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

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

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 $NaHCO_{3(s)}$.

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

$n = \frac{6.55\,g}{84.01\,g/mol} = 0.077966\ldots mol$

$n = 0.0780\,mol$

22.99
+ 1.01
+ 12.01
+ 16.00 (x3)
84.01 g/mol = M

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

Ca^{2+} PO_4^{3-}

$Ca_3(PO_4)_2$

$m = Mn$

$m = (310.18\,g/mol)(0.155\,mol)$

$m = 48.0779\,g$

$m = 48.1\,g$

40.08 (x3)
+ 30.97 (x2)
+ 16.00 (x8)
310.18 g/mol = M

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

$n = ?$

N_2O_2

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

$14.01\ (\times 2)$
$16.00\ (\times 2)$
$60.02\ \text{g/mol} = M$

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

$m = M_n \longrightarrow \frac{m}{M} = n$

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

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

Now try Practice Problem #1

m = Mn

Practice Problems

1. Complete the following chart.

Name	Formula	Molar Mass (g/mol)	Mass (g)	Moles (mol)
sodium chloride	$NaCl$	58.44 g/mol	m = 12 g	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 x10^{-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	$K_2Cr_2O_7$	294.20 g/mol	406 g	1.38 mol