**Exam 1: Chem 1013 INTRODUCTORY CHEMISTRY ALFRED STATE 21 FEB 2014**

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

1. **Atomic Structure and General Atomic Properties (fill-in the blanks) 8 pts**
2. The proton count is the same as the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ number in an given element.
3. The electronic radius is about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_times bigger than the nuclear radius

c) Where is most of the mass of the atom located ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d) Which is heavier, a proton or an electron? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

e) which sub atomic particle is responsible for the chemistry ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

f) Suppose we assume a grapefruit with a radius of about 2.5 inches is the nucleus. Decide which of the choices

 below represents the approximate radius of the electron cloud (2 pts). 1 foot =12 inches; 1 mile = 5280 feet

1. Distance from CDH to Alfred State’s Bell tower (200 feet)
2. Distance from Orvis Gym to Alfred Post Office (0.2 miles) circle your answer
3. Distance from Alfred to Almond (4 miles)
4. Distance from Hornell to Rochester ( ~ 60 miles)

g) I am an isotope with 13 neutrons. My mass number is 24. I am found in great quantities in the ocean.

 I am the element: \_\_\_\_\_\_\_\_\_\_\_

1. **Element ID 8 pts**

***Fill in the name or symbol for the elements below: (spelling counts)***

**Cl\_\_\_\_\_\_\_\_\_\_\_\_ Manganese\_\_\_\_\_\_ Si\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ Iron\_\_\_\_\_\_\_\_**

**B\_\_\_\_\_\_\_\_\_\_\_\_ Magnesium\_\_\_\_\_ P\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Sulfur\_\_\_\_\_\_\_\_**

1. **Chemical Book keeping:-Reading and Balancing Chemical Reactions 13 pts**

***Given the reaction: 4 C3H5N3O9(l) 🡪 6N2(g) + 10H2O(g) +1 O2(g) + 12CO2(g) (7 pts)***

1. How many atoms of H are involved in the reaction ? \_\_\_\_\_\_\_
2. How many atoms of O are created in the reaction ? \_\_\_\_\_\_\_
3. How many molecules of H2O are created in the reaction ? \_\_\_\_\_\_\_
4. What physical state is CO2 in when formed ? \_\_\_\_\_\_\_
5. How many molecules of N2 are created in the reaction ? \_\_\_\_\_\_\_
6. How many atoms of N are involved in the reaction ? \_\_\_\_\_\_\_
7. How many atoms of C are involved in the reaction ? \_\_\_\_\_\_\_

***Provide coefficients in front of the indicated molecules to create a balanced reaction: (9 pts)***

1. \_\_\_H2  + \_\_\_\_O2  🡪 \_\_\_H2O2
2. \_\_ Cu + \_\_H2S 🡪 \_\_\_ Cu2S3 +3H2
3. \_\_\_O2 + \_\_\_\_C3H8 🡪 3 CO2 + \_\_\_H2O

**\_\_\_/32**

Exam 1 (continued) Chem 1013 INTRO TO CHEM

1. **Stable Element Charges and Inorganic Compound Building (18 pts)**

***What are likely stable ionic charges for the elements listed below ? ( include sign) (8 pts)***

1. H \_\_\_\_\_\_
2. Mg \_\_\_\_\_\_
3. B \_\_\_\_\_\_
4. Br \_\_\_\_\_\_
5. Se \_\_\_\_\_\_
6. N \_\_\_\_\_\_
7. Ne \_\_\_\_\_\_
8. K \_\_\_\_\_\_

***Write the most likely ionic compound formula formed from combining the element pairs below:***

**(2 pts each/ 12 pts total)**

1. B and O \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. C and Cl \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. H and P \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Ca and P \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Na and As \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. Be and O \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. **Minerals and Salts vs Organics (poo) 18 pts**

***Briefly characterize the listed properties for both minerals and organics as high or low (3 pts)***

*Property Minerals/salts Organics*

**Ex. Solubility in water\_\_\_\_\_high\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_low\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Melting points \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Conductivity of solutions \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Hardness/brittleness \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Salt dissolving in water is a : physical chemical biological process (circle choice)**

**Milk is a: a)pure substance b)homogeneous mixture c) compound d)heterogeneous mixture**

***What kind of bond is typical of salts and minerals ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

***What kind of bond is typical of organics ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

**\_\_\_\_\_\_/26**

Exam 1 (continued) Chem 1013 INTRO TO CHEM ***Minerals and Salts vs Organics (poo) (continued)***

**How do you correctly write the formulas for compounds composed of the element counts below ?**

**1 Mg + 4 O + 1 S \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**1 C + 2 H + 3 O \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**2 N + 5 O \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Circle all the compounds below that are written correctly : (2 pts)**

**O2H CaCO3 Li2S S3Na2Al**

**Oxidation means \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ electrons**

**Identify the species below undergoing oxidation and reduction (ox and red)**

**3Mg o + 2 Fe3+🡪 3Mg2+ + 2 Feo**



**\_\_\_\_\_\_ \_\_\_\_\_**

1. **Describing Covalent Compounds 15 pts**

***a)How many bonds are in this compound ?* \_\_\_\_\_\_ bonds**

**b)*How many electrons are in the bonds?*  \_\_\_\_\_\_ # bond e-**

**c) How many total valence electrons are in this compound ? \_\_\_\_\_\_\_ sum of valence e-**

***d) Draw to electron dot picture for the elements below:***

**Na Mg B C N K Br**



***e) In the molecule shown on the right, what two kinds of valence electrons are shown ?***

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***f) The bond length of the C=O bond is \_\_\_\_\_\_\_\_\_\_\_\_compared to that of the C≡O bond.***

***g) How many core electrons are in Ca ? \_\_\_\_\_\_\_\_\_***

**h)The compound shown below is: *saturated unsaturated polyunsaturated***

 **(circle your choice)**



\_\_\_/23

Exam 1 (continued) Chem 1013 INTRO TO CHEM

1. **Building and Describing Covalent Molecules (2 pts each/10 pts total)**

**Draw the correct bonding structures for the combinations of elements below, making sure to indicate all lone pairs.**

**O2**

**CO2 (assume O-C-O attachment order)**

**CO**

**COCl2 assume O and both**

 **Cl are attached to central C**

**SO3 (all O attached to central S only with minimum**

**Formal charge)**

**9) Whose hooked to who ?**

**Which element is most likely central in the compounds below ? (4 pts)**

AlCl3 \_\_\_\_\_\_\_\_ CF4\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Li3N\_\_\_\_\_\_\_\_\_\_\_\_\_\_ PO33-\_\_\_\_\_\_\_\_\_\_\_\_\_

**10) Formal charge (5 pts)**

A

 B



 **What are the formal charges of S, O and H in the structure drawn here ?**

**\_\_\_/19**

S \_\_\_\_\_ OA\_\_\_\_\_ OB\_\_\_\_\_\_\_

OC\_\_\_\_\_ H\_\_\_\_\_ (1 pt each)

 C