**Exam 1 version B: Chemistry 1013**

**Introduction to Chemistry**

Wed 25 Feb 2015

\_\_\_\_\_/100 pts

Your name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 1 pt

1. How many cats does Doc serve ?\_\_\_\_\_\_2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What corporation did Doc do research with for a dozen years before coming to Alfred?

\_\_\_\_\_\_\_\_Corning Inc\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Does Doc keep attendance? Yes No
2. Provide the correct name or symbol for the elements below:

(spelling counts)

Manganese = \_Mn\_\_\_\_ P= \_\_phosphorus\_\_\_\_\_\_\_ silver =\_\_Ag\_\_\_

Hg= \_mercury\_\_\_\_\_\_\_\_ cobalt= \_Co\_\_\_ Be=\_\_Beryllium\_\_

gold=\_\_Au\_\_\_\_\_ Sn=\_\_\_Tin\_\_\_\_\_\_\_\_\_\_\_ copper=\_\_Cu\_

1. Order the masses of the particles here from heaviest to lightest (list left to right): a)**neutron b) helium atom c) water molecule d) electron**

heaviest\_\_c\_ >\_\_b\_\_\_> \_\_a\_\_\_ > \_\_d\_\_\_\_lightest (2 pts)

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1. How many neutrons in : B \_\_\_\_\_6\_\_\_\_\_\_\_\_

5

1. Proton count is also called the \_\_\_atomic\_\_\_ number.
2. What is the term applied to an element with a specific count of neutrons ? \_\_\_isotope\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**9**. Mass number is: (p=protons, e=electrons, n= neutrons)

a) #p

b) #p + #e

c) #n

**d) #p + #n**

**10.** What is the ~ratio of the electron orbital radius to the nuclear radius ? \_\_100,000\_\_\_\_

**11.** Fill in the missing data 2 pts per line/ 8 pts total

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Atomic # | Element symbol | Mass  Number | # protons | # neutrons | # electrons | Net  charge |
| 17 | Cl | 37 | 17 | 20 | 17 | 0 |
| 46 | Pd | 108 | 46 | 108-46=62 | 46 | 0 |
| 29 | Cu | 64 | 29 | 35 | 29 | 0 |
| 8 | O | 17 | 8 | 9 | 7 | +1 |

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11. If a pea with a ~ diameter of 0.25 inch is assumed to be the nucleus. How many miles across is the

electron cloud ? (12 inches= 1 foot, 1 mile = 5280 feet) Show work !

0.25\*(100000) \*(1 foot/12 in) \*(1 mil/5280 ft)=0.39 mil

electronic diameter ~\_\_\_0.39\_\_\_\_ miles 3 pts

(round to neares 0.1 mile)

12. Element Y comes in two isotopic forms: 20-Y (80%) and 24-Y (20%). What is the average mass of Y?

(show work)

[20\*80 + 24\*20]/100=20.8

average atomic mass of Y= \_\_20.8\_\_\_\_\_\_\_\_

(round to nearest 0.01) 2 pts

13. Neon (Ne) is an example of a(n) \_\_\_noble (inert)\_\_\_\_\_\_\_\_\_\_gas.

14. Ca is in **the column** called: \_\_\_\_\_\_\_\_\_alkaline earth metals\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

15. The Periodic Table is composed of metals, metalloids and \_\_\_non-metals\_\_\_\_\_\_\_\_

16. Ag, Au, Pt are transition metals and also examples of \_\_\_\_Noble\_\_\_\_\_\_\_\_\_\_\_\_\_\_metals.

17. Cl is in a **column** commonly named the \_\_\_\_\_halogens\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

18. Np is in a **row** commonly referred to as the \_\_\_\_\_actinides\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

19. Ge is an example of: **metalloid** noble metal transition metal non-metal

20. Which is not a transition metal: O Fe Cu Tc V (circle choice)

21. Provide the correct name or formula for the compounds below (use oxy anion table provided)

**(2 pts each/14 pts total)**

**sodium phosphate \_\_\_\_\_\_Na3PO4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Fe(CN)2 \_\_\_\_\_\_\_\_iron (II) cyanide\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Calcium phosphide \_\_\_\_Ca3P2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Li3PO3\_\_\_\_lithium phosphite\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**nitrogen monoxide \_\_\_\_\_\_\_\_NO\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**H2O\_\_\_\_\_\_\_\_dihydrogen monoxide\_\_\_\_\_\_\_\_\_\_\_\_ (it’s water, but what is the `official’ name ?)**

**Manganese (III) phosphate\_\_\_\_\_\_MnPO4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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22. Predict the most likely formula for the binary ionic compounds made from the elements below:

**most likely formula for compound** (2 pts each/10 pts total)

Mg + O \_\_\_\_\_MgO\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Li + As \_\_\_\_\_Li3As\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Fe3+ + F \_\_\_\_\_FeF3\_\_\_\_\_\_\_\_\_\_\_\_\_

Mg + C \_\_\_\_\_Mg2C\_\_\_\_\_\_\_\_\_\_

H + Cl \_\_\_\_\_\_HCl\_\_\_\_\_\_\_\_\_\_\_\_

23. Express the several computations below as a **single scientific notation number**: (2 pts each/8 pts total)

1. 5.0\*10-4 + 4.0\*10-3 = \_\_\_\_\_\_4.5\*10-3\_\_
2. 3.0\*10-3\*(6.0\*104) = \_\_\_\_1.8\*102\_\_\_\_
3. 4.5\*109/2.25\*107 = \_\_\_\_2\*102\_\_\_\_
4. 1.0\*103 + (2.0\*106/2.0\*103) \_\_\_\_\_2.0\*103\_\_\_\_\_

24. Fill in the correct magnitudes, names and symbols for the prefix values below (8 pts)

**10-6 = \_\_micro\_\_\_\_\_\_\_\_\_ name = \_\_μ\_\_ symbol**

**n =\_\_\_\_10-9\_\_\_\_\_\_\_\_\_ magnitude = \_\_nano\_\_\_\_\_\_\_\_\_ name**

**Tera = \_\_\_\_1012\_\_\_\_\_ magnitude = \_\_T\_\_\_ symbol**

**10-2 = \_\_\_centi\_\_\_\_\_\_\_\_\_ name = \_\_c\_\_ symbol**

25. **Scientific-decimal conversions (3 pts)**

1. 0.000001 = \_\_1\*10-6\_\_\_\_\_\_\_\_\_\_\_ in scientific notation
2. Convert 0.006 \*104 to its correct expression in scientific notation \_6\*101\_\_\_\_\_
3. 3.0\*105 = \_\_300,000\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in decimal notation

**26. metric-Metric unit conversions (2 pts each/6 pts total)**

1. 100 cg = \_\_1\_\_\_\_g
2. 0.2 ns = \_\_200\_ ps
3. 50 MW = 0.05\_\_ GW

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27. What are the molecular weights for the compounds below ? (round to nearest g/mol) (4 pts total)

**molecular weight (g/mol)**

**Na3PO4 \_\_\_164\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Ca3As2 \_\_\_270\_\_\_\_\_\_\_\_\_\_\_\_\_**

**C12H22O11\_\_\_342\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Fe(OH)3 =FeO3H3 \_\_\_\_107\_\_\_\_\_\_(110 using erroneous Fe on Test Table)\_\_\_\_\_\_**

**28. The molecular mass of CaCO3 is 100 g/mol. Given that 1 mol count ~ 6\*1023 molecules:**

1. **how many moles of CaCO3 are in 300 g CaCO3 \_\_\_\_3\_\_\_\_\_\_\_\_\_\_ moles CaCO3**
2. **how many grams of CaCO­3 are in 0.5 mol of CaCO3 \_\_\_\_50\_\_\_\_\_\_\_\_ g CaCO3**
3. **How many moles of CaCO3 are 2.4\*1024 molecules of CaCO3? \_\_4\_\_\_\_\_\_\_ moles CaCO3**
4. **How many molecules of CaCO3 are in 5000 g of CaCO3 \_\_\_\_\_300\*1023=3\*1025 molecules CaCO3**

**29. True/False and fill-in**

1. **The mole concept is the same as the dozen concept T F**
2. **Every element has several isotopes T F**
3. **Rutherford is famous for directing the \_\_gold\_\_\_\_\_\_\_ foil experiment.**
4. **The density of the electron cloud is**
5. **a little more dense 2) a little less dense 3) a lot less dense 4) about the same**

**…than the density of the nucleus**

1. **Any day doing chemistry is a \_\_\_\_\_\_great\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ day.**

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