

Warm Up

How many moles are in 2.14×10^{24} molecules of NO_2 ?

$$2.14 \times 10^{24} \text{ molecules NO}_2 \times \frac{1 \text{ mol NO}_2}{6.02 \times 10^{23} \text{ molecules NO}_2} = 3.55 \text{ mol NO}_2$$

How many atoms are in 8.08 moles of C_3H_8 ?

$$8.08 \text{ mol C}_3\text{H}_8 \times \frac{6.02 \times 10^{23} \text{ molecules C}_3\text{H}_8}{1 \text{ mol C}_3\text{H}_8} \times \frac{11 \text{ atoms}}{1 \text{ molecules C}_3\text{H}_8}$$

$$= 5.35 \times 10^{25} \text{ atoms}$$

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$$\textcircled{5} \quad 1.14 \text{ mol SO}_3 \times \frac{6.02 \times 10^{23} \text{ molecules SO}_3}{1 \text{ mol SO}_3} \times \frac{4 \text{ atoms}}{1 \text{ molecules SO}_3}$$
$$= \boxed{2.75 \times 10^{24} \text{ atoms}}$$

$$\textcircled{6} \quad \frac{4.65 \times 10^{24} \text{ molecules NO}_2}{1} \times \frac{1 \text{ mol NO}_2}{6.02 \times 10^{23} \text{ molecules NO}_2} =$$
$$\boxed{7.72 \text{ mol NO}_2}$$

Molar Mass

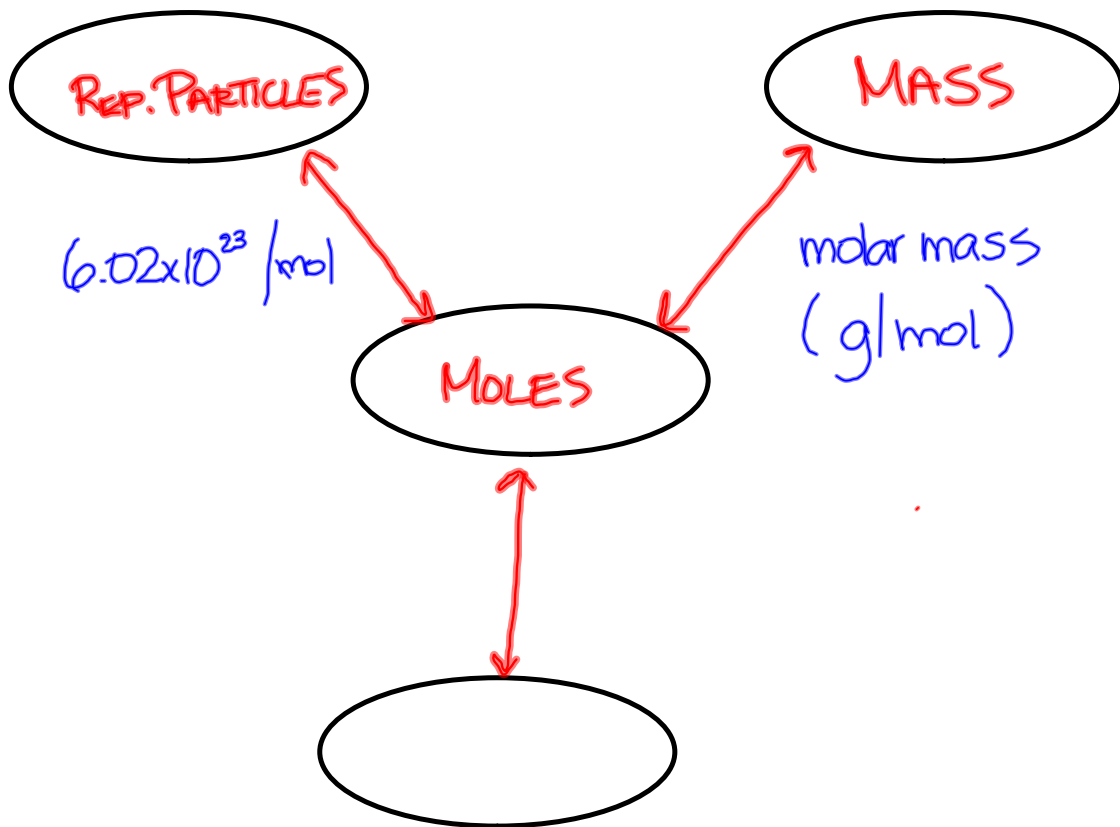
- the **molar mass** of a substance represents the mass of one mole of the substance
 - it is expressed in **grams per mol (g/mol)**

To determine the molar mass of a substance:

- make sure the formula is written properly
- determine the number of atoms of each element
- use the atomic molar masses of each atom from the periodic table and multiply this by the number of atoms
- add the mass of the atoms together so as to represent the total mass of the substance in grams per mole

Ex. What is the molar mass of $(\text{NH}_4)_3\text{PO}_4$?

$$\begin{aligned} \text{N} &\rightarrow 3 \times 14.01 = 42.03 \\ \text{H} &\rightarrow 12 \times 1.01 = 12.12 \\ \text{P} &\rightarrow 1 \times 30.97 = 30.97 \\ \text{O} &\rightarrow 4 \times 16.00 = \frac{64.00}{149.12 \text{ g/mol}} \end{aligned}$$



Find the molar mass of:



Once molar mass is established, a conversion can be made from grams to moles or moles to grams (depending on the measurement of the sample)

$$Mm = \frac{m}{n}$$

\swarrow mass (g)
 \swarrow # of moles

Ex. How many moles are found in 100.g of NaCl?

$$100.\text{g NaCl} \times \frac{1 \text{ mol NaCl}}{58.44 \text{ g NaCl}} = 1.71 \text{ mol NaCl}$$

$$\text{NaCl} \rightarrow (1 \times 22.99) + (1 \times 35.45) = 58.44 \text{ g/mol}$$

Ex. What is the mass of 5.00 mol of NaCl?

Homework

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