Chemistry 115 Name

Dr. Cary Willard

Quiz 5a (20 points) October 1, 2013

All work must be shown to receive credit. Give answers to the correct number of significant figures. Avogadro’s number = 6.022 x 1023/mol

1. (4 points) Calculate the mass in grams of one atom of molybdenum.

$$?g Mo=1 atom Mo×\frac{1 mol Mo}{6.022×10^{23}atom Mo}×\frac{95.94 g Mo}{1 mol Mo}=1.593×10^{-22}g Mo$$

1. (6 points) Glucose has a molecular formula of C6H12O6 and has a molar mass of 180.1 g/mol.
	1. How many molecules of glucose are there in 3.66 x 10−4g of glucose?

$$?molec C\_{6}H\_{12}O\_{6}=3.66×10^{-4}g C\_{6}H\_{12}O\_{6}×\frac{1 mol C\_{6}H\_{12}O\_{6}}{180.1 g C\_{6}H\_{12}O\_{6}}×\frac{6.022×10^{23} molec C\_{6}H\_{12}O\_{6}}{1 mol C\_{6}H\_{12}O\_{6}}=1.22×10^{18}molec C\_{6}H\_{12}O\_{6}$$

* 1. How many atoms of carbon are there is 3.56 moles of glucose?

$$?atom C=3.56 mol C\_{6}H\_{12}O\_{6}×\frac{6.022×10^{23} molec C\_{6}H\_{12}O\_{6}}{1 mol C\_{6}H\_{12}O\_{6}}×\frac{6 atom C}{1 molec C\_{6}H\_{12}O\_{6}}=1.29×10^{25}atom C$$

1. (6 points) What is the empirical formula of a compound that is 63.6% nitrogen and 36.4% oxygen?

$$63.6 g N×\frac{1 mol N}{14.01 g N}=4.53 mol N$$

$$36.4 g O×\frac{1 mol O}{16.00 g O}=2.28 mol O$$

$$N\_{\frac{4.53}{2.28}}O\_{\frac{2.28}{2.28}}\rightarrow \rightarrow N\_{2}O$$

1. (4 points) Change this word equation into a formula equation and balance it. Show state labels, (*s,l,g,aq*).

Magnesium metal is placed into hydrobromic acid solution, forming hydrogen gas and aqueous magnesium bromide.

Mg*(s)* + 2 HBr*(aq)* 🡪 H2*(g)* + MgBr2*(aq)*

Chemistry 115 Name

Dr. Cary Willard

Quiz 5b (20 points) October 1, 2013

All work must be shown to receive credit. Give answers to the correct number of significant figures. Avogadro’s number = 6.022 x 1023/mol

1. (4 points) Calculate the mass in grams of one atom of chromium.

$$?g Cr=1 atom Cr×\frac{1 mol Cr}{6.022×10^{23}atom Cr}×\frac{52.00 g Cr}{1 mol Cr}=8.635×10^{-23}g Cr$$

1. (6 points) Glucose has a molecular formula of C6H12O6 and has a molar mass of 180.1 g/mol.
	1. How many molecules of glucose are there in 8.52 x 10−4 g of glucose?

$$?molec C\_{6}H\_{12}O\_{6}=8.52×10^{-4}g C\_{6}H\_{12}O\_{6}×\frac{1 mol C\_{6}H\_{12}O\_{6}}{180.1 g C\_{6}H\_{12}O\_{6}}×\frac{6.022×10^{23} molec C\_{6}H\_{12}O\_{6}}{1 mol C\_{6}H\_{12}O\_{6}}=2.84×10^{18}molec C\_{6}H\_{12}O\_{6}$$

* 1. How many atoms of carbon are there is 5.12 moles of glucose?

$$?atom C=5.12 mol C\_{6}H\_{12}O\_{6}×\frac{6.022×10^{23} molec C\_{6}H\_{12}O\_{6}}{1 mol C\_{6}H\_{12}O\_{6}}×\frac{6 atom C}{1 molec C\_{6}H\_{12}O\_{6}}=1.85×10^{25}atom C$$

1. (6 points) What is the empirical formula of a compound that is 72.02 % manganese and 27.98 % oxygen?

$$72.02 g Mn×\frac{1 mol Mn}{54.94 g Mn}=1.31 mol Mn$$

$$27.98 g O×\frac{1 mol O}{16.00 g O}=1.75 mol O$$

$$Mn\_{\frac{1.31}{1.31}}O\_{\frac{1.75}{1.31}}\rightarrow MnO\_{1.33}\rightarrow Mn\_{3}O\_{4}$$

1. (4 points) Change this word equation into a formula equation and balance it. Show state labels, (*s,l,g,aq*).

Lithium metal reacts with oxygen gas to form solid lithium oxide.

4 Li*(s)* + O2*(g)* 🡪 2 Li2O*(s)*

Chemistry 115 Name

Dr. Cary Willard

Quiz 5c (20 points) October 1, 2013

All work must be shown to receive credit. Give answers to the correct number of significant figures. Avogadro’s number = 6.022 x 1023/mol

1. (4 points) Calculate the mass in grams of one atom of titanium.

$$?g Ti=1 atom Ti×\frac{1 mol Ti}{6.022×10^{23}atom Ti}×\frac{47.88 g Ti}{1 mol Ti}=7.951×10^{-23}g Ti$$

1. (6 points) Glucose has a molecular formula of C6H12O6 and has a molar mass of 180.1 g/mol.
	1. How many molecules of glucose are there in 9.57 x 10−4 g of glucose?

$$?molec C\_{6}H\_{12}O\_{6}=9.57×10^{-4}g C\_{6}H\_{12}O\_{6}×\frac{1 mol C\_{6}H\_{12}O\_{6}}{180.1 g C\_{6}H\_{12}O\_{6}}×\frac{6.022×10^{23} molec C\_{6}H\_{12}O\_{6}}{1 mol C\_{6}H\_{12}O\_{6}}=3.20×10^{18}molec C\_{6}H\_{12}O\_{6}$$

* 1. How many atoms of carbon are there is 2.88 moles of glucose?

$$?atom C=2.88 mol C\_{6}H\_{12}O\_{6}×\frac{6.022×10^{23} molec C\_{6}H\_{12}O\_{6}}{1 mol C\_{6}H\_{12}O\_{6}}×\frac{6 atom C}{1 molec C\_{6}H\_{12}O\_{6}}=1.04×10^{25}atom C$$

1. (6 points) What is the empirical formula of a compound that is 47.2 % copper and 52.8 % chlorine?

$$47.2 g Cu×\frac{1 mol Cu}{63.55 g Cu}=0.743 mol Cu$$

$$52.8 g Cl×\frac{1 mol Cl}{35.45 g Cl}=1.48 mol Cl$$

$$Cu\_{\frac{0.743}{0.743}}O\_{\frac{1.48}{0.743}}\rightarrow \rightarrow CuO\_{2}$$

1. (4 points) Change this word equation into a formula equation and balance it. Show state labels, (*s,l,g,aq*).

Gaseous sulfur dioxide reacts with oxygen gas to form gaseous sulfur trioxide.

2 SO2*(g)* + O2*(g)* 🡪 2 SO3*(g)*

Chemistry 115 Name

Dr. Cary Willard

Quiz 5d (20 points) October 1, 2013

All work must be shown to receive credit. Give answers to the correct number of significant figures. Avogadro’s number = 6.022 x 1023/mol

1. (4 points) Calculate the mass in grams of one atom of vanadium.

$$?g V=1 atom V×\frac{1 mol V}{6.022×10^{23}atom V}×\frac{50.94 g V}{1 mol V}=8.459×10^{-23}g V$$

1. (6 points) Glucose has a molecular formula of C6H12O6 and has a molar mass of 180.1 g/mol.
	1. How many molecules of glucose are there in 7.53 x 10−4 g of glucose?

$$?molec C\_{6}H\_{12}O\_{6}=7.53×10^{-4}g C\_{6}H\_{12}O\_{6}×\frac{1 mol C\_{6}H\_{12}O\_{6}}{180.1 g C\_{6}H\_{12}O\_{6}}×\frac{6.022×10^{23} molec C\_{6}H\_{12}O\_{6}}{1 mol C\_{6}H\_{12}O\_{6}}=2.52×10^{18}molec C\_{6}H\_{12}O\_{6}$$

* 1. How many atoms of carbon are there is 4.85 moles of glucose?

$$?atom C=4.85 mol C\_{6}H\_{12}O\_{6}×\frac{6.022×10^{23} molec C\_{6}H\_{12}O\_{6}}{1 mol C\_{6}H\_{12}O\_{6}}×\frac{6 atom C}{1 molec C\_{6}H\_{12}O\_{6}}=1.75×10^{25}atom C$$

1. (6 points) What is the empirical formula of a compound that is 51.9 % chromium and 48.1 % sulfur?

$$51.9 g Cr×\frac{1 mol Cr}{52.00 g Cr}=0.998 mol Cr$$

$$48.1 g S×\frac{1 mol S}{32.06 g S}=1.50 mol S$$

$$Cr\_{\frac{0.998}{0.998}}O\_{\frac{1.50}{0.998}}\rightarrow CrS\_{1.50}\rightarrow Cr\_{2}S\_{3}$$

1. (4 points) Change this word equation into a formula equation and balance it.

Upon heating, solid lead(IV) oxide decomposed into solid lead(II) oxide and oxygen gas.

2 PbO2*(s)* 🡪 2 PbO*(s)* + O2*(g)*