

Do Now: Molar Mass & % Composition Complete the table as indicated by the example. Show work!

Molecular Formula	Molar Mass of Compound	% Composition of Each Element
PbO₂	Pb: 1 x 207.22 = 207.22 O: 2 x 16.00 = 32.00 1 mole PbO₂ = 239.22 grams PbO₂	$\% \text{Pb} = \frac{207.22}{239.22} \times 100 = \mathbf{86.62\% \text{ Pb}}$ $\% \text{O} = \frac{32.00}{239.22} \times 100 = \mathbf{13.38\% \text{ O}}$
Mg(OH)₂		
CrF₃		
Al₂(SO₄)₃		
KNO₃		

How to Convert from Grams to Moles

1. Determine the mass of your substance that you are interested in Sample problem: "How many moles of KCl are in 26.0 grams of KCl ?"	2. If necessary, calculate the molar mass for that substance. If it is given, use that value. $1 \times 39.1 + 1 \times 35.5 =$ 74.6 grams KCl <hr/> 1 mole KCl
3. Use dimensional analysis to solve for moles. $26.0 \text{ grams KCl} \times \frac{1 \text{ mole KCl}}{74.6 \text{ grams KCl}}$ $= \frac{26.0 \times 1 \text{ mole KCl}}{74.6} = \mathbf{0.349 \text{ moles KCl}}$	

How to Convert from Moles to Grams

1. Determine the # of moles of your substance that you are interested in Sample problem: "How many grams of CO ₂ are in 1.5 moles of CO₂ ?"	2. If necessary, calculate the molar mass for that substance. If it is given, use that value. $1 \times 12.0 + 2 \times 16.0 =$ 44.0 grams CO₂ <hr/> 1 mole CO₂
3. Use dimensional analysis to solve for mass. $1.5 \text{ moles CO}_2 \times \frac{44.0 \text{ grams CO}_2}{1 \text{ mole CO}_2}$ $= \frac{1.5 \times 44.0 \text{ g}}{1} = \mathbf{66.0 \text{ grams CO}_2}$	

Practice: Calculate the number of moles or grams equivalent to the samples below (you may need to find the molar mass first):

1. 30 grams of H₃PO₄ (MM=98 grams/mole) = _____ moles H₃PO₄

$$30 \text{ grams H}_3\text{PO}_4 \times \text{_____} =$$

2. 25 grams of HF = _____ moles HF

3. 12.03 grams of CO₂ = _____ moles CO₂

4. 5.6 moles of C₆H₆ = _____ grams C₆H₆

$$5.6 \text{ moles C}_6\text{H}_6 \times \text{_____} =$$

5. 21.3 moles of BaCO₃ (MM=197.33 grams/mole) = _____ grams BaCO₃

6. 6.6 moles of ZnO (MM=81.41 grams/mole) = _____ grams ZnO

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**Atom vs. Molecule**

**Atom:** \_\_\_\_\_

Can refer to \_\_\_\_\_

**Molecule:** \_\_\_\_\_

Can refer to \_\_\_\_\_

**\*\*\*Remember:** \_\_\_\_\_

**How to Determine the Number of Molecules or Atoms in a Sample**

|                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Determine the given amount of your substance and what you're looking for</p> <p><b>Sample Problem:</b><br/>"How many <i>molecules</i> of CO<sub>2</sub> are in 66.0 grams of CO<sub>2</sub>?"</p> <p>"How many <i>atoms</i> of oxygen are in 66.0 grams of CO<sub>2</sub>?"</p>                                         | <p>2. If necessary, calculate the molar mass for that substance. If it is given, use that value.</p> <p><math>1 \times 12.0 + 2 \times 16.0</math><br/><b><math>\frac{44.0 \text{ grams } CO_2}{1 \text{ mole } CO_2}</math></b></p> |
| <p>3. Use dimensional analysis to solve for molecules.</p> <p><math>66.0 \text{ grams } CO_2 \times \frac{1 \text{ mole } CO_2}{44.0 \text{ grams } CO_2} \times \frac{6.02 \times 10^{23} \text{ molecules } CO_2}{1 \text{ mole } CO_2}</math></p> <p><b><math>= 9.03 \times 10^{23} \text{ molecules } CO_2</math></b></p> |                                                                                                                                                                                                                                      |

**Practice:**

1. Nitroglycerin: C<sub>3</sub>H<sub>5</sub>N<sub>3</sub>O<sub>9</sub>, molar mass 227.09 grams/mole. How many molecules of nitroglycerin are in 568 grams of nitroglycerin?

$568 \text{ grams } C_3H_5N_3O_9 \times \text{_____} \times \text{_____} =$

2. Calcium Phosphate: Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>, molar mass 310 grams/mole. How many molecules of calcium phosphate are found in a 225 gram sample?

**HOMEWORK: Solve the following problems using dimensional analysis. SHOW WORK!**

*\*Note: you need to find the molar mass of the substance if it is not provided*

1. How many grams are in 4.5 moles of sodium fluoride, NaF? \_\_\_\_\_

2. How many moles are in 98.3 grams of aluminum hydroxide, Al(OH)<sub>3</sub>? \_\_\_\_\_

3. How many molecules are there in 450 grams of sodium sulfate, Na<sub>2</sub>SO<sub>4</sub>? \_\_\_\_\_

4. How many molecules are there in 315 grams of Na<sub>2</sub>SO<sub>4</sub>? \_\_\_\_\_

5. How many grams are there in  $7.5 \times 10^{23}$  molecules of sulfuric acid, H<sub>2</sub>SO<sub>4</sub>? \_\_\_\_\_