Chem 1013 Exam 1 version A

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

1. **Atomic dimensions, parts and relations between them (8 pts)**
2. List the 3 main subatomic pieces of the atom:

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

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

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

1. Which of the pieces above reside in the atomic nucleus ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. The ~ ratio of the outside of the atom’s radius to the radius of the nucleus is ~ \_\_\_\_\_\_\_\_\_\_\_ to 1
3. Which of the subatomic pieces weighs the least ? \_\_\_\_\_\_\_\_\_\_\_\_\_
4. Most of the mass of an atom resides in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2. Nomenclature of the Elements (10 pts)**

a) In the modern theory of the atom a specific element has a fixed count of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) An isotope of a specific element has as particular count of: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c) Mass number, M= \_\_\_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6

C

12.01

d) The `6’ in the Periodic Table representation of C is the: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

e) The 12.01 in the Periodic Table representation of C is the:

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

1. Provide names or symbols for the elements listed below:

Lithium\_\_\_\_\_\_ Ne\_\_\_\_\_\_\_\_\_\_\_\_\_\_ gold\_\_\_\_ K\_\_\_\_\_\_\_\_\_\_\_\_

3. **Atomic Bookkeeping ( 9 pts)**

Fill in the missing pieces to the table below: (3 pts per correct line)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Atomic # | Mass # | symbol | #p | #n | #e | Atom charge |
|  |  |  | 26 | 33 |  | 0 |
|  | 37 | Cl |  |  | 17 |  |
| 8 |  |  |  | 9 |  | 0 |

**4. Light, Frequency, Wavelength and Color (10 pts)**

a) In the old theory of light, light is considered to be a(n):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) In Einstein’s new theory of light is now a massless particle called a(n)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c) In the new theory of light, light energy is proportional to: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d) Using the new theory of light, rank these colors from lowest to highest in energy: 2 pts

Green Yellow Blue Red \_\_\_\_\_\_\_\_\_\_<\_\_\_\_\_\_\_\_\_\_<\_\_\_\_\_\_\_\_\_\_<\_\_\_\_\_\_\_

Low energy High energy

**\_\_\_/32**

**4. Light, Frequency, Wavelength and Color (continued) p 2/3**

e) Using the new theory of light, rank these wavelengths from lowest to highest energy: (2 pts)

300 nm 500 nm 400 nm 600 nm \_\_\_\_\_\_\_\_\_\_<\_\_\_\_\_\_\_\_\_\_\_<\_\_\_\_\_\_\_\_\_\_<\_\_\_\_\_\_\_\_\_\_\_ low energy high energy

1. Using the new theory of light, rank these frequencies from lowest to highest energy (2 pts)

50 GHz 80 GHz 40 GHz 10 GHz \_\_\_\_\_\_\_\_<\_\_\_\_\_\_\_\_\_\_\_\_\_<\_\_\_\_\_\_\_\_\_\_<\_\_\_\_\_\_\_\_\_

Low energy high energy

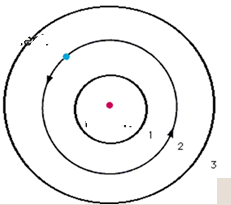
1. The frequency of blue light is: **higher the same lower**  than the frequency of red light.

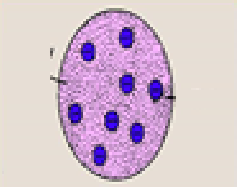
(circle choice)

**5. Atomic Models (8 pts)**

1. Match the pictures to the atomic model names below:
2. Thomson’s `Plum Pudding’ (chocolate chip cookie) atom
3. Rutherford’s atom
4. Bohr’s atom







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

1. Which of the three models listed successively explained the emission lines of the Sun? \_\_\_\_\_\_\_\_\_\_\_\_
2. In Bohr’s atom, absorption of light occurs when **n** goes from : (circle choice):

**higher n🡪 lower n lower n🡪 higher n positive n🡪 negative n**

1. Bohr’s atom successfully explained the behavior of which element(s) ? \_\_\_\_\_\_\_\_\_\_\_\_\_
2. Name one failure of the Bohr atom: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

**6. Periodic Table Geography (9 pts)**

1. The three main kinds of element classes are:

1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Region Y

1 2 7 8



🡨 Region X 🡪

**\_\_\_/14**

**6. Periodic Table Geography (continued) p 3/3**

1. Which column # contains halogens?: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Name of column 2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. What is Region X called ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Which column # contains inert (noble gases) ? \_\_\_\_\_\_
5. Name of column 1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. Name of region Y (circled) ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**7. Singing the spdf song and Lewis dots (23 pts total)**

1. Using your own spdf Periodic Table map:

Write the complete ground state electronic configurations for: (3 pts each)

Al\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ O\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Na\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Write the abbreviated ground state electronic configurations for: (2 pts each)

Ca \_\_\_\_\_\_\_\_\_\_\_ S\_\_\_\_\_\_\_\_\_\_\_\_\_ N\_\_\_\_\_\_\_\_\_\_\_\_

1. Correct the errors in the configurations below: (2 pts each)
2. 0s22s22p3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (2) 1s32s42p1 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Which element has the configuration: [Ar] 4s1 ? \_\_\_\_\_\_\_\_\_\_\_\_
4. Provide the equivalent Lewis dot pictures for: (1 pt each/3 pts total)

P Li F

**8. Ionic compounds (9 pts)**

1. Write the correct ionic formulas for compounds made from: (3 pts each/9 pts total)
2. Ca and N \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Li and O \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Mg and Cl \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**9. Covalent Compounds (15 pts)**

1. Draw the correct Lewis structure for: (2 pts each/6 pts total)

**O2 N2 F2**

1. Draw the correct Lewis structure for: (3 pts each/ 6 pts total)

**CO CO2**

H H

| |

1. Does the compound to right satisfy HONC rules? H-C-O-N-H Yes No
2. How many electrons are bonding electrons in: H-C≡C-H \_\_\_\_\_\_\_
3. **True/False:** Any day doing chemistry is a good day **T T FU** (circle answer)

**\_\_\_/53**