**Exam 2: Chem 1013 INTRODUCTORY CHEMISTRY ALFRED STATE 5 April 2013**

\_\_\_/100 pts

Your name: \_\_\_\_\_\_\_\_\_\_\_answers\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 1 point

1. **Extensions of Lewis Structure rules**

(2 pts per answer/20 pts total)



1. Draw the best structures for the molecules and ions below

**assuming** formal charge is minimized.

1. SO2 (both O attached to central S)



1. SF6 (all 6 F are attached to S which is at the center of the molecule)
2. SO3 (all O are attached to a central S. )



1. Supply the formal charges for the indicated elements in each of the compounds drawn below



1. Formal charge on O in : : \_\_\_+1\_\_\_\_



1. Formal charge on P in \_\_0\_\_\_\_\_

:

1. Formal charge on S in \_\_0\_\_\_\_\_





1. **Formal charge on N in \_\_0\_\_\_\_**
2. **What are the most likely shapes for the molecules below ?**
3. **H2O \_\_\_\_bent\_\_\_\_\_\_\_\_\_\_\_**
4. **O=C=O (CO2) \_\_\_\_\_linear\_\_\_\_\_\_\_\_\_\_**
5. **SO2 \_\_\_\_\_\_bent\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_/21 (includes name)**

1. **HONC Rules and Bondline expressions of molecules (14 pts)**
2. **Determine the count of H,C and O in the compounds drawn below: (8 pts total)**







**\_4\_C \_10\_H \_1\_O \_7\_\_C \_14\_H \_\_4\_\_C \_\_6\_\_H \_\_2\_O**

1. **Draw a plausible structures for compounds containing the following count of elements**









**3 C and 8 H 2 C 6 H 1 O or (CH3-O-CH3) 2 C and 4 H (or**

1. **pts each)**
2. **Number games (5 pts)**
3. Express 0.00345 in scientific notation \_\_\_\_3.45\*10-3\_\_\_\_\_\_\_\_\_
4. Express 1.23 \*10+2 as a decimal \_\_\_\_\_\_\_123\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Log10 (5\*103) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_3.6989\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. If log10 X = -3.5, what is X ? \_\_\_\_\_\_\_\_\_\_\_3.162\*10-4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. Express 434 EE-2 in scientific notation\_\_\_\_\_4.34\*100\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. **Lessons and Insights from Studying Salts: pH, pOH and osmosis**
9. pts each/20 pts total)

0) Which end of a water molecule, O or H, tends to point towards Na+ when it is dissolved in water ?\_\_O\_\_\_

1) What is the pH of an acid solution containing 0.010 M H+? \_\_\_\_2\_\_\_\_\_\_\_\_

2) If the pOH of a solution is 4, then the solution is : **acidic neutral basic**

(circle your answer above)

3) The pH of blood is ~7.25. What is the concentration of H+ implied by this? \_5.62\*10-8\_\_\_ M

4) The pH of Coca Cola is around 2.6. What is the pOH in Coca Cola ? \_\_\_14-2.6=11.4\_\_\_\_\_\_

5) The concentration of salt in a blood cell is 3 g sodium chloride/100 mL . If the blood cell is

placed in a solution that contains 6 g sodium chloride/100 mL what will happen to the cell ? (circle answer)

1. Cell will shrivel b) cell will bloat and blow up c) cell will release salt d) cell will be unchanged

6) To decrease an ionic salt’s melting point and soften its structure: \_\_increase\_\_\_\_\_\_\_ the size of the ions/charge

\_\_\_/33

**c)Lessons and Insights from Studying Salts: pH, pOH and osmosis (continued)**

not

**salty salty**

7) Which way does the natural osmotic pressure move in the system shown here

a)LEFT **b)RIGHT** c) PARALLEL TO MEMBRANE d) NO PRESSURE

8) What species, according to Arrhenius, is the source of `acidity’? \_\_\_\_H+\_\_\_\_\_\_\_\_

semipermeable

membrane

H2O + NaCl

9) Finish the acid/base reaction : HCl + NaOH 🡪

**Electronic configurations and quantum ideas (40 pts)**

1. **Quantum and spectrum pictures (1 pt each/10 pts total)**
2. **The Sun’s spectrum consists of: (circle your answer)**

1) all the colors of the rainbow 2) white light 3) distinct `lines’ of particular color 4) only yellow

1. **Chemistry is created by interactions and exchanges of….:**
2. Protons 2) core electrons
3. Valence electrons 4) neutrons
4. **The spectrum of H is: (circle your answer)**
5. More complex than heavier elements 3) The same as for heavier elements
6. Simpler than all the heavier elements 4) not composed of visible light
7. **A quantum jump:**
8. Can use any old energy to happen 3) requires a specific energy input to occur

2) produces a range of different colors 4) applies only to large scale objects like planets and stars

1. **How many levels are present for s orbitals ? \_\_1\_\_\_\_\_**
2. **How many levels are present for d orbitals ? \_\_\_5\_\_\_\_\_**
3. **When you write Mg as [Ne]3s2, [Ne] contains the \_\_\_core\_\_\_\_\_\_ electrons and 3s2 are the \_\_valence\_\_\_\_\_\_\_\_\_\_ electrons**
4. **The German word `aufbau’ translated into English means: \_\_\_building up\_\_\_\_\_\_\_\_\_**
5. **How many electrons can go into any one energy level ? \_\_2\_\_\_**
6. **If two energy levels are the same and two electrons are to be placed in the levels, you should:**

1)put both electrons in one level 2) put an electron in each level 3)show only 1 electron 4) run away

1. **Configurations**

**What are the complete electronic configurations for the elements below? (2 pts each/10 pts total)**

**F 1s22s22p5**

**Na 1s22s22p63s1**

**Be 1s22s2**

**P 1s22s22p63s23p3**

**Ga 1s22s22p63s23p63d14s24p1**

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

1. **Electronic configurations and quantum ideas (continued)**

**What are the abbreviated configurations for the elements below ?**

**Mg [Ne] 3s2**

**Si [Ne]3s23p2**

**S [Ne]3s23p4**

**Fe [Ar]3d64s2**

**Zn [Ar]3d104s2**

**Draw the correct pigeonhole configurations for the various species below. (Make sure to correct for charges; a (+1) means the element has lost 1 electron from its usual count.)**

**Fe2+  [Ar]**

**Cu [Ar]**

**Cu1+ [Ar]**

**Ru3+ [Kr]**

**Mn+ [Ar]**

**\_\_\_/20**