**Exam 2 General Chemistry 1114 Alfred State College Monday 29 October 2012 B**

Your name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1 pt)

* 1. **English-metric conversions (2 pts each/6 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 3.078 m ? \_\_10\_\_\_\_\_ ft in 3.078 m  
   3.078 ~~m~~\*3.281 ft/~~m~~=10 m
2. How many g in 0.7048 oz ? \_\_\_20\_\_\_\_oz in 7048 oz

0.7048 oz\*454 g/16 oz =20 g

1. How many gallons in 36.3636 liters \_\_\_10\_\_\_\_ gallons in 36.3636 L

36.3636 liter\* 0.275 gal/liter =10 gal

**2.2. Metric-metric symbols and conversions (16 pts)**

1) fill in the missing symbols, magnitudes and names (2 pt/line; 8 pts total)

|  |  |  |
| --- | --- | --- |
| **Prefix name** | **Symbol(letter)** | **Magnitude (10x)** |
| **nano** | **n** | **10-9** |
| **Giga** | **G** | **10+9** |
| **Tera** | **T** | **1012** |
| **Micro** |  |  |

2) convert the metric units below to the indicated, alternative Metric measure (2 pts each/ 8 pts total)

1. 5.0\*10-8 kg = \_\_50\_\_\_\_\_\_\_\_\_\_\_\_\_\_µg
2. 0.040 Gs = \_\_\_\_40\_\_\_\_\_\_\_\_\_\_\_ Ms
3. 300 cm = \_\_\_\_\_30\_\_\_\_\_\_\_\_\_\_ dm
4. 0.02 ns = \_\_\_\_\_\_\_20\_\_\_\_\_\_\_\_ ps

**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 !!!)**

***Space occupied by water =7.500 mL so space occupied my 25.00 grams metal = 10-7.5=2.5 mL***

***D = mass metal/Vmetal = 25.000 g/2.5 mL = 10 g/mL***

Unknown metal density=\_10\_\_\_\_g/mL \_\_\_/27 pts (includes name)

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

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A dozen large eggs from Aldi’s weighs 500 g. Assuming 1 dozen =12 count:

1. If you have 10,000 grams of eggs, how many dozen eggs do you have ? \_\_\_\_\_**20**\_\_\_\_\_\_ dozen eggs
2. If you have 0.2 dozen eggs, what is the total mass of eggs you have ? \_\_**100**\_\_\_\_\_\_\_\_\_ grams eggs
3. If you have 30 eggs, what do they weigh ? \_\_1250\_\_\_\_\_\_\_ grams eggs

30/12 = # dozen eggs=2.5 ~~dozen~~ \* 500 g/~~dozen~~ =1250 g

1. If you have 50,000 grams of eggs, how many eggs do you have ? \_\_\_1200\_\_\_\_\_\_\_ egg count

50,000 g/500 g doz-1 = 100 doz => 100 doz\*12 egg/doz = 1200 eggs

**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 ? \_162\_\_\_ MW nicotine (g/mol)**
2. ***10\*12 +14\*1 + 2\*14=162***
3. What does 0.03704 moles of nicotine weigh ? \_\_\_\_6\_\_\_\_\_ g nicotine

0.03704 mol \*162 g/mol=6

1. How many moles of nicotine in 1620 g of nicotine ? \_\_\_10\_\_\_\_\_\_\_ mol nicotine

1620 g/162 g mol-1 =10

1. How many moles of in 8.4\*1024 molecules of nicotine ? \_\_\_14\_\_\_\_\_ mol nicotine

8.4\*1024 molecules/6\*1023molecules mol-1 = 14

1. How many grams of nicotine are found in 3.7037\*1022 molecules of nicotine ? \_\_10\_\_\_\_grams nicotine

**(3.7037\*1022/6\*1023) \* 162 =10**

Mole g/mol

1. How many molecules are in 27 g of nicotine ? \_\_\_1\*1023\_\_\_\_molecules nicotine

27 g \* mol/162 g \*6\*1023 molecules/mol = 1E23

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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 4.666 moles C in TNT ? \_\_4\_\_\_\_\_ mol O

Mol O/mol C= 6/7=m/4.666=> m=4

1. How many grams of N are in a sample of TNT containing 0.714 mol H ? \_\_\_6\_\_\_\_ g N

Mol N/mol H= 3/5= m/0.714=> m(N)= 3\*0.714/5=0.4284 mol => 0.4285\*14 g/mol=6

1. How many moles of TNT are present if a sample of it contains 84 g C ? \_\_\_1\_\_\_ mol TNT

84 g C/12 g mol-1 = 7 mol C

Mol TNT/mol C=1/7=m/7 =>m=1

1. A sample of TNT contains 3.0\*1025 atoms of H. How many moles of TNT are present? \_\_10\_\_\_mol TNT

3\*1025/6\*1023 = 50 mol H

Mol TNT/Mol H= 1/5= m/50=> m=10

1. 1.75 g of C are in a sample of TNT. How many grams of O are combined with it ? \_\_2\_\_\_\_\_\_ g C

1.75 g/12 g mol-1 = 0.1458 mol C

Mol O/mol C= 6/7=m/0.1458=>m =6\*0.1458/7=0.125 mol O=> 0.125 mol \*16 g/mol=2 g

\_\_\_\_/25

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

1. An alcohol sample contains C,H andO at the weight % below. What is the alcohol’s empiric formula?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Element | mass | AW (g/mol) | moles | Mol/min mol |
| C | **60.000** | 12 | 60/12=5 | 3 |
| O | **26.667** | 16 | 26.667/16=1.666 | 1 |
| H | **13.333** | 1 | 13.333 | 8 |

**Empiric formula:** \_\_\_\_\_**C3H8O**\_\_\_**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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 empiric formula given that the molecular weight of the compound is 1192 g/mol?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Element | mass | AW (g/mol) | N=mass/AW | N/Nmin | X2 |
| **N** | **9.58** | **14** | **0.684** | **1** | **2** |
| **C** | **16.44** | **12** | **1.37** | **2** | **4** |
| **O** | **21.92** | **16** | **1.37** | **2** | **4** |
| **H** | **3.075** | **1** | **3.075** | **4.5** | **9** |

**Empiric formula** = \_\_\_**\_\_\_\_C4H9O4N2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**2.8 Reaction Balancing** (2 pt each/ 6 pts total)

Balance these reactions:

\_1\_\_ CH4 + \_\_2\_O2 🡪 \_\_1\_CO2 + \_2\_H2O

\_\_\_2H2O 🡪 \_2\_H2 + \_1\_O2

\_2\_\_AgNO3 + \_1\_\_ CaCl2 🡪 \_2\_\_AgCl + \_1\_Ca(NO3)2

**2.9 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= \_\_\_\_NO\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Ca3N2name= \_\_\_\_calcium nitride\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Lithium carbonate: formula = \_\_\_\_Li2CO3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Cu3PO3 name= \_\_\_\_\_\_Cu(I) phosphite\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2.9 Simple Reaction Stoichiometry Problem (3 pts)**

Given the balanced reaction:

**2C8H18 + 25O2 🡪 16CO2 + 18H2O**

***MW 114 32 44 18 g/mol***

How many grams of water form when 0.061728 mol C8H18 are burned ? (show work or no credit)

0.061728 mol C8H18 \*18 mol H2O/2 mol C8H18 \*18 g /mol H2O =10.0

\_\_**10.0\_\_\_\_** grams water from

0.061728 mol C8H18

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