Chemistry 115 Name Key

Dr. Cary Willard

Quiz 5A (20 points) March 9, 2009

All work must be shown to receive credit. Avogadro’s number 6.022 x 1023/mol

1. (3 points) Calculate the number of moles of phosphorous that contain 3.54 x 1021 atoms of phosphorous

$$?mol P=3.54 × 10^{21}atom P×\frac{1 mol P}{6.022 ×10^{23}atom P}=5.88×10^{-3}mol P $$

$$(0.00588 mol P)$$

1. (3 points) Calculate the mass of 6.53 moles of titanium.

$$?g Ti=6.53 mol Ti×\frac{47.90 g Ti}{1 mol Ti}=313 g Ti$$

1. (3 points) Calculate the number of atoms of boron in 3.00 g of boron.

$$?atom B=3.00 g B×\frac{1 mol B}{10.81 g B}×\frac{6.022 ×10^{23}atom B}{1 mol B}=1.67 ×10^{23}atom B$$

1. (3 points) Calculate the molar mass of calcium carbonate, (CaCO3)

$$Ca+C+3\left(O\right)=40.08+12.01+3\left(16.00\right)=100.09 g/mol$$

1. (3 points) Calculate the number of atoms of carbon in 3.50 mol of calcium carbonate.

$$?atom C=3.50 mol CaCO\_{3}×\frac{1 mol C}{1 mol CaCO\_{3}}×\frac{6.022 ×10^{23}atom C}{1 mol C}$$

$$=2.11 ×10^{24}atom C$$

1. (5 points) Determine the empirical formula of a compound that is composed of 69.9% iron and 30.1% oxygen.

$$69.9 g Fe×\frac{1 mol Fe}{55.85 g Fe}=1.25 mol Fe$$

$$30.1 g O×\frac{1 mol O}{16.00 g O}=1.88 mol O$$

$$Fe\_{\frac{1.25}{1.25}}O\_{\frac{1.88}{1.25}}=Fe\_{1}O\_{1.50}=Fe\_{2}O\_{3}$$

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1. (3 points) Calculate the number of moles of phosphorous that contain 6.03 x 1021 atoms of phosphorous

$$?mol P=6.03 × 10^{21}atom P×\frac{1 mol P}{6.022 ×10^{23}atom P}=1.00×10^{-2}mol P $$

$$(0.0100 mol P)$$

1. (3 points) Calculate the mass of 2.84 moles of titanium.

$$?g Ti=2.84 mol Ti×\frac{47.90 g Ti}{1 mol Ti}=136 g Ti$$

1. (3 points) Calculate the number of atoms of boron in 5.00 g of boron.

$$?atom B=5.00 g B×\frac{1 mol B}{10.81 g B}×\frac{6.022 ×10^{23}atom B}{1 mol B}=2.79 ×10^{23}atom B$$

1. (3 points) Calculate the molar mass of calcium carbonate, (CaCO3)

$$Ca+C+3\left(O\right)=40.08+12.01+3\left(16.00\right)=100.09 g/mol$$

1. (3 points) Calculate the number of atoms of carbon in 7.93 mol of calcium carbonate.

$$?atom C=7.93 mol CaCO\_{3}×\frac{1 mol C}{1 mol CaCO\_{3}}×\frac{6.022 ×10^{23}atom C}{1 mol C}$$

$$=4.78 ×10^{24}atom C$$

1. (5 points) Determine the empirical formula of a compound that is composed of 72.4% iron and 22.3% oxygen.

$$72.4 g Fe×\frac{1 mol Fe}{55.85 g Fe}=1.30 mol Fe$$

$$22.3 g O×\frac{1 mol O}{16.00 g O}=1.73 mol O$$

$$Fe\_{\frac{1.30}{1.30}}O\_{\frac{1.73}{1.30}}=Fe\_{1}O\_{1.33}=Fe\_{3}O\_{4}$$