

Ch 10  
 See 10.1 A  
 obj: calculate the mass of a mole of any substance.

### Mole - Mass Relationship

- Gram Atomic Mass (g am)
- \* 1 mole of an element is equal to that element's atomic mass.
- \* 1 mole = g am
- g am is the mass of 1 mole of an element.

How many moles are in 105 g of Ag?

Given

105 g Ag

Wanted

mols Ag

$$\frac{105 \cancel{\text{g Ag}}}{108 \cancel{\text{g Ag}}} \times \frac{1 \text{ mol Ag}}{1 \text{ mol Ag}}$$

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- Gram molecular Mass (g mm)
- \* 1 mole of a molecular compound is the sum of all the elements atomic masses in the compound.

H<sub>2</sub>O

$$\text{H} - 2 \times 1\text{g} = 2\text{g}$$

$$\text{O} - 1 \times 16\text{g} = 16\text{g}$$

$$\underline{18\text{g}}$$

CO<sub>2</sub>

$$* 1 \text{ mole} = \text{g mm}$$

What is the mass of .82 mols of SO<sub>3</sub>?

Given

.82 mols SO<sub>3</sub>

Wanted

mass SO<sub>3</sub>

$$\frac{.82 \cancel{\text{mols SO}_3}}{1 \cancel{\text{mol SO}_3}} \times \frac{80 \text{g SO}_3}{1 \text{ mol SO}_3}$$

SO<sub>3</sub>

$$\text{S} - 1 \times 32\text{g} = 32\text{g}$$

$$\text{O} - 3 \times 16\text{g} = 48\text{g}$$

$$\underline{80\text{g}}$$

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- Gram Formula Mass (gfm)

\* 1 mole of an ionic compound is equal to the sum of the gram atomic masses for each element in the compound.

$$\begin{array}{r} \text{CuCl}_2 \quad \text{Cu} - 1 \times 63.5\text{g} = 63.5\text{g} \\ \quad \quad \quad \text{Cl} - 2 \times 35.5\text{g} = +71.0\text{g} \\ \hline \quad \quad \quad \quad \quad \quad \quad \quad \quad 134.5\text{g} \end{array}$$

\* 1 mole = gfm

How many moles of  $\text{KNO}_3$  are in 153g  $\text{KNO}_3$ ?

|        |                     |                      |
|--------|---------------------|----------------------|
| Given  | 153g $\text{KNO}_3$ | 1 mol $\text{KNO}_3$ |
| Wanted |                     | 101g $\text{KNO}_3$  |
|        |                     |                      |

$$\begin{array}{r} \text{KNO}_3 \quad \text{K} = 1 \times 39\text{g} = 39\text{g} \\ \quad \quad \quad \text{N} = 1 \times 14\text{g} = 14\text{g} \\ \quad \quad \quad \text{O} = 3 \times 16\text{g} = 48\text{g} \\ \hline \quad \quad \quad \quad \quad \quad \quad \quad \quad 101\text{g} \end{array}$$

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- gam, gmm + gfm are all the same.

\* The mass of 1 mole of a substance.

\* The terms formula mass and molar mass are substituted for gam, gmm + gfm.

The measured mass of Au is 190g.  
How many atoms of Au?

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