Chemistry 115 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Quiz 5a

Dr. Cary Willard March 12, 2014

Avogadro’s number = 6.022 x 1023/mol

1. (4 points) Eugenol, C10H12O2, is a phenylpropanoid that gives clove its characteristic aroma. What is the molar mass of eugenol?

$$Molar mass=10\left(C\right)+12\left(H\right)+2\left(O\right)=10\left(12.01 amu\right)+12\left(1.008 amu\right)+2\left(16.00 amu\right)=176.02 amu=120.1 amu+12.10 amu+32.00 amu=164.2 amu$$

1. (4 points) How many grams of oxygen are in 8.47 mol of eugenol?

$$?g O\_{2}=8.47 mol C\_{10}H\_{12}O\_{2}×\frac{2 mol O}{1 mol C\_{10}H\_{12}O\_{2} }×\frac{16.00 g O}{1 mol O}=271 g O$$

1. (4 points) How many atoms of carbon are in 3.28 g of eugenol?

$$?atom C=3.28 g C\_{10}H\_{12}O\_{2}×\frac{1 mol C\_{10}H\_{12}O\_{2}}{164.2 g C\_{10}H\_{12}O\_{2}}×\frac{10 mol C}{1 mol C\_{10}H\_{12}O\_{2}}×\frac{6.022×10^{23}atom C}{1 mol C}=1.21×10^{23}atom C$$

1. (5 points) Calculate the empirical formula of a compound that is composed of 43.64% phosphorus and 56.36% oxygen

$$?mol P=43.64 g P×\frac{1 mol P}{30.97 g P}=1.409 mol P$$

$$?mol O=56.36 g O×\frac{1 mol O}{16.00 g O}=3.523 mol O$$

$$P\_{\frac{1.409}{1.409}}O\_{\frac{3.523}{1.409}}\rightarrow P\_{1}O\_{2.50}\rightarrow P\_{2}O\_{5}$$

1. (3 points) A compound is found to have a molar mass of 70 g/mol and an empirical formula of CH2. What is the molecular formula of this compound?

Molar mass of CH2 = 12+1+1=14. 70/14=5 so molecular formula is (CH2)5 or C5H10

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Quiz 5b

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Avogadro’s number = 6.022 x 1023/mol

1. (4 points) Eugenol, C10H12O2, is a phenylpropanoid that gives clove its characteristic aroma. What is the molar mass of eugenol?

$$Molar mass=10\left(C\right)+12\left(H\right)+2\left(O\right)=10\left(12.01 amu\right)+12\left(1.008 amu\right)+2\left(16.00 amu\right)=176.02 amu=120.1 amu+12.10 amu+32.00 amu=164.2 amu$$

1. (4 points) How many grams of oxygen are in 3.72 mol of eugenol?

$$?g O\_{2}=3.72 mol C\_{10}H\_{12}O\_{2}×\frac{2 mol O}{1 mol C\_{10}H\_{12}O\_{2} }×\frac{16.00 g O}{1 mol O}=119 g O$$

1. (4 points) How many atoms of carbon are in 6.84 g of eugenol?

$$?atom C=6.84 g C\_{10}H\_{12}O\_{2}×\frac{1 mol C\_{10}H\_{12}O\_{2}}{164.2 g C\_{10}H\_{12}O\_{2}}×\frac{10 mol C}{1 mol C\_{10}H\_{12}O\_{2}}×\frac{6.022×10^{23}atom C}{1 mol C}=2.51×10^{23}atom C$$

1. (5 points) Calculate the empirical formula of a compound that is composed of 56.35% phosphorus and 43.65% oxygen

$$?mol P=56.35 g P×\frac{1 mol P}{30.97 g P}=1.820 mol P$$

$$?mol O=43.65 g O×\frac{1 mol O}{16.00 g O}=2.728 mol O$$

$$P\_{\frac{1.820}{1.820}}O\_{\frac{2.728}{1.820}}\rightarrow P\_{1}O\_{1.50}\rightarrow P\_{2}O\_{3}$$

1. (3 points) A compound is found to have a molar mass of 98 g/mol and an empirical formula of CH2. What is the molecular formula of this compound?

Molar mass of CH2 = 12+1+1=14. 98/14=7 so molecular formula is (CH2)7 or C7H14

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Quiz 5c

Dr. Cary Willard March 12, 2014

Avogadro’s number = 6.022 x 1023/mol

1. (4 points) Methyl salicylate, C8H8O3, is an organic that gives wintergreen its characteristic aroma. What is the molar mass of methyl salicylate?

$$Molar mass=8\left(C\right)+8\left(H\right)+3\left(O\right)=8\left(12.01 amu\right)+8\left(1.008 amu\right)+3\left(16.00 amu\right)=176.02 amu=96.08 amu+8.064 amu+48.00 amu=152.14 amu$$

1. (4 points) How many grams of oxygen are in 8.47 mol of methyl salicylate?

$$?g O\_{2}=8.47 mol C\_{8}H\_{8}O\_{3}×\frac{3 mol O}{1 mol C\_{8}H\_{8}O\_{3} }×\frac{16.00 g O}{1 mol O}=407 g O$$

1. (4 points) How many atoms of carbon are in 3.28 g of methyl salicylate?

$$?atom C=3.28 g C\_{8}H\_{8}O\_{3}×\frac{1 mol C\_{8}H\_{8}O\_{3}}{152.14 g C\_{8}H\_{8}O\_{3}}×\frac{8 mol C}{1 mol C\_{8}H\_{8}O\_{3}}×\frac{6.022×10^{23}atom C}{1 mol C}=1.04×10^{23}atom C$$

1. (5 points) Calculate the empirical formula of a compound that is composed of 76.90% bromine and 23.10% oxygen

$$?mol Br=76.90 g Br×\frac{1 mol Br}{79.90 g Br}=0.962 mol Br$$

$$?mol O=23.10 g O×\frac{1 mol O}{16.00 g O}=1.444 mol O$$

$$Br\_{\frac{0.962}{0.962}}O\_{\frac{1.444}{0.962}}\rightarrow Br\_{1}O\_{1.50}\rightarrow Br\_{2}O\_{3}$$

1. (3 points) A compound is found to have a molar mass of 70 g/mol and an empirical formula of CH2. What is the molecular formula of this compound?

Molar mass of CH2 = 12+1+1=14. 70/14=5 so molecular formula is (CH2)5 or C5H10

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Quiz 5d

Dr. Cary Willard March 12, 2014

Avogadro’s number = 6.022 x 1023/mol

1. (4 points) Methyl salicylate, C8H8O3, is an organic that gives wintergreen its characteristic aroma. What is the molar mass of methyl salicylate?

$$Molar mass=8\left(C\right)+8\left(H\right)+3\left(O\right)=8\left(12.01 amu\right)+8\left(1.008 amu\right)+3\left(16.00 amu\right)=176.02 amu=96.08 amu+8.064 amu+48.00 amu=152.14 amu$$

1. (4 points) How many grams of oxygen are in 3.72 mol of methyl salicylate?

$$?g O\_{2}=3.72 mol C\_{8}H\_{8}O\_{3}×\frac{3 mol O}{1 mol C\_{8}H\_{8}O\_{3} }×\frac{16.00 g O}{1 mol O}=179 g O$$

1. (4 points) ) How many atoms of carbon are in 6.84 g of methyl salicylate?

$$?atom C=6.84 g C\_{8}H\_{8}O\_{3}×\frac{1 mol C\_{8}H\_{8}O\_{3}}{152.14 g C\_{8}H\_{8}O\_{3}}×\frac{8 mol C}{1 mol C\_{8}H\_{8}O\_{3}}×\frac{6.022×10^{23}atom C}{1 mol C}=2.17×10^{23}atom C$$

1. (5 points) Calculate the empirical formula of a compound that is composed of 66.64% bromine and 33.36% oxygen

$$?mol Br=66.64 g Br×\frac{1 mol Br}{79.90 g Br}=0.834 mol Br$$

$$?mol O=33.36 g O×\frac{1 mol O}{16.00 g O}=2.085 mol O$$

$$Br\_{\frac{0.834}{0.834}}O\_{\frac{2.085}{0.834}}\rightarrow Br\_{1}O\_{2.50}\rightarrow Br\_{2}O\_{5}$$

1. (3 points) A compound is found to have a molar mass of 154 g/mol and an empirical formula of CH2. What is the molecular formula of this compound?

Molar mass of CH2 = 12+1+1=14. 154/14=11 so molecular formula is (CH2)11 or C11H22