$$n_T = 4n_{\text{N}_2}$$

~~$$4n_{\text{N}_2} = \frac{P_T V}{RT}$$~~

$$n_{\text{N}_2} = \frac{1}{4} \frac{P_T V}{RT}$$

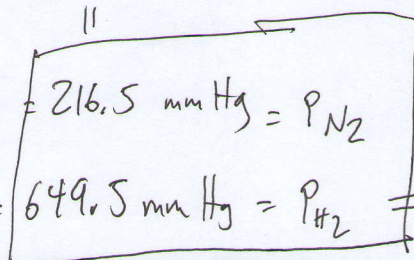
$$n_{\text{H}_2} = 3n_{\text{N}_2} = \frac{3}{4} \frac{P_T V}{RT}$$

$$P_{\text{N}_2} = \frac{n_{\text{N}_2}}{n_T} P_T = \frac{1}{4} (866) \text{ mmHg}$$

$$P_{\text{H}_2} = \frac{n_{\text{H}_2}}{n_T} P_T = \frac{3}{4} (866) \text{ mmHg}$$

0.285 atm

||



5. A real gas is introduced into a flask of volume V . Is the corrected volume of the gas greater or less than V ? Why?

The corrected volume of the gas is less than V .

In Kinetic Molecular Theory, we assume the volume (free volume) of the gas is equal to the volume of the container it occupies.

For real gases, some of the container volume is occupied by the gases, and the volume of the gases "excludes" other gas molecules from occupying the total (free) volume of the container.

Thus, the corrected volume of the gas is lower than the volume, V , of the container.

6. Ammonia has a larger value of a in the van der Waals equation than neon does. What can you conclude about the relative strength of attractive forces between molecules of ammonia and between atoms of neon?

In the van der Waals equation, " a " represents the strength of intermolecular forces between gas molecules for a particular compound. The higher the value of " a ", the stronger the intermolecular forces.

Since $\text{NH}_3(\text{g})$ has a larger value of " a " than $\text{Ne}(\text{g})$, we can predict that $\text{NH}_3(\text{g})$ has stronger intermolecular forces than $\text{Ne}(\text{g})$.