Chemistry 141 Name key

Dr. Cary Willard

Quiz 2a (20 points) February 11, 2014

1. (6 points) How do the properties of compounds compare to the properties of the elements from which they are composed?

There is no relationship between the properties of compounds and the elements from which they are formed.

1. (7 points) Combustion analysis of 5.000 g of an organic compound produced 12.21 g of carbon dioxide and 4.999 grams of water. The compound contains C,H, and O. Calculate the empirical formula of the compound.

$$12.21 g CO\_{2}×\frac{1 mol CO\_{2}}{44.01 g CO\_{2}}×\frac{1 mol C}{1 mol CO\_{2}}×\frac{12.01 g C}{1 mol C}=3.332 g C$$

$$4.999 g H\_{2}O×\frac{1 mol H\_{2}O}{18.01 g H\_{2}O}×\frac{2 mol H}{1 mol H\_{2}O}×\frac{1.008 g H}{1 mol H}=0.5595 g H$$

$$5.000 g-\left(3.332 g C+0.5595 g H\right)=1.108 g O$$

$$3.332 g C×\frac{1 mol C}{12.01 g C}=0.2774 mol C$$

$$0.5595 g H×\frac{1 mol H}{1.008 g H}=0.5551 mol H$$

$$1.108 g O×\frac{1 mol O}{16.00 g O}=0.06925 mol O$$

$$C\_{\frac{0.2774}{0.06925}}H\_{\frac{0.5551}{0.06925}}O\_{\frac{0.06925}{0.06925}}\rightarrow C\_{4}H\_{8}O$$

1. (7 points) A metal (M) forms a compound with the formula MCl2. Of the compound contains 58.19% Cl by mass, what is the identity of the metal?

In 100 gram of sample

58.19 g Cl and 41.81 g M

$$58.19 g Cl×\frac{1 mol Cl}{35.45 g Cl}×\frac{1 mol MCl\_{2}}{2 mol Cl}×\frac{1 mol M}{1 mol MCl\_{2}}=0.8207 mol M$$

$$\frac{41.81 g M}{0.8207 mol M}=50.94 ∴V$$

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Quiz 2b (20 points) February 11, 2014

1. (6 points) How do the properties of compounds compare to the properties of the elements from which they are composed?

There is no relationship between the properties of compounds and the elements from which they are formed.

1. (7 points) Combustion analysis of 5.000 g of an organic compound produced 9.991 g of carbon dioxide and 4.089 grams of water. The compound contains C,H, and O. Calculate the empirical formula of the compound.

$$9.991 g CO\_{2}×\frac{1 mol CO\_{2}}{44.01 g CO\_{2}}×\frac{1 mol C}{1 mol CO\_{2}}×\frac{12.01 g C}{1 mol C}=2.726 g C$$

$$4.089 g H\_{2}O×\frac{1 mol H\_{2}O}{18.01 g H\_{2}O}×\frac{2 mol H}{1 mol H\_{2}O}×\frac{1.008 g H}{1 mol H}=0.4577 g H$$

$$5.000 g-\left(2.726 g C+0.4577 g H\right)=1.816 g O$$

$$2.726 g C×\frac{1 mol C}{12.01 g C}=0.2270 mol C$$

$$0.4577 g H×\frac{1 mol H}{1.008 g H}=0.4541 mol H$$

$$1.816 g O×\frac{1 mol O}{16.00 g O}=0.1135 mol O$$

$$C\_{\frac{0.2270}{0.1135}}H\_{\frac{0.4541}{0.1135}}O\_{\frac{0.1135}{0.1135}}\rightarrow C\_{2}H\_{4}O$$

1. (7 points) A metal (M) forms a compound with the formula MCl2. Of the compound contains 54.71% Cl by mass, what is the identity of the metal?

In 100 gram of sample

54.71 g Cl and 45.29 g M

$$54.71 g Cl×\frac{1 mol Cl}{35.45 g Cl}×\frac{1 mol MCl\_{2}}{2 mol Cl}×\frac{1 mol M}{1 mol MCl\_{2}}=0.7717 mol M$$

$$\frac{45.29 g M}{0.7717 mol M}=58.69 ∴Ni$$