

# Moles / Stoichiometry

## molar Conversions

mole - a measurement used in chemistry to help simplify molecules and atoms.

mol, avogadro's #

1 mol =  $6.02 \times 10^{23}$  molecules or atoms

Mole  $\leftrightarrow$  molecules/atoms

How many molecules are in 2.2 mol of Copper?

$$\textcircled{3} \quad \frac{2.2 \text{ mol Cu}}{\text{1 mol Cu}} \times \frac{6.02 \times 10^{23} \text{ molecules Cu}}{1 \text{ mol Cu}} = 1.32 \times 10^{24} \text{ molecules Cu}$$

1. What is the starting unit?
2. What is the ending unit?
3. Make a connection between the units and solve.

$$\underline{1 \text{ mol Cu}} = \underline{6.02 \times 10^{23} \text{ molecules Cu}}$$

How many moles are in  $6.28 \times 10^{25}$  particles of dust?

$$\frac{6.28 \times 10^{25} \text{ part. dust}}{\text{Ⓜ}} \bigg/ \frac{1 \text{ mol dust}}{6.02 \times 10^{23} \text{ part. dust}} = 104 \text{ mol dust}$$

moles  $\leftrightarrow$  Liters of gas

$$\underline{1 \text{ mol} = 22.4 \text{ L (gas)}}$$

How many moles are in  $36 \text{ L}$  of Fluorine gas? ①

$$\frac{36 \text{ L F}_2}{\text{Ⓜ}} \bigg/ \frac{1 \text{ mol F}_2}{22.4 \text{ L F}_2} = 1.61 \text{ mol F}_2$$

How many liters are in  $4.92 \text{ mol}$  of  $\text{O}_2$ ?  $1 \text{ mol} = 22.4 \text{ L}$

$$\frac{4.92 \text{ mol O}_2}{\text{Ⓜ}} \bigg/ \frac{1 \text{ mol O}_2}{22.4 \text{ L O}_2} = \boxed{110.21 \text{ L O}_2}$$

How many particles are in 2.4L of hydrogen gas?

$$\frac{1 \text{ mol} = 6.02 \times 10^{23} \text{ particles}}{1 \text{ mol} = 22.4 \text{ L}}$$

$$\frac{2.4 \text{ L H}_2 / 1 \text{ mol H}_2}{22.4 \text{ L H}_2 / 1 \text{ mol H}_2} \times \frac{6.02 \times 10^{23} \text{ part H}_2}{1 \text{ mol H}_2} = 6.45 \times 10^{22} \text{ part. H}_2$$

How many liters are in  $6.28 \times 10^{25}$  part. of NaOH?

Moles  $\leftrightarrow$  grams

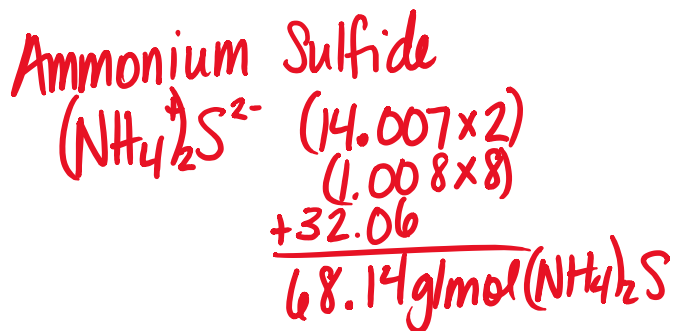
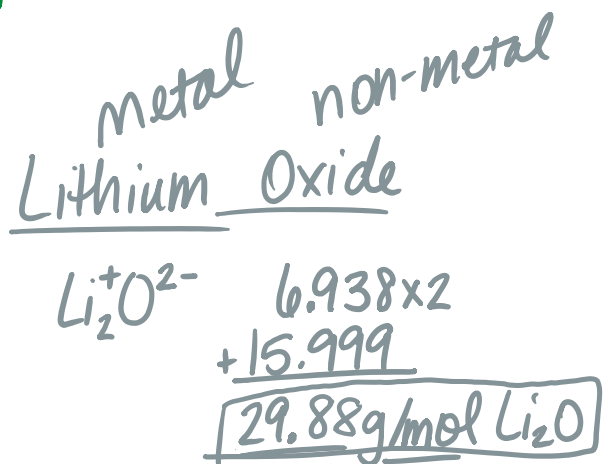
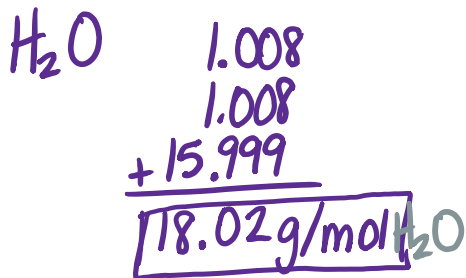
Formula mass - total mass of chemical formula

molar mass - mass of 1 mole of a compound.  
(g/mol)

### Finding Formula Mass (FM)

- ① Write formula out
- ② Find atomic mass for each component in compound.
- ③ Add masses  
\*  $\rightarrow$  be careful of subscripts!

Examples!



Moles  $\leftrightarrow$  grams

1 mol = FM of compound (Not the same for every compound)

\* Find equivalent statement, then convert.

How many grams are in 1.8 moles of Lithium Oxide?  
 $1 \text{ mol Li}_2\text{O} = 29.88 \text{ g Li}_2\text{O}$

$$\frac{1.8 \cancel{\text{mol Li}_2\text{O}}}{1} \times \frac{29.88 \text{ g Li}_2\text{O}}{1 \cancel{\text{mol Li}_2\text{O}}} = \boxed{53.78 \text{ g Li}_2\text{O}}$$

How many moles of Nitrogen dioxide are in 102.4 grams of  $\text{NO}_2$ ?  
FM of  $\text{NO}_2$

$$\begin{array}{r} 14.007 \\ + 15.999 \times 2 \\ \hline 46.01 \text{ g NO}_2 \end{array}$$

$$\frac{102.4 \cancel{\text{g NO}_2}}{1} \times \frac{1 \cancel{\text{mol NO}_2}}{46.01 \cancel{\text{g NO}_2}} = \boxed{2.23 \text{ mol NO}_2}$$

molar Map

