

Calculate Mass to Moles

How many moles are in 150.00 grams of elemental potassium?

$$\frac{150.0 \text{ g K}}{39.098 \text{ g K}} \times \frac{1 \text{ mol K}}{1} = 3.837 \text{ mol K}$$

Calculate Moles to Mass

How many grams of lead (II) oxide are in .076 moles?

$$\begin{array}{l} \text{Pb} = 207.2 \text{ g/mol} \times 1 = 207.2 \text{ g/mol} \\ \text{O} = 15.999 \text{ g/mol} \times 2 = 31.998 \text{ g/mol} \\ \hline 223.199 \text{ g/mol} \end{array}$$

$$\frac{0.076 \text{ mol PbO}}{1 \text{ mol PbO}} \times \frac{223.199 \text{ g PbO}}{1} = 16.963 \text{ g PbO}$$

Calculate Moles to Atoms/Molecules

Calculate the number of molecules present in 0.975 moles of sodium chloride.

$$\frac{0.975 \text{ mol NaCl}}{1 \text{ mol NaCl}} \times \frac{6.022 \times 10^{23} \text{ molecules NaCl}}{1} = 5.871 \times 10^{23} \text{ molecules NaCl}$$

Calculate Atoms/Molecules to Moles

Calculate the number of moles present in 1.67×10^{24} molecules of titanium (II) fluoride.

$$\frac{1.67 \times 10^{24} \text{ molecules TiF}_2}{6.022 \times 10^{23} \text{ molecules TiF}_2} \times \frac{1 \text{ mol TiF}_2}{1} = 2.77 \text{ mol TiF}_2$$

Calculate Atoms/Molecules to Mass

Calculate the mass in 3.21×10^{25} molecules of Sulfur Dioxide.

$$\begin{array}{l} \text{S} = 32.066 \text{ g/mol} \times 1 = 32.066 \text{ g/mol} \\ \text{O} = 15.999 \text{ g/mol} \times 2 = 31.998 \text{ g/mol} \\ \hline 64.064 \text{ g/mol} \end{array}$$

$$\frac{3.21 \times 10^{25} \text{ molecules SO}_2}{6.022 \times 10^{23} \text{ molecules SO}_2} \times \frac{64.064 \text{ g SO}_2}{1 \text{ mol SO}_2} = 3443.687 \text{ g SO}_2$$

Calculate Mass to Atoms/Molecules

Calculate the molecules present in 10.27 grams of Sulfur Dioxide.

$$\begin{array}{l} \text{S} = 32.066 \text{ g/mol} \times 1 = 32.066 \text{ g/mol} \\ \text{O} = 15.999 \text{ g/mol} \times 2 = 31.998 \text{ g/mol} \\ \hline 64.064 \text{ g/mol} \end{array}$$

$$\frac{10.27 \text{ g SO}_2}{64.064 \text{ g SO}_2} \times \frac{6.022 \times 10^{23} \text{ molecules SO}_2}{1 \text{ mol SO}_2} = 9.654 \times 10^{22} \text{ molecules SO}_2$$

Calculate Moles to Volume

What is the volume of 5.663 moles of oxygen gas?

$$\frac{5.663 \text{ mol O}_2}{1 \text{ mol O}_2} \times \frac{22.4 \text{ L O}_2}{1} = 126.851 \text{ L O}_2$$

Calculate Volume to Moles

Calculate the number of moles present in 78.115 L of nickel (II) sulfide.

$$\frac{78.115 \text{ L NiS}}{22.4 \text{ L NiS}} \times \frac{1 \text{ mol NiS}}{1} = 3.487 \text{ mol NiS}$$

Calculate Mass to Volume

How many liters of nitrogen gas are in 16.500 grams?

$$\frac{\text{N} = 14.007 \text{ g/mol} \times 2 = 28.014 \text{ g/mol}}{28.014 \text{ g/mol}}$$

$$\frac{16.500 \text{ g N}_2}{28.014 \text{ g N}_2} \times \frac{1 \text{ mol N}_2}{1} \times \frac{22.4 \text{ L N}_2}{1 \text{ mol N}_2} = 13.193 \text{ g N}_2$$

Calculate Volume to Mass

What is the mass of 4.75 L of hydrogen gas?

$$\frac{\text{H} = 1.008 \text{ g/mol} \times 2 = 2.016 \text{ g/mol}}{2.016 \text{ g/mol}}$$

$$\frac{4.75 \text{ L H}_2}{22.4 \text{ L H}_2} \times \frac{1 \text{ mol H}_2}{1} \times \frac{2.016 \text{ g H}_2}{1 \text{ mol H}_2} = 0.428 \text{ g H}_2$$

Calculate Volume to Atoms/Molecules

Calculate the number of molecules in 187.77 liters of water.

$$\frac{187.77 \text{ L H}_2\text{O}}{22.4 \text{ L H}_2\text{O}} \times \frac{1 \text{ mol SO}_2}{1} \times \frac{6.022 \times 10^{23} \text{ molecules H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = 5.048 \times 10^{24} \text{ molecules H}_2\text{O}$$

Calculate Atoms/Molecules to Volume

What is the volume, in liters, of 7.556×10^{24} atoms of titanium?

$$\frac{7.556 \times 10^{24} \text{ molecules Ti}}{6.022 \times 10^{23} \text{ molecules Ti}} \times \frac{1 \text{ mol Ti}}{1} \times \frac{22.4 \text{ L Ti}}{1 \text{ mol Ti}} = 281.06 \text{ molecules Ti}$$