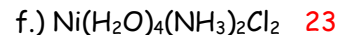
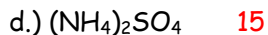
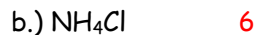
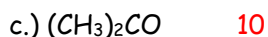
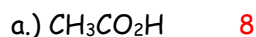
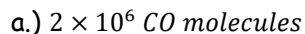


Mole Conversions

1.) How many atoms are contained in 1 molecule of each of the following?



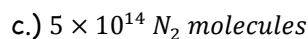
2.) Find the mass, in grams, of each of the following.



$$2 \times 10^6 \text{ molec} \times \frac{1 \text{ mol}}{6.022 \times 10^{23} \text{ molec}} \times \frac{28.01 \text{ g CO}}{1 \text{ mol}} = 9 \times 10^{-17} \text{ g CO}$$



$$1.25 \text{ NH}_3 \text{ L} \times \frac{1 \text{ mol}}{22.41 \text{ L}} \times \frac{17.04 \text{ g NH}_3}{1 \text{ mol}} = 0.950 \text{ g NH}_3$$



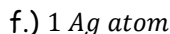
$$5 \times 10^{14} \text{ N}_2 \text{ molec} \times \frac{1 \text{ mol}}{6.022 \times 10^{23} \text{ molec}} \times \frac{28.02 \text{ g N}_2}{1 \text{ mol}} = 2 \times 10^{-8} \text{ g N}_2$$



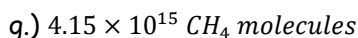
$$1 \text{ KOH molec} \times \frac{1 \text{ mol}}{6.022 \times 10^{23} \text{ molec}} \times \frac{56.11 \text{ g KOH}}{1 \text{ mol}} = 9.318 \times 10^{-23} \text{ g KOH}$$



$$125 \text{ He atom} \times \frac{1 \text{ mol}}{6.022 \times 10^{23} \text{ atom}} \times \frac{4.00 \text{ g He}}{1 \text{ mol}} = 8.31 \times 10^{-22} \text{ g He}$$



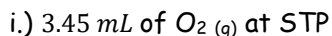
$$1 \text{ Ag atom} \times \frac{1 \text{ mol}}{6.022 \times 10^{23} \text{ atom}} \times \frac{107.87 \text{ g Ag}}{1 \text{ mol}} = 1.791 \times 10^{-22} \text{ g Ag}$$



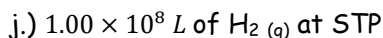
$$4.15 \times 10^{15} \text{ molec} \times \frac{1 \text{ mol}}{6.022 \times 10^{23} \text{ molec}} \times \frac{16.04 \text{ g CH}_4}{1 \text{ mol}} = 1.11 \times 10^{-7} \text{ g CH}_4$$



$$175 \text{ atom} \times \frac{1 \text{ mol}}{6.022 \times 10^{23} \text{ atom}} \times \frac{14.01 \text{ g N}}{1 \text{ mol}} = 4.07 \times 10^{-21} \text{ g N}$$

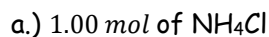


$$0.00345 \text{ O}_2 \text{ L} \times \frac{1 \text{ mol}}{22.41 \text{ L}} \times \frac{32.00 \text{ g O}_2}{1 \text{ mol}} = 0.00493 \text{ g O}_2$$

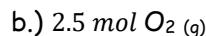


$$1.00 \times 10^8 \text{ L} \times \frac{1 \text{ mol}}{22.41 \text{ L}} \times \frac{2.02 \text{ g H}_2}{1 \text{ mol}} = 9.01 \times 10^6 \text{ g H}_2$$

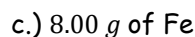
3.) How many atoms are contained in each of the following?



$$1.00 \text{ mol NH}_4\text{Cl} \times \frac{6.022 \times 10^{23} \text{ molec}}{1 \text{ mol}} \times \frac{6 \text{ atoms}}{1 \text{ molec}} = 3.61 \times 10^{24} \text{ atoms NH}_4\text{Cl}$$



$$2.5 \text{ mol O}_2 \times \frac{6.022 \times 10^{23} \text{ molec}}{1 \text{ mol}} \times \frac{2 \text{ atoms}}{1 \text{ molec}} = 3.0 \times 10^{24} \text{ atoms O}_2$$



$$8.00 \text{ g Fe} \times \frac{1 \text{ mol}}{55.85 \text{ g Fe}} \times \frac{6.022 \times 10^{23} \text{ atoms}}{1 \text{ mol}} = 8.63 \times 10^{22} \text{ atoms Fe}$$



$$15.0 \text{ L Ag} \times \frac{1 \text{ mol}}{22.41 \text{ L}} \times \frac{6.022 \times 10^{23} \text{ atoms}}{1 \text{ mol}} = 4.03 \times 10^{23} \text{ atoms Ag}$$

e.) 12 g of H<sub>2</sub>O<sub>2</sub>

$$12 \text{ g H}_2\text{O}_2 \times \frac{1 \text{ mol}}{34.02 \text{ g H}_2\text{O}_2} \times \frac{6.022 \times 10^{23} \text{ molec}}{1 \text{ mol}} \times \frac{4 \text{ atoms}}{1 \text{ molec}} = 8.5 \times 10^{23} \text{ atoms H}_2\text{O}_2$$

f.) 55.0 mL of N<sub>2</sub>O (g) at STP

$$0.055 \text{ L N}_2\text{O} \times \frac{1 \text{ mol}}{22.41 \text{ L N}_2\text{O}} \times \frac{6.022 \times 10^{23} \text{ molec}}{1 \text{ mol}} \times \frac{3 \text{ atoms}}{1 \text{ molec}} = 4.43 \times 10^{21} \text{ atoms N}_2\text{O}$$

i.) 125 g of CH<sub>3</sub>Cl

$$125 \text{ g CH}_3\text{Cl} \times \frac{1 \text{ mol}}{50.49 \text{ g CH}_3\text{Cl}} \times \frac{6.022 \times 10^{23} \text{ molec}}{1 \text{ mol}} \times \frac{5 \text{ atoms}}{1 \text{ molec}} = 7.45 \times 10^{24} \text{ atoms CH}_3\text{Cl}$$

j.) 8.30 × 10<sup>-4</sup> mL of BF<sub>3</sub> (g) at STP

$$8.30 \times 10^{-7} \text{ L BF}_3 \times \frac{1 \text{ mol}}{22.41 \text{ L BF}_3} \times \frac{6.022 \times 10^{23} \text{ molec}}{1 \text{ mol}} \times \frac{4 \text{ atoms}}{1 \text{ molec}} = 8.92 \times 10^{16} \text{ atoms BF}_3$$

g.) 40.0 g of K

$$40.0 \text{ g K} \times \frac{1 \text{ mol}}{39.10 \text{ g K}} \times \frac{6.022 \times 10^{23} \text{ atoms}}{1 \text{ mol}} = 6.16 \times 10^{23} \text{ atoms K}$$

h.) 5.0 g of NaCl

$$5.0 \text{ g NaCl} \times \frac{1 \text{ mol}}{58.44 \text{ g NaCl}} \times \frac{6.022 \times 10^{23} \text{ molec}}{1 \text{ mol}} \times \frac{2 \text{ atoms}}{1 \text{ molec}} = 1.0 \times 10^{23} \text{ atoms NaCl}$$

k.) 6.5 × 10<sup>-6</sup> g of Kr

$$6.5 \times 10^{-6} \text{ g Kr} \times \frac{1 \text{ mol}}{83.80 \text{ g Kr}} \times \frac{6.022 \times 10^{23} \text{ atoms}}{1 \text{ mol}} = 4.7 \times 10^{16} \text{ atoms Kr}$$

l.) 9.5 × 10<sup>-3</sup> g of NH<sub>3</sub>

$$9.5 \times 10^{-3} \text{ g NH}_3 \times \frac{1 \text{ mol}}{17.04 \text{ g NH}_3} \times \frac{6.022 \times 10^{23} \text{ molec}}{1 \text{ mol}} \times \frac{4 \text{ atoms}}{1 \text{ molec}} = 1.3 \times 10^{21} \text{ atoms NH}_3$$

4.) What volume at STP is occupied by each of the following?

a.) 16.5 g of AsH<sub>3</sub> (g)

$$16.5 \text{ g AsH}_3 \times \frac{1 \text{ mol}}{77.95 \text{ g AsH}_3} \times \frac{22.41 \text{ L}}{1 \text{ mol}} = 4.74 \text{ L AsH}_3$$

e.) 8.65 × 10<sup>21</sup> molecules of SO<sub>2</sub> (g)

$$8.65 \times 10^{21} \text{ molec SO}_2 \times \frac{1 \text{ mol}}{6.022 \times 10^{23} \text{ molec}} \times \frac{22.41 \text{ L}}{1 \text{ mol}} = 0.322 \text{ L SO}_2$$

b.) 5.65 × 10<sup>22</sup> molecules of POF<sub>3</sub> (g)

$$5.65 \times 10^{22} \text{ molec POF}_3 \times \frac{1 \text{ mol}}{6.022 \times 10^{23} \text{ molec}} \times \frac{22.41 \text{ L}}{1 \text{ mol}} = 2.10 \text{ L POF}_3$$

f.) 6.98 × 10<sup>15</sup> atoms of Xe (g)

$$6.98 \times 10^{15} \text{ atoms Xe} \times \frac{1 \text{ mol}}{6.022 \times 10^{23} \text{ atoms}} \times \frac{22.41 \text{ L}}{1 \text{ mol}} = 2.60 \times 10^{-7} \text{ L Xe}$$

c.) 0.750 g of O<sub>3</sub> (g)

$$0.750 \text{ g O}_3 \times \frac{1 \text{ mol}}{48.00 \text{ g O}_3} \times \frac{22.41 \text{ L}}{1 \text{ mol}} = 0.350 \text{ L O}_3$$

g.) 28.4 mg of H<sub>2</sub>Te (g)

$$0.0284 \text{ g H}_2\text{Te} \times \frac{1 \text{ mol}}{129.62 \text{ g H}_2\text{Te}} \times \frac{22.41 \text{ L}}{1 \text{ mol}} = 4.91 \times 10^{-3} \text{ L H}_2\text{Te}$$

d.) 9.04 × 10<sup>24</sup> atoms of He (g)

$$9.04 \times 10^{24} \text{ atoms He} \times \frac{1 \text{ mol}}{6.022 \times 10^{23} \text{ atoms}} \times \frac{22.41 \text{ L}}{1 \text{ mol}} = 336 \text{ L He}$$

h.) 3.25 kg of C<sub>2</sub>H<sub>6</sub> (g)

$$3250 \text{ g C}_2\text{H}_6 \times \frac{1 \text{ mol}}{30.08 \text{ g C}_2\text{H}_6} \times \frac{22.41 \text{ L}}{1 \text{ mol}} = 2.42 \times 10^3 \text{ L C}_2\text{H}_6$$

5.) What is the density of CO<sub>2</sub> (g) at STP?

$$d = \frac{g}{L} \quad d = \frac{44.01 \text{ g}}{22.4 \text{ L}} \quad d = 1.96 \text{ g/L}$$

6.) How many atoms of Nitrogen are there in 30.0 g of  $\text{NH}_4\text{NO}_3$ ?

$$30.0 \text{ g } \text{NH}_4\text{NO}_3 \times \frac{1 \text{ mol}}{80.06 \text{ g } \text{NH}_4\text{NO}_3} \times \frac{6.022 \times 10^{23} \text{ molec}}{1 \text{ mol}} \times \frac{2 \text{ atoms}}{1 \text{ molec}} = 4.51 \times 10^{23} \text{ atoms N}$$