

NAME Key

Homework 8

Calculating the mass percent composition from a chemical formula

- o Calculate the following Percent Compositions:

1. What is the mass percent of Cl in  $\text{CCl}_4$ ?

$$4(35.45) + 12.01 = 153.81 \text{ g/mol}$$

$$\% \text{Cl} = \frac{4(35.45 \text{ g/mol})}{153.8 \text{ g/mol}} \times 100\% = 92.19\%$$

2. Calculate the mass percent of H in  $\text{CH}_3\text{F}$ .

$$\frac{3(1.01 \text{ g})}{34.04 \text{ g}} \times 100\% = 8.90\%$$

$$12.01 \text{ g} + 3(1.01 \text{ g}) + 19.00 \text{ g} = 34.04 \text{ g}$$

3. What is the mass percent of O in  $\text{Al}_2(\text{CO}_3)_3$ ?

$$\frac{9(16.00 \text{ g})}{233.99 \text{ g}} = 61.54\%$$

$$2(26.98 \text{ g}) + 3(12.01 \text{ g}) + 9(16.00) = 233.99$$

Use mass percent as a conversion factor.

- o Convert the following quantities using mass percent:

1. In a reaction you need 35.00g Cl. How many grams of  $\text{CCl}_4$  do you need to add to the reaction so that you provide the correct amount of Cl?

$$35.00 \text{ g Cl} \left( \frac{100 \text{ g CCl}_4}{92.19 \text{ g Cl}} \right) = \boxed{37.97 \text{ g CCl}_4}$$

2. How many moles of H are present in 150.0g CH<sub>3</sub>F?

$$150.0\text{g CH}_3\text{F} \left( \frac{8.90\text{g H}}{100\text{g CH}_3\text{F}} \right) = 13.35\text{g H} \left( \frac{1\text{mol H}}{1.01\text{g H}} \right) \\ = \boxed{13.22\text{ mol H}}$$

3. Cisplatin is a very expensive cancer drug. It contains 65.08% Pt by mass. I found 1.500g of pure Pt in our stockroom and am looking to make some money to fund raise for our ACS student group, so I decide to make some Cisplatin and sell it to the drug company. (Completely hypothetical, this is not a real thing. I can't make that drug, and they wouldn't buy it from me if I did.) Anyway, how many grams of Cisplatin can I make?

$$1.500\text{g Pt} \left( \frac{100\text{g cispl.}}{65.08\text{g Pt}} \right) = \boxed{2.305\text{g cisplatin}}$$

4. Turns out, cisplatin costs about \$500 per 50.00 mg dose. How much money will my Cisplatin be worth when I am done?

$$2.305\text{g cispl} \left( \frac{1\text{mg}}{10^{-3}\text{g}} \right) \left( \frac{\$500}{50\text{mg}} \right) = \\ \$23,049$$