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

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

1. **Atomic Structure and General Atomic Properties (fill-in the blanks) 8 pts**
2. The proton count is the same as the \_**\_atomic**\_\_\_\_\_\_\_\_\_ number in an given element.
3. The electronic radius is about \_\_\_**100,000**\_\_\_\_\_\_\_\_\_\_\_\_times bigger than the nuclear radius

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

d) Which is heavier, a proton or an electron? \_\_\_\_\_\_**proton (by ~2000 X)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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

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)

**Electron radius= 2.5\*100,000=250,000 inches \*1 ft/12 inches \* 1 mile/5250 ft =3.9 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: \_\_\_\_**Na\_\_\_\_\_\_\_**

1. **Element ID 8 pts**

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

**Cl\_\_chlorine\_\_\_\_\_\_\_ Manganese\_\_Mn\_\_\_ Si\_\_silicon\_\_\_\_\_\_\_ Iron\_\_\_Fe\_\_\_\_\_**

**B\_\_boron\_\_\_\_\_\_\_\_ Magnesium\_\_Mg\_ P\_\_\_phosphorus\_ Sulfur\_\_\_S\_\_\_\_\_**

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 ? \_\_**20**\_\_\_
2. How many atoms of O are created in the reaction ? \_\_ 0\_\_\_\_
3. How many molecules of H2O are created in the reaction ? \_\_\_10\_\_
4. What physical state is CO2 in when formed ? **\_\_gas\_\_**
5. How many molecules of N2 are created in the reaction ? \_\_**6\_\_\_**
6. How many atoms of N are involved in the reaction ? \_\_\_**12\_\_\_\_**
7. How many atoms of C are involved in the reaction ? \_\_**12\_\_\_\_**

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

1. \_\_**1**\_H2  + \_\_**1**\_\_O2  🡪 \_1\_\_H2O2
2. \_**2**\_ Cu + \_**3**\_H2S 🡪 \_\_**1**\_ Cu2S3 +3H2
3. \_**5\_\_**O2 + \_\_**1**\_\_C3H8 🡪 3 CO2 + \_**4**\_\_H2O

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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 **\_+1\_\_\_\_\_**
2. Mg **\_+2\_\_\_\_\_**
3. B \_**+3** \_\_\_\_\_
4. Br **\_-1\_\_\_\_\_**
5. Se **\_-2\_\_\_\_\_**
6. N **\_-3\_\_\_\_\_**
7. Ne \_**0\_\_\_\_**
8. K **\_+1\_\_\_**

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

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

1. B and O \_\_**B2O3**\_\_\_\_\_\_\_\_\_\_
2. C and Cl \_\_**CaCl2**\_\_\_\_\_\_\_\_\_\_\_
3. H and P \_\_\_**H3P**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Ca and P \_\_\_**Ca3P2**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Na and As \_\_**Na3As**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. Be and O \_\_\_\_**BeO**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
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 \_\_\_\_\_\_high\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_low\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Conductivity of solutions \_\_\_high\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_low\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Hardness/brittleness \_\_\_\_\_hihg\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_low\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**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 ? \_\_\_\_ionic\_\_\_\_\_\_\_\_\_\_***

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

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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 \_\_\_\_\_\_MgSO4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**1 C + 2 H + 3 O \_\_\_\_\_\_\_HC2O3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**2 N + 5 O \_\_\_\_\_\_\_N2O5\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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

**O2H CaCO3 Li2S S3Na2Al**

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

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

**3Mg o + 2 Fe3+🡪 3Mg2+ + 2 Feo**



**\_ox\_ \_\_red\_\_\_**

1. **Describing Organic Compounds 15 pts**

***a)How many bonds are in this compound ?* \_\_6\_\_\_\_ bonds**

**b)*How many electrons are in the bonds?*  \_\_12\_\_\_\_ # bond e-**

**c) How many total valence electrons are in this compound ? \_\_12\_\_\_ 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 ?***

**\_\_\_\_\_lone pairs\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_bond pairs\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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

***g) How many core electrons are in Ca ? \_\_18\_\_\_\_\_\_\_***

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

**(circle your choice)**



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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 \_\_**Al\_\_\_\_\_\_** CF4\_\_\_\_**C**\_\_\_\_\_\_\_\_\_\_ Li3N\_\_\_\_**N**\_\_\_\_\_\_\_\_\_\_ PO33-\_\_\_\_\_**P**\_\_\_\_\_\_\_\_

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

A

B



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

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S **\_\_1\_\_\_** OA**\_-1\_\_** OB\_**\_0**\_\_\_\_\_

OC\_\_**0**\_\_\_ H\_\_**0**\_\_ (1 pt each)

C