Answer on Question #82506 – Chemistry – Organic Chemistry

Task:

If 3.50 grams of neon gas is at a temperature 298 K and pressure of 722 mm Hg, what is the volume?

Solution:

For most gases at temperatures near (or above) room temperature (298 K = 25°C) and near (or below) room pressure (1 atm = 760 torr = 760 mmHg), the ideal gas law adequately describes the behavior of the gas:

$$pV = nRT,$$

where R = 0.08206 L·atm·mol^{-1}·K^{-1} is the ideal gas constant.

$$pV = nRT; \quad \Rightarrow \quad pV = \frac{m}{M}RT; \quad \Rightarrow \quad V = \frac{mRT}{pM}.$$

M(Ne) = 20.1797

1 atm = 760 mmHg; → 722 mm Hg = 0.95 atm.

Then,

$$V = \frac{mRT}{pM} = \frac{3.50*0.08206*298}{0.95*20.1797} = 4.465L.$$

Answer: 4.465 L of neon gas.