

Review of Molar Mass

- **Molar mass (M)** is the mass of 1 mole of chemical
 - In other words, the mass of 6.022×10^{23} molecules of a particular chemical
- Molar mass is used to relate the number of moles of a particular chemical to the mass of that chemical through the following equation

$$m = Mn \quad * \text{ memorize!}$$

where m is the mass of a chemical (g)
 M is the molar mass of a chemical (g/mol)
 n is the moles (mol)

EXAMPLES:

1. Calculate the number of moles in 6.55 g of $\text{NaHCO}_3(\text{s})$.

$$m = Mn \rightarrow \frac{m}{M} = n$$

$$n = \frac{6.55 \text{ g}}{84.01 \text{ g/mol}} = 0.077966... \text{ mol}$$

$$\begin{array}{r} 22.99 \\ + 1.01 \\ + 12.01 \\ + 16.00 \text{ (x3)} \\ \hline 84.01 \text{ g/mol} = M \end{array}$$

$$n = 0.0780 \text{ mol}$$

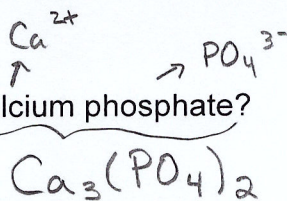
2. What is the mass of 0.155 mol of calcium phosphate?

$$m = Mn$$

$$m = (310.18 \text{ g/mol})(0.155 \text{ mol})$$

$$m = 48.0779 \text{ g}$$

$$m = 48.1 \text{ g}$$



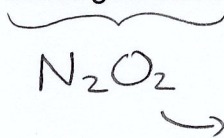
$$\begin{array}{r} 40.08 \text{ (x3)} \\ + 30.97 \text{ (x2)} \\ + 16.00 \text{ (x8)} \\ \hline 310.18 \text{ g/mol} = M \end{array}$$

3. How many moles are in 0.558 kg of dinitrogen dioxide?

$$n = ?$$

$$m = 0.558 \text{ kg} \times \left(\frac{10^3}{1 \text{ kg}} \right)$$

$$m = 558 \text{ g}$$



$$14.01 (\times 2)$$

$$16.00 (\times 2)$$

$$\hline 60.02 \text{ g/mol} = M$$

$$m = Mn \rightarrow \frac{m}{M} = n$$

$$n = \frac{558 \text{ g}}{60.02 \text{ g/mol}} = 9.29690... \text{ mol}$$

$$n = 9.30 \text{ mol}$$

Now try Practice Problem #1

Practice Problems

$$m = Mn$$

1. Complete the following chart.

Name	Formula	Molar Mass (g/mol)	Mass (g)	Moles (mol)
sodium chloride	NaCl	58.44 g/mol	m = 11.688 g <u>m = 12 g</u>	0.20 mol
sulphur trioxide	SO ₃	80.07 g/mol	1.23 g	0.0154 mol
iron(III) hydroxide	Fe(OH) ₃	106.88 g/mol	10.3 g	9.64 x 10 ⁻² mol
nitrogen	N ₂	28.02 g/mol	65.1 g	2.32 mol
calcium nitrate	Ca(NO ₃) ₂	164.10 g/mol	8.45 g	0.0515 mol
potassium dichromate	K ₂ Cr ₂ O ₇	294.20 g/mol	406 g	1.38 mol