- **34.05 mL of phosphorus vapour weighs 0.625 g at 546 °C and 0.1 bar pressure. What is the molar mass of phosphorus?**

Ans) The molar mass of phosphorus,

$$M = \frac{wRT}{PV} = \frac{0.0625 \times 0.08314 \times 819}{1 \times 34.05 \times 10^{-3}} = 124.98$$

An air filled balloon has a volume of 125L at 760 mm of mercury and 25°C. What will be its volume when the pressure is 670 mm of mercury and temperature is 18°C?

Ans)   Here p_1 = 760 mm of Hg, V_1 = 125 L, $T_1 = 25°C$ = 25 + 273 = 298 K, p_2 =670 mm of Hg, $T_2 = 18°C$ = 18 + 273 = 291 K , V_2 = ?

From combined gas law: $\dfrac{p_1 V_1}{T_1} = \dfrac{p_2 V_2}{T_2}$

So $V_2 = \dfrac{p_1 V_1 T_2}{p_2 T_1}$

$= \dfrac{760 \times 125 \times 291}{670 \times 298} = \underline{138.46 \text{ mm of Hg}}$