**Exam 2 General Chemistry 1114 Alfred State College Monday 21 October 2013 A**

Your name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. **English-metric conversions (2 pts each/4 pts total)**

Conversion factors 1 meter = 1.094 yards= 3.281 feet 1 inch=2.54 cm=25.4 mm

 1 kilometer= 0.622 miles 1 liter=1000 mL = 0.275 gallons

 1 mile=5280 feet =1760 yards 1 lb =454 g = 0.454 kg =16 oz

 12 in = 1 foot

1. How many ft are in 1.220 meters ? \_\_\_\_\_\_\_ ft in 1.220 meters ( report to nearest 1 ft)
2. How many liters in 5.50 gallons? \_\_\_\_\_\_\_ liters in 5.50 gallons (report to nearest 1 L)

**2.2. Metric-metric symbols and conversions (14 pts)**

1) fill in the missing symbols, magnitudes and names (2 pt/line; 6 pts total)

|  |  |  |
| --- | --- | --- |
| **Prefix name** | **Symbol(letter)** | **Magnitude (10x)** |
| **nano** |  |  |
|  | **μ** |  |
|  |  | **1012** |

2) convert the metric units below to the indicated, alternative Metric measure (2 pts each/ 6 pts total)

1. 1.0\*10-8 kg = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_µg
2. 0.0090 Gs = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Ms
3. 80 cm = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_dm

**2.3. unknown metal density determination (4 pts)**

A flask pycnometer has a volume of 10.000 mL. After taring, metal is placed in the flask. The metal is found to weigh 25.00 grams. The flask and metal are then re-tared and the flask containing metal is filled with water. The added water is found to weigh 7.500 g. Given that the density of water is 1.000 g/mL, what is the metal’s density in g/mL?  **(show work or no credit !!!)**

 Unknown metal density=\_\_\_\_\_g/mL \_\_\_/22

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**2.4 egg arithmetic (2 pt each/8 pts total))**

A dozen monstrously large eggs from Aldi’s weighs 4000 g. Assuming 1 dozen =12 count:

1. If you have 12,000 grams of eggs, how many dozen eggs do you have ? \_\_\_\_\_\_\_\_\_\_\_ dozen eggs
2. If you have 0.2 dozen eggs, what is the total mass of eggs you have ? \_\_\_\_\_\_\_\_\_\_\_ grams eggs
3. If you have 30 eggs, what do they weigh? \_\_\_\_\_\_\_\_\_ grams eggs
4. If you have 50,000 grams of eggs, how many eggs do you have ? \_\_\_\_\_\_\_\_\_\_ egg count

**2.5. Simple mole-weight-count conversions (3 pts each/18 pts total) SHOW WORK !!!**

Assuming that a mole count= 6\*1023 and the gram atomic masses: C=12 g/mol N=14 g/mol H= 1 g/mol

1. What is the molecular weight (g/mol) of nicotine[**C**](http://en.wikipedia.org/wiki/Carbon)**10**[**H**](http://en.wikipedia.org/wiki/Hydrogen)**14**[**N**](http://en.wikipedia.org/wiki/Nitrogen)**2 ? \_\_\_\_\_\_ MW nicotine (g/mol)**
2. What does 0.06178 moles of nicotine weigh ? \_\_\_\_\_\_\_\_\_ g nicotine
3. How many moles of nicotine in 1296 g of nicotine ? \_\_\_\_\_\_\_\_\_\_ mol nicotine
4. How many moles of nicotine in 3.6\*1024 molecules of nicotine ? \_\_\_\_\_\_\_\_ mol nicotine
5. How many grams of nicotine are found in 1.4815\*1022 molecules of nicotine ? \_\_\_\_\_\_grams nicotine
6. How many molecules are in 5.4 g of nicotine ? \_\_\_\_\_\_\_molecules nicotine

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**2.6. Stoichiometry Problems (`Body Parts’): SHOW WORK !!!! (5 pts each/25 pts total)**

The molecular mass of dynamite=TNT (C7H5N3O6) is 227 g/mol.

Given the atomic masses for C=12 g/mol, H = 1 g/mol, N = 14 g/mol O=16 g/mol

1. How many moles of O are combined with 2.333 moles C in TNT ? \_\_\_\_\_\_\_ mol O
2. How many grams of N are in a sample of TNT containing 0.357 mol H ? \_\_\_\_\_\_\_ g N
3. How many moles of TNT are present if a sample of it contains 84 g C ? \_\_\_\_\_\_ mol TNT
4. A sample of TNT contains 1.428\*1023 atoms of H. How many g of N are also present? \_\_\_\_\_\_\_g N
5. 2.625 g of C are in a sample of TNT. How many grams of O are combined with it ? \_\_\_\_\_\_\_\_ g O

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**2.7. % Composition problems ( 4 pts each/8 pts total)**

1. An alcohol sample contains 60 wt % C, 26.667 wt % O and 13.333 wt % H. What is the alcohol’s empiric formula?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Element | mass | AW (g/mol) | mol | Mol ratio (mol/min mol) |
| C |  | 12 |  |  |
| O |  | 16 |  |  |
| H |  | 1 |  |  |

**Alcohol’s Empiric formula:** \_\_\_\_\_\_\_\_**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. A small protein molecule contains the following masses of component elements: 9.58 g N, 16.44 g C 21.92 g O and 3.075 g H. What is the **molecular formula** given that the molecular weight of the compound is 447 g/mol?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Element | mass | AW (g/mol) | mol | Mol ratio(mol/min mol) | Mol ratio\* factor (2) |
| N |  | 14 |  |  |  |
| C |  | 12 |  |  |  |
| O |  | 16 |  |  |  |
| H |  | 1 |  |  |  |

**Molecular formula** = \_\_\_**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**2.8 Combustion Problem (4 pts) show work or no credit**

A hydrocarbon sample, CxHy, is burned in pure O2 to form 0.480 g CO2 and 0.393 g H2O. Given that 1 mole CO2 weighs 44 g and 1 mole of H2O weighs 18 grams, what is the empiric formula of the hydrocarbon CxHy ?

**CxHy = \_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**2.9 Reaction Balancing** (1 pt each/11 pts total)

Balance these reactions:

\_\_\_ CH4 + \_\_\_O2 🡪 \_\_\_CO2 + \_\_H2O

\_\_\_H2O 🡪 \_\_H2 + \_\_O2

\_\_\_AgNO3 + \_\_\_ CaCl2 🡪 \_\_\_AgCl + \_\_Ca(NO3)2

**2.10 Naming ( 1 pt/name; 4 pts total)**

Given: acetate = C2H3O2-1 phosphite = PO3-3 carbonate = CO3-2 nitrate = NO3-1

Use the Periodic Table provided to name or determine the formula of the four compounds below:

1. Nitrogen monoxide: formula= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Ca3N2name= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Lithium carbonate: formula = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Cu3PO3 name= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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