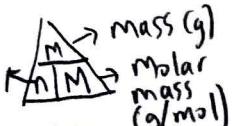


## 2-Step Mole Conversions

- ANSWERS



\*\*Remember: Convert to moles first!

$$\text{mol} \rightarrow \frac{N}{n} \text{ molecules/atoms} = 6.02 \times 10^{23}$$

1) How many molecules are there in 47 grams of  $\text{FeF}_3$ ?

$$M_{\text{FeF}_3} = \frac{\text{Fe}}{1(55.845)} + \frac{\text{F}}{3(18.998)} = 112.839 \text{ g/mol}$$

$$n = \frac{m}{M} = \frac{47 \text{ g}}{112.839 \text{ g/mol}}$$

$$N = n N_A = (0.417 \text{ mol}) (6.02 \times 10^{23}) \approx 2.51 \times 10^{23} \text{ molecules}$$

2) How many molecules are there in 375 grams of  $\text{Na}_2\text{SO}_4$ ?

$$M_{\text{Na}_2\text{SO}_4} = \frac{\text{Na}}{2(22.990)} + \frac{\text{S}}{1(32.065)} + \frac{\text{O}}{4(15.999)} = 142.041 \text{ g/mol}$$

$$n = \frac{m}{M} = \frac{375 \text{ g}}{142.041 \text{ g/mol}}$$

$$N = n N_A = (2.640 \text{ mol}) (6.02 \times 10^{23}) \approx 1.589 \times 10^{24} \text{ molecules}$$

3) How many grams are there in  $2.3 \times 10^{23}$  atoms of silver?

$$n = \frac{N}{N_A} = \frac{2.3 \times 10^{23}}{6.02 \times 10^{23}} = 0.382 \text{ mol}$$

$$m = n M = (0.382 \text{ mol}) (107.87 \text{ g/mol})$$

4) How many grams are there in  $19.2 \times 10^{23}$  molecules of  $\text{AgNO}_3$ ?

$$M_{\text{AgNO}_3} = \frac{\text{Ag}}{1(107.87)} + \frac{\text{N}}{1(14.007)} + \frac{\text{O}}{3(15.999)} = 169.874 \text{ g/mol}$$

$$n = \frac{N}{N_A} = \frac{19.2 \times 10^{23}}{6.02 \times 10^{23}} = 3.189 \text{ mol}$$

$$m = n M = (3.189 \text{ mol}) (169.874 \text{ g/mol}) = 541.79 \text{ g}$$

5) How many molecules are there in 968 grams of  $\text{H}_2\text{SO}_4$ ?

$$M_{\text{H}_2\text{SO}_4} = \frac{\text{H}}{2(1.0079)} + \frac{\text{S}}{1(32.065)} + \frac{\text{O}}{4(15.999)} = 98.077 \text{ g/mol}$$

$$n = \frac{m}{M} = \frac{968 \text{ g}}{98.077 \text{ g/mol}}$$

$$N = n N_A = (9.870 \text{ mol}) (6.02 \times 10^{23}) = 5.942 \times 10^{24} \text{ molecules}$$

6) How many molecules are there in 100 moles of  $\text{Cu}(\text{NO}_3)_2$ ?

$$M_{\text{Cu}(\text{NO}_3)_2} = \frac{\text{Cu}}{1(63.546)} + \frac{\text{N}}{2(14.007)} + \frac{\text{O}}{6(15.999)} = 187.554 \text{ g/mol}$$

$$N = n N_A = (100) (6.02 \times 10^{23}) = 6.02 \times 10^{25} \text{ molecules}$$

7) How many atoms are there in  $27 \times 10^{23}$  molecules of Calcium (Ca)?

8) Convert the following two-step quantities, converting first to moles and then to the desired quantity.

- Find the number of molecules in 60.0 g of  $\text{N}_2\text{O}$ .
- Find the volume of  $3.24 \times 10^{22}$  molecules of Ne
- Find the mass of 18.0 L of  $\text{CH}_4$
- Find the volume of 835 g of  $\text{SO}_3$
- Find the mass of one atom of nickel.