How many atoms of Cl2 gas are in 38.7L?
What is the mass of 2.3 x 10^24 particles of Aluminum Sulfide?
If I have 425 grams of water, how many particles of water do I have?
How many liters of space is occupied by 75.0 g of CO2 gas?

Solution:

$$\nu = \frac{m}{M}$$; ν - mole (mol); m – the mass (g); M – the molar mass (g^mol^{-1}).

$$\nu = \frac{N}{N_A}$$ N – the number of particles (atoms, molecules) N_A =6.02^10^{23} mol^{-1} (Avogadro constant)

$$\nu = \frac{V}{V_m}$$ V – the volume (L); V_m (the molar volume)=22.4 L^mol^{-1}

How many atoms of Cl2 gas are in 38.7L?
N(Cl2)=1.04^10^{24} N(Cl)=2.08 ^10^{24}

Answer: N(Cl)=2.08^10^{24}

What is the mass of 2.3 x 10^24 particles of Aluminum Sulfide?
m(Al2S3)=573 g

Answer: 573 g

If I have 425 grams of water, how many particles of water do I have?

$$\nu = \frac{m}{M} ; \quad \nu = \frac{N}{N_A}$$; N(H2O)=1.42^10^{25}

Answer: 1.42^10^{25}

How many liters of space is occupied by 75.0 g of CO2 gas?

$$\nu = \frac{m}{M} ; \nu = \frac{V}{V_m}$$; V(CO2)=38.2 L

Answer: V(CO2)=38.2 L