A 3.98 g gas occupies 0.96L at 8.3atm and 37°C. What is its molecular weight?

Solution:

According to general gas equation:

$$PV = nRT;$$

(where P – pressure, V – volume of gas, n – number of moles of gas, R – gas constant, T - temperature).

Also, $n=\dfrac{m}{M}$;

(where m – mass of gas, M – molecular weight of gas)

Then, equation could be reduced to the form:

$$PV=\dfrac{m}{M}RT;$$

And molecular mass of gas equals to:

$$M=\frac{mRT}{PV}=\frac{3.98\ g*0.082\left(\frac{L*atm}{K*Mol}\right)*310.15\ K}{8.3\ atm*0.96\ L} = 12.70 \text{ g/mol}$$

Answer:

Molecular weight of gas equals to 12.70 g/mol.