Chem 1013 Exam 1 version B

Your name: Answers 1 pt

1. Atomic dimensions, parts and relations between them (7 pts)

a) What subatomic particles reside in the atomic nucleus ? neutrons & protons

b) Most of the mass of an atom resides in the nucleus

c) Of the three subatomic particles in the atom, which is the lightest? electrons

d) Two of the three subatomic particles in an atom weigh the same. Which ones ?
protons and neutrons

e) The ratio of the diameter of an atom to its nucleus is ~ 100,000/1

2. Nomenclature of the Elements (11 pts)

a) An isotope of a specific element has as particular count of: neutrons

b) In the modern theory of the atom a specific element has a fixed count of protons

c) Mass number, M= # protons + # neutrons

d) Which element has an atomic number of 15 ? P

e) The 28.09 in the Periodic Table representation of Si is the:
Average atomic mass of Si

14
Si
28.09

f) Provide names or symbols for the elements listed below:

Sodium Na Cl chlorine silver Ag K potassium Lithium Li

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
29	64	Cu	29	35	29	0
16	32	S	16	16	16	0
9	19	F	9	10	10	-1

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

a) Using the new theory of light, rank these colors from lowest to highest in energy: 2 pts
Yellow Green Blue Red Red < Yellow < Green < Blue
Low energy High energy

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

c) In Einstein's new theory of light is now a massless particle called a(n) photon

d) In the new theory of light, light energy is proportional to: frequency

e) Using the new theory of light, rank these wavelengths from lowest to highest energy: (2 pts)
800 nm 200 nm 400 nm 600 nm 800 < 600 < 400 < 200 nm
low energy high energy

f) Using the new theory of light, rank these frequencies from lowest to highest energy (2 pts)
10 GHz 90 GHz 40 GHz 10 GHz 10 < 20 < 40 < 90
Low energy high energy

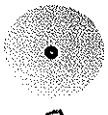
g) The frequency of blue light is: **higher** **the same** **lower** than the frequency of red light.
(circle choice)

20

___/37

5. Atomic Models (8 pts)

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



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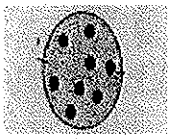

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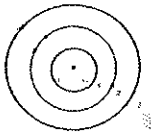

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b) Which of the three models listed made the `+' charge in the `cookie' dough? 1 (Thomson)

c) In Bohr's atom, emission of light occurs when **n** goes from : (circle choice):

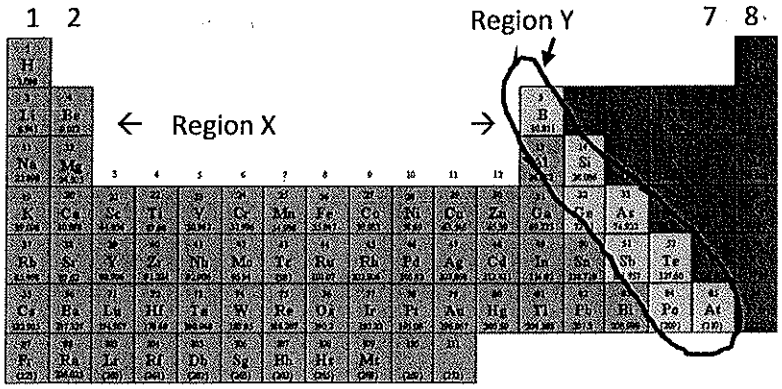
higher n→ lower n **lower n→ higher n** **positive n→ negative n**

d) Bohr's atom successfully explained the behavior of which element(s) ? H

e) Name one failure of the Bohr atom: (1) Can't explain emission lines of any element except H (2) Can't explain effect of magnet on H emission lines

6. Periodic Table Geography (9 pts)

a) The three main kinds of element classes are:
1) non-metals 2) metalloids 3) metals



Use the Periodic Table above to answer the questions below:

(1) Which column # contains alkaline earths?: 2
(2) Name of column 7 halogens
(3) Name of region Y (circled) ? metalloids
(4) What is Region X called ? transition metals
(5) Which column # contains inert (noble gases) ? 8
(6) Name of column 1 alkal. metals

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

a) Using your own spdf Periodic Table map:
Write the complete ground state electronic configurations for: (3 pts each)

Al $1s^2 2s^2 2p^6 3s^2 3p^1$ O $1s^2 2s^2 2p^4$ Na $1s^2 2s^2 2p^6 3s^1$

____/27

7. Singing the spdf song and Lewis dots (continued)

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

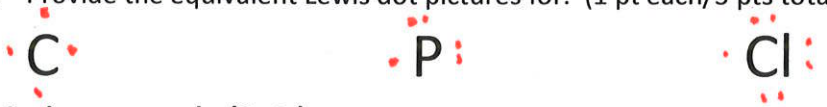
Mg [Ne] $3s^2$ Cl [Ne] $3s^2 3p^5$ Si [Ne] $3s^2 3p^2$

c) Correct the errors in the configurations below: (2 pts each)

(1) $0s^2 3s^2 2p^3$ $1s^2 2s^2 2p^3$ (2) $1s^2 2s^2 3p^1$ $1s^2 2s^2 2p^1$

d) Which element has the configuration: [Ar] $4s^2$? _____

e) Provide the equivalent Lewis dot pictures for: (1 pt each/3 pts total)



8. Ionic compounds (9 pts)

a) Write the correct ionic formulas for compounds made from: (3 pts each/9 pts total)

(1) Ca and O CaO

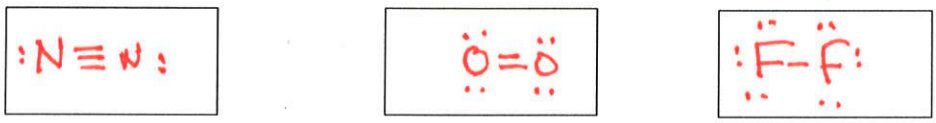
(2) Li and N Li_3N

(3) Mg and Br $MgBr_2$

9. Covalent Compounds (15 pts)

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

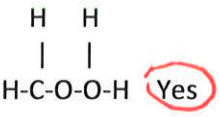
N_2 **O_2** **F_2**



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

CO **CO_2**

c) Does the compound to right satisfy HONC rules?



(Yes) No

d) How many electrons are bonding electrons in: H-C≡C-H 10

e) **True/False:** Any day doing chemistry is a good day **T** **T** **FU** (circle answer)

___/53