

Answer on Question #56048 - Chemistry - Inorganic Chemistry

Question:

Calculate the densities of each of the following gases in g/L at STP.

Express your answer with the appropriate units.

1.C₄H₆

$\rho = ???$

2.SiH₄

$\rho = ???$

3.Cl₂

$\rho = ???$

4.Kr

$\rho = ???$

Answer:

$$PV = \frac{mRT}{M} \rightarrow \left| \rho = \frac{m}{V} \right| \rightarrow M = \frac{mRT}{PV} = \rho \frac{RT}{p} \rightarrow \rho = M \frac{P}{RT}$$

$$[\rho] = g \, mol^{-1} \frac{Pa}{m^3 Pa K \, mol^{-1}} = g \, m^{-3}$$

$$\rho = M \frac{100000}{8.3144598 \times 273.15} = 44.0316 \, M$$

	C ₄ H ₆	SiH ₄	Cl ₂	Kr
M, g mol ⁻¹	28.05	32.12	70.9	83.798
ρ , g m ⁻³	1235.086	1414.295	3121.84	3689.76
ρ , g L ⁻¹	1.235	1.414	3.122	3.690