Quiz 5A

1. What substance will be combusted during this week’s experiment (2 points)?

In Estimating the Caloric Content of Peanuts, a peanut is combusted.

1. A compound containing only sulfur and nitrogen is 69.6% S by mass; the molar mass is 184 g/mol. (Note write the S first then the N) (10 points)
	1. What is the empirical formula?

$$69.6\% S=69.9 g S×\frac{1 mol S}{32.07 g S}=2.170252573 mol S$$

$$100\%-69.6\% N=30.4 \% N=30.4 g N×\frac{1 mol N}{14.01 g }=2.169878658 mol N$$

$$S\_{\frac{2.170252573}{2.169878658}}N\_{\frac{2.169878659}{2.169878658}}=S\_{1.00017232}N\_{1}=SN$$

* 1. What is the molecular formula?

$$ratio=\frac{molecular mass}{empirical mass}=\frac{184 g/mol}{46.08 g/mol}=3.993055556≈4$$

 Molecular formula = (SN)4 = S4N4

* 1. Name the compound using its molecular formula. Tetrasulfur tetranitride
1. Stearic acid, C18H36O2, is a principle component of saturated fat (8 points).
	1. Calculate the molar mass of stearic acid.

C: (12.011 g/mol)18 = 216.198 g/mol

H: (1.008 g/mol)36 = 36.288 g/mol

O: (15.999 g/mol)2 = 31.998 g/mol

 = 284.484 g/mol ≈ 284.48 g/mol

* 1. Calculate the percent carbon in stearic acid.

$$\%C=\frac{216.20 g/mol}{284.47 g/mol}×100=76.00\% C$$

* 1. How many moles of hydrogen are in 0.2415 moles of stearic acid?

$$0.2415 mol C\_{18}H\_{36}O\_{2}×\frac{36 mol H}{1 mol C\_{18}H\_{36}O\_{2}}=8.694 mol H$$

* 1. How many molecules of stearic acid are in 2.45 g?

$$2.45 g C\_{18}H\_{36}O\_{2}×\frac{1 mol C\_{18}H\_{36}O\_{2}}{284.48 g C\_{18}H\_{36}O\_{2}}×\frac{6.022×10^{23} molecules C\_{18}H\_{36}O\_{2}}{1 mol C\_{18}H\_{36}O\_{2}}=5.19×10^{21} molecules C\_{18}H\_{36}O\_{2}$$

Quiz 5B

1. Stearic acid, C18H36O2, is a principle component of saturated fat (8 points).
	1. Calculate the molar mass of stearic acid.

C: (12.011 g/mol)18 = 216.198 g/mol

H: (1.008 g/mol)36 = 36.288 g/mol

O: (15.999 g/mol)2 = 31.998 g/mol

 = 284.484 g/mol ≈ 284.48 g/mol

* 1. Calculate the percent hydrogen in stearic acid.

$$\%H=\frac{36.29 g/mol}{284.47 g/mol}×100=12.76\% H$$

* 1. How many moles of carbon are in 0.2415 moles of stearic acid?

$$0.2415 mol C\_{18}H\_{36}O\_{2}×\frac{18 mol C}{1 mol C\_{18}H\_{36}O\_{2}}=4.347 mol C$$

* 1. How many grams of stearic acid are in 2.33 x 1021 molecules?

$$2.33×10^{21} molecules C\_{18}H\_{36}O\_{2}×\frac{1 mol C\_{18}H\_{36}O\_{2}}{6.022×10^{23} molecules C\_{18}H\_{36}O\_{2}}×\frac{284.48 g C\_{18}H\_{36}O\_{2}}{1 mol C\_{18}H\_{36}O\_{2}}=1.10 g C\_{18}H\_{36}O\_{2}$$

1. A compound containing only sulfur and nitrogen is 30.4% N by mass; the molar mass is 184 g/mol. (Note write the S first then the N) (10 points)
	1. What is the empirical formula?

$$100\%-30.4\% N=69.6\% S=69.9 g S×\frac{1 mol S}{32.07 g S}=2.170252573 mol S$$

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