

NAME

Homework 7/

Key

Basic Skills:

- Go back and forth between moles and numbers of atoms/molecules

o Convert the following quantities using Avagadro's number:

1. 3.45×10^{-12} mol C_3H_7OH = _____ molecules C_3H_7OH

mol \rightarrow molecules CF: 1 mol C_3H_7OH = 6.022×10^{23} molecules C_3H_7OH

$$3.45 \times 10^{-12} \text{ mol } C_3H_7OH \left(\frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol } C_3H_7OH} \right) = 2.0769 \times 10^{12}$$

2. 7.59×10^{45} atoms of He = _____ mol He

atoms $\xrightarrow{N_A}$ mol

$$7.59 \times 10^{45} \text{ atoms He} \left(\frac{1 \text{ mol He}}{6.02 \times 10^{23} \text{ atoms}} \right) = 1.26 \times 10^{22} \text{ mol He}$$

2.08×10^{12} molecules C_3H_7OH

- Calculate molar mass

o Give the molar mass for the following atoms:

1. Helium (He)	4.00 g/mol
2. Manganese (Mn)	54.94 g/mol
3. Mercury (Hg)	200.59 g/mol
4. Iodine (I)	126.90 g/mol
5. Carbon (C)	12.01 g/mol

o Calculate the molar mass for the following compounds:

1. $Ca(NO_3)_2$

$$40.08 \text{ g/mol} + 2(14.01 \text{ g/mol}) + 6(16.00 \text{ g/mol}) = 164.10 \text{ g/mol} \text{ or } 1 \text{ mol } Ca(NO_3)_2 = 164.10 \text{ g}$$

2. C_6H_{12}

$$6(12.01 \text{ g/mol}) + 12(1.01 \text{ g/mol}) =$$

$$84.18 \text{ g/mol}$$

3. SO_2Cl_2

$$32.07 \text{ g/mol} + 2(16.00 \text{ g/mol}) + 2(35.45 \text{ g/mol})$$

$$= 134.97 \text{ g/mol}$$

* I usually use 2 decimal places for molar mass. You are welcome to use more if you prefer.

□ Use molar mass as a conversion factor

○ Convert the following using the information you calculated in the above section:

1. 45.00 g Mn = _____ mol Mn

$g \rightarrow mol$
CF: $54.94g Mn = 1mol Mn$

$$45.00g Mn \left(\frac{1mol Mn}{54.94g Mn} \right) = \boxed{.8191mol Mn}$$

4sf

2. 98.23 mol C₆H₁₂ = _____ g C₆H₁₂

$$98.23mol C_6H_{12} \left(\frac{84.18g C_6H_{12}}{1mol C_6H_{12}} \right) = \boxed{8269g C_6H_{12}}$$

4sf

3. 1.598g SO₂Cl₂ = _____ molecules SO₂Cl₂

$$1.598g SO_2Cl_2 \left(\frac{1mol SO_2Cl_2}{134.97g SO_2Cl_2} \right) \left(\frac{6.02 \times 10^{23} molec}{1mol SO_2Cl_2} \right) = \boxed{7.127 \times 10^{21} molecules SO_2Cl_2}$$

4. 1.593×10^{32} atoms C = _____ g C

$$1.593 \times 10^{32} atoms C \left(\frac{1mol C}{6.02 \times 10^{23} atoms} \right) \left(\frac{12.01g C}{1mol C} \right) = \boxed{3.177 \times 10^9 g C}$$

□ Use a chemical formula as a conversion factor

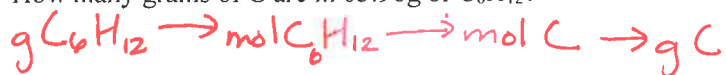
○ Convert the following:

1. Determine the number of moles of O in 27.05 mol CO₂.

$$1mol CO_2 = 2mol O$$

$$27.05mol CO_2 \left(\frac{2mol O}{1mol CO_2} \right) = \boxed{54.10mol O}$$

2. How many grams of C are in 65.98g of C_6H_{12} ?



$$65.98g C_6H_{12} \left(\frac{1 mol C_6H_{12}}{84.18g C_6H_{12}} \right) \left(\frac{6 mol C}{1 mol C_6H_{12}} \right) \left(\frac{12.01g C}{1 mol C} \right) =$$

56.48g C

3. How many grams of $Ca(NO_3)_2$ can you produce if you begin with 75.23g Ca?

$$75.23g Ca \left(\frac{1 mol Ca}{40.08g Ca} \right) \left(\frac{1 mol Ca(NO_3)_2}{1 mol Ca} \right) \left(\frac{164.10g Ca(NO_3)_2}{1 mol} \right) =$$

308.0g $Ca(NO_3)_2$

4. How many grams of N are there in 25.9g of N_2O_4 ?

$$25.9g N_2O_4 \left(\frac{1 mol N_2O_4}{92.02g N_2O_4} \right) \left(\frac{2 mol N}{1 mol N_2O_4} \right) \left(\frac{14.01g N}{1 mol N} \right)$$

= 7.89g N

