**Chem 1411 – Exam 1, summer 2015**:

Part I Multiple Choice Questions ( 3 points each)

1) Which of the following corresponds to the longest period of time?

1. 5.0 x 105 nsb) 5.0 x 106 μsc) 5.0 x 102 msd) 5.0 x 10-4 Mse) 50 cs

2) What is mass percentage of N in urea, NH2CONH2?

1. 28.0 % b) 23.3 g c) 25.0 % d) 14.0% e) 46.6 %

3) -40 deg F is which of the following in Kelvin?

1. 278 K b) 269 K c) 586 K d) 233 K e) 213 K

4) 81Br- anions contain how many electrons, protons, neutrons?

1. 35 e, 34 p, 81 n b) 35 e, 36 p, 81 n c) 35 e, 34 p, 47 n d) 36 e, 35 p, 46 n e) 34 e, 35 p,47 n

5) What is the name and formula of the compound formed in the reaction between calcium and iodine?

1. Calcium Iodious, CaI b) Calcium Iodide, CaI2 c) Calcium Iodic, Ca2I

d) Calcium Didiodine, Ca2I2 e) Calcium Diiodide, Ca2I2

6) What is the correct electron configuration for Ni

1. [Ar] 4s24d8 b) [Kr] 4s2 3d8 c) [Ar] 4s2 3d8
2. [Ar] 3s2 3d8 e) [Ar] 4s2 3d6

7) The mass of 1.50 x 1020 atoms of Copper is

a) 0.0158 g b) 0.00722 g c) 0.00673 d) 0.0147 e) 2.49 x 10-4 g

8) Do the indicated arithmetic and give the answer to the correct number of significant figures: (1.5 × 10–4 × 61.3) + 2.01 =

a) 2.0192 b) 2.0 c) 2.019 d) 2.02 e) 2.019195

9) Bromine is a red liquid at 25°C. Its density is 3.12 g/cm3. What is the volume of 28.1 g of liquid bromine?

a) 87.7 cm3 b) 0.111 cm3 c) 9.01 cm3 d) 28.1 cm3 e) 8.01 cm3

10) Which one of these represents a *chemical* change?

1. lard when heated changes to liquid
2. water disappears from a beaker in a few days at room temperature
3. sugar dissolving in water
4. milk turns sour in a few days at room temperature
5. water boils below 100°C on a mountain

11) Which of these pairs of elements would be most likely to form an ionic compound? 

1. P and Br b) Cu and K c) C and O d) S and Si e) Ga and F

12) If principal quantum number is 2, what are the values of angular quantum numbers ?

1. 1,2, and 3 b) 0, 1, 2 c) 0 and 1 d) 1 and 2 e) 2 or 3

13) What the correct name of the compound, Cr2S3 , and what is the charge on Chromium in the compound?

1. Chromium (III) sulfide, Cr3+ b) Chromium(II) sulfide, Cr2+

c) Chromium(VIII) sulfide and Cr8+ d) Chromium (I) sulfide, 1+ e) Chromium sulfide, Cr0

14) Pick the correct statement: One mole of iron 

1. is heavier than one mole of lead (Pb).
2. is 77.0 g of iron
3. is 26.0 g of iron
4. weighs the same as one mole of lead
5. is none of these

15) What is the coefficient of O2 when the following equation is properly balanced with the smallest set of whole numbers?  
  
\_\_\_ C2H6O + \_\_\_ O2 → \_\_\_ CO2 + \_\_\_ H2O

1. 1 b) 2 c)3 d) 4 e)5

16) Which of the following is not an intensive property?

1. Boiling Point b)Volume c) Pressure d) density e) Temperature

17) Which of the following do not forms ions of +2 charge?

a) Cesium b) Copper c) Tin d) Strontium e) Zinc

18) 1.61 cg is how many kg?

a) 1.61 x 105 kg b) 1.61 x 10-5 kg c) 1.61 x 10-1 kg d) 16.1 kg e) 1.61 x 10-2 kg

19) An element exists in 2 stable isotopic forms with the following data:

|  |  |  |
| --- | --- | --- |
|  | Mass (amu) | Percentage Abundance |
| Isotope A | 10.01 | 19.9 % |
| Isotope B | 11.01 | 80.1 % |

Calculate its average atomic mass:

1. 10.51 amu b) 5.41 amu c) 10.81 amu d) 8.82 amu e) 10.21 amu

20) Identify the correct name-symbol combination:

a) Aluminum ion: Al+2 b) Chloride ion: Cl-2 c) nitride ion: N3-  d) phosphide ion: P-2 e) sulfide: S-3

**Part II: Show all work on the sheets provided. (8 points each)**

1. Identify the limiting reactant and calculate the theoretical yield of Ammonia (NH3) in the following reaction

N2 + H2 → NH3

10g 10 ?

1. When 22.0 g NaCl and 21.0 g H2SO4 are mixed, they react according to: 2NaCl + H2SO4 → Na2SO4 + 2HCl
2. Identify the limiting reagent and calculate the theoretical yield of sodium sulfate.
3. What mass of the excess reagent remains at the end of the reaction
4. The percent composition by mass of nicotine is: 74.074 % C, 8.642 % H, and 17.284 % N.

a. Determine the empirical formula of the compound

b. Given that the molecular mass of nicotine is 162 amu, determine its molecular formula.

1. The speed of sound at sea level is 340.29 m/s. What is this speed in yards per hour? Express answer with the right number of significant figures. (1 yd = 3 ft, 1ft = 12 in, 1 in = 2.54 cm)
2. Consider 5.00 g of Calcium nitrate, Ca(NO3)2
3. How many moles of nitrate ions are contained?
4. How many Ca+2 ions are contained?

Bonus question (5 points) :

If an electron transition occurs from n = 2 to n = 5, calculate the change in energy and wavelength of radiation.