Chem 1013 Exam 1 version A

Your name: Answers 1 pt

1. Atomic dimensions, parts and relations between them (8 pts)

a) List the 3 main subatomic pieces of the atom:

protons
neutrons
electrons

b) Which of the pieces above reside in the atomic nucleus ? neutrons & protons

c) The ~ ratio of the outside of the atom's radius to the radius of the nucleus is ~ 100,000 to 1

d) Which of the subatomic pieces weighs the least ? electron

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

2. Nomenclature of the Elements (10 pts)

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

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

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

d) The `6' in the Periodic Table representation of C is the: proton count

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

6
C
12.01

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

Lithium Li Ne Neon gold Au K Potassium

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	59	Fe	26	33	26	0
17	37	Cl	17	20	17	0
8	17	O	8	9	8	0

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

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

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

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

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

Green Yellow Blue Red

Red < ~~Green~~ Yellow < Green < Blue

Low energy High energy

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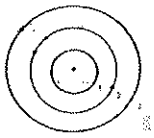
e) Using the new theory of light, rank these wavelengths from lowest to highest energy: (2 pts)
300 nm 500 nm 400 nm 600 nm 600 < 500 < 400 < 300
low energy high energy

g) Using the new theory of light, rank these frequencies from lowest to highest energy (2 pts)
50 GHz 80 GHz 40 GHz 10 GHz 10 < 40 < 50 < 80 GHz
Low energy high energy

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

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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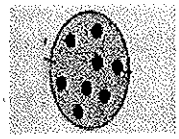
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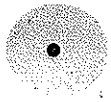
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b) Which of the three models listed successively explained the emission lines of the Sun? Bohr model

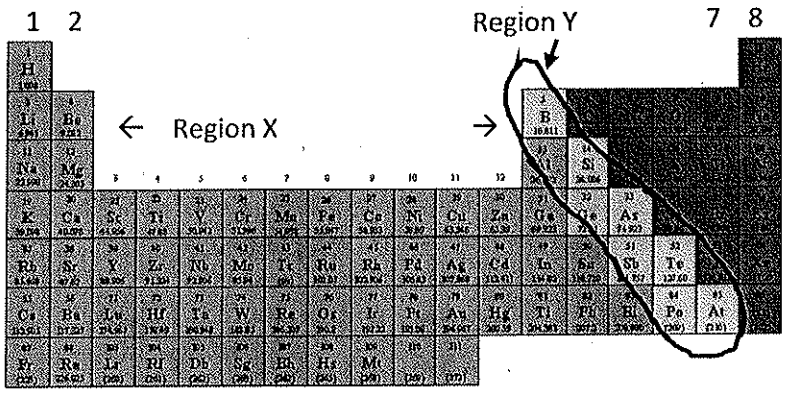
c) In Bohr's atom, absorption of light occurs when **n** goes from : (circle choice):
higher n→ lower n (**lower n→ higher n**) **positive n→ negative n**

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 but H (2) Can't explain magnet's effect on H emission lines

6. Periodic Table Geography (9 pts)

a) The three main kinds of element classes are:
1) Metals 2) Metalloids 3) Non-Metals



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

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 $1s^2 2s^2 2p^6 3s^1$

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

Ca $[Ar] 4s^2$ S $[Ne] 3s^2 3p^4$ N $[He] 2s^2 2p^3$

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

(1) $0s^2 2s^2 2p^3$ $1s^2 2s^2 2p^3$ (2) $1s^3 2s^4 2p^1$ $1s^2 2s^2 2p^1$

d) Which element has the configuration: [Ar] $4s^1$? _____

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 N Ca_3N_2
(2) Li and O Li_2O
(3) Mg and Cl $MgCl_2$

9. Covalent Compounds (15 pts)

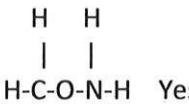
a) Draw the correct Lewis structure for: (2 pts each/6 pts total)

O_2 **N_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)