

Question #59004, Chemistry / General Chemistry

what is the molecular weight of a pure gaseous compound having a density of 4.95g/l at -35°C and 1020 torr?

Answer:

According to the Ideal Gas Law:

$$PV = \frac{m}{M}RT$$

We can modify this formula by dividing both parts by V:

$$P = \frac{\rho}{M}RT,$$

where $\rho = \frac{m}{V}$ – density.

Therefore, the molecular weight is:

$$M = \frac{\rho RT}{P} = \frac{4.95 \text{ g/L} * 62.3636 \frac{\text{Torr} * \text{L}}{\text{K} * \text{mol}} * 238.15 \text{ K}}{1020 \text{ Torr}} = 72.075 \text{ g/mol}$$