**Exam 1 General Chemistry 1114 Alfred State College A**

Your name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1 pt) \_\_\_\_/100 pts

1. **Introductions (3 pts)**
2. From what California university did Doc Fong receive a B.Sc. in Chemistry ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. How many cats at home does Doc Fong act as servant to? \_\_\_\_\_\_\_\_
4. What corporation did Doc Fong work at before becoming an impoverished chemistry professor?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. **Atomic dimensions and scaling (6 pts)**
1. What is the approximate ratio of the mass of the proton/mass of electron? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What is the ~ratio of an electron orbit diameter to an atomic nucleus diameter?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. If you wanted to make an accurate scale model of the hydrogen atom and decided the nucleus would have a diameter of 1 mm, what would be the diameter of the entire model ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mm
4. A softball is about 10 cm in diameter. If we assume the softball is a nucleus, which distance below is closest to representing the diameter of the nearest electronic orbit ? (circle your choice)
5. Distance across a football field (~ 10,000 cm)

**3 pts**

1. Distance across a pizza (~100 cm)
2. Diameter of the Earth (~1,000,000,000 cm)
3. Distance from Alfred Bell Tower to Alfred Pizza and Sub (~100,000 cm)
4. Distance from Almond to Hornell ( 1,000,000 cm)
5. Distance to the Sun (~10,000,000,000,000 cm)
	1. **Element Symbols and Names 18 pts total**
6. Circle all the symbolic representations of atomic elements below that are **incorrect:**

 (must circle all for credit)

**KR U Co Kr UuU bE h 2 pts**

 b) Write the correct name or symbol for the elements listed below: (1 pt for each correct answer)

 Ag \_\_\_\_\_\_\_\_\_ Mg \_\_\_\_\_\_\_\_\_\_\_\_\_ Arsenic\_\_\_\_ d)Gold \_\_\_\_

Manganese\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ Mercury\_\_\_\_ h) Pb\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **c)**  How many neutrons are present in neutral Fe-57 ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 d) What is the electron count for neutral Phosphorus-31 ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 e)How many protons(**p**), neutrons(**n**) and electrons(**e**) are in the neutral atoms of the two elements below ?

 **199Au 34S**

**6 pts** total

 **p=\_\_\_\_\_ n=\_\_\_\_\_\_ e=\_\_\_\_\_\_ p=\_\_\_\_\_ n=\_\_\_\_\_\_ e=\_\_\_\_\_\_**

**\_\_\_/28 (includes name pt)**

**Exam 1(continued) General Chemistry 1114 Alfred State College page 2**

**1.3 Atomic Body Part Count ( 8 pts/ 2 pts per line)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Atomic # | mass # | element symbol  | #p | #n | #e | atom charge |
| **12** | **23** |  |  |  |  | **0** |
|  |  | **Ga** |  | **38** | **31** |  |
|  |  |  | **16** | **16** |  | **0** |
|  |  |  |  | **20** | **18** | **0** |

**1.4 Evolution of the Atomic Model ( 10 pts)**

 **2p \_\_\_ \_\_\_ \_\_\_**

 **2s \_\_\_**

 **1s \_\_\_ Carbon 1s22s22p2**

**A B C D E**

**a)Which pictorial representation above goes with which atomic model listed below ? (use letter designations)**

**Bohr atom Thomson atom Rutherford atom Schrodinger’s atom spectroscopist’s atom**

**\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_**

1. Which model(s) above rely mostly on mathematics ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Which model had problems explaining why the Earth wasn’t the size of a golf ball \_\_\_\_\_\_\_\_\_
3. Which model was crushed by the gold foil experiment? \_\_\_\_\_\_\_

**e**) Which model doesn’t rely on theory at all ?

f) Which of the models above is connected to hypothetical murders of innocent cats ? \_\_\_\_\_\_

**1.5. Wave and Planck’s Laws Calculations ( 9 pts)**

**Given that λ\*f = c:**

1. Calculate c given λ=1\*10-5 and f = 3\*1013 : c= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ m/s
2. Calculate λ given f= 6\*1014 and c= 3\*108 : λ=\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ m
3. Calculate f given λ=4.2857\*10-5 and c = 3\*108: f=\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ s-1

**Given E = hf = hc/λ in Joules (J) : (h=6.63\*10-34 Joule sec ; c= 3\*108 m/s) [2 pts each]**

1. **Calculate E given f= 4.522\*108 s-1 E = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ J**
2. **Calculate E given λ = 1.326\*10-5 m E = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ J**
3. **Calculate f given E= 1.989\*10‑19 J f= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ s-1**

**\_\_\_/27**

**1.6. Bohr’s Theory of the atom ( 4 pts)**

**Name two successes of the Bohr theory of the atom**

**1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**2)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Name two failures of the Bohr theory of the atom**

**1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**2)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**1.7. Electronic Configurations of the Atoms (using the Periodic Table provided during exam) 22 pts**

**Write the complete electronic configurations for the elements below (2 pts each)**

1. **Na \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. **Cl \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
3. **Mg \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
4. **Si \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Write the correct abbreviated electronic configurations for the elements below, making sure to pay attention to all the rules associated with d electrons if they are present. (2 pts each)**

1. **P \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. **Mn \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
3. **Cr+1 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
4. **V \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Write the correct pigeonhole (orbital) diagrams for the elements below, making sure to pay attention to all the rules associated with d electrons if they are present, and including the correct inert gas core. (2 pts each)**

**a) Cr [ ]**

**b) Ni [ ]**

**c) Ag+1 [ ]**

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

**1.8 Periodic Table Predictions and Vocabulary (12 pts total)**

**a) fill** in the blank spaces below assuming that X and Z are in the same column and the unknown element (???) lies between them : (5 pts)

***element # p atomic mass #n/#p density (g/cm3****) mp (oC)*

**X 130 299 1.3 1.9 1200**

**??**

**Z 170 391 1.3 2.5 1400**

**b) fill-in the required term or region name ( 8 pts)**

Sodium is in this group column \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Example of an alkaline earth metal\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The Periodic Table is composed of metals, non-metals and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Example of a noble metal\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

These gases are completely un-reactive and all reside on the far right of the Periodic Table\_\_\_\_\_\_\_\_\_\_\_\_\_

Another name for elements in the `d’ block \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Fluorine is in this group’s column\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1.9 This, that and the other things (7 pts)**

1. Who was behind the gold foil experiment ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. German who won the Nobel Prize with Einstein and got his name on the constant **h**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Besides 1/sec or cycles per second, another name for the units of frequency is\_\_\_\_\_\_\_\_\_

**True or False**

Bohr’s theory of the atom is good for all the elements. T F

Elements are distinguished by proton count T F

The specific mixture of s, p,d for an element’s valence electrons decides its chemical character T F

Any day doing chemistry is a good day. T T

\_\_\_/19