**Exam 1: Chem 1013 INTRODUCTORY CHEMISTRY ALFRED STATE 22 FEB 2013**

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

1. **Atomic Structure and General Atomic Properties (fill-in the blanks) 11 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)Fill in the missing boxes assuming the elements are neutral (You can use your Periodic Tables)

(2 pt for each completely correct line)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Atomic # | Mass # Z | Element symbol | # protons | # neutrons | # electrons |
| 10 |  |  |  | 10 |  |
|  |  | Mg |  | 12 |  |
|  | 28 |  | 13 |  |  |

1. **Element ID 8 pts**

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

**F\_\_\_\_\_\_\_\_\_\_ Aluminum\_\_\_\_\_\_ Si\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ Argon\_\_\_\_\_\_\_\_**

**Be\_\_\_\_\_\_\_\_\_\_ 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 involved 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 molecules of O2  created in the reaction ? \_\_\_\_\_\_\_

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

1. \_\_\_H2  + \_\_\_\_O2  🡪 \_\_\_H2O2

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

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

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

1. H \_\_\_\_\_\_
2. P \_\_\_\_\_\_
3. Cl \_\_\_\_\_\_
4. Li \_\_\_\_\_\_
5. Ar \_\_\_\_\_\_
6. Br \_\_\_\_\_\_
7. Mg \_\_\_\_\_\_
8. As \_\_\_\_\_\_

***Write the most likel yionic 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) 15 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 ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

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**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**



1. **Describing Organic 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 core + valence electrons are in this compound ? \_\_\_\_\_\_\_ sum of e-**

***c) Draw to electron dot picture for the elements in their neutral states below:***

**Na Mg B C N K Br**



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

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

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

1. **Last name of the American chemist connected with the `octet rule’\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. **The compound shown below is: *saturated unsaturated polyunsaturated***

**(circle your choice)**



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1. **Building and Describing Covalent Molecules (2 pts each/8 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**

**N2**

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

**Formal charge)**

**What is the correct formula for the two compounds drawn in abbreviated bond line form below ?**





**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡨 formula (2 pts each)**

**9) Formal charge (5 pts)**

A

B



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

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

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

C