Chemistry: Ch. 5 Open Note/Take Home Quiz Name:

1. Explain what parts of Dalton's Atomic Theory no longer holds true.

   a. The atom is the smallest particle of matter. This is not true because of subatomic and elementary particles are the smaller components

   b. All atoms of the same element are identical. This is not true because there exist isotopes & the elements which differ by the # of neutrons

2. Match the name & the discovery together

1.	C	Thomson	a. neutron
2.	f	Rutherford	b. nucleus (protons)
3.	d	Millikan	c. electrons (plum-pudding model of the atom)
4.	b	Goldstein	d. charge and mass of the electron
5.	a	Chadwick	e. atomic number
6.	e	Moseley	f. nucleus (Gold foil experiment)

3. Finish the chart for the following

Name	symbol	atomic #	mass #	# of electrons	# of protons	# of neutrons
a. carbon-14	^{14}C	6	14	6	6	8
b. Zinc-68	^{68}Zn	30	68	30	30	38
c. Sulfur-34	^{34}S	16	34	16	16	18

4. What are the differences between Potassium-40 (^{40}K) and Potassium-42 (^{42}K).

   The number of neutrons and masses.

5. Fill in the Chart

Subatomic Particle	Charge	Mass (amu)	Location in atom
Proton	+1	1	nucleus
electron	−1	1/1827	in electron cloud or around nucleus
neutron	0	1	in nucleus

$\upsilon = \frac{c}{\lambda} = \frac{2.998 \times 10^{8} \frac{m}{s}}{6.74 \times 10^{-6} m}$

6. Solve for the Following: Show your work underneath the table.

Wave	Wavelength (m)	Frequency (s^{-1})	Energy (J)
Infrared	6.74×10^{-6}	4.45×10^{13}	2.95×10^{-20}
visible	4.92×10^{-7}	6.10×10^{14}	4.04×10^{-19}

7. The hydrogen atom when excited in a spectrum tube (like that on the counter) shows a distinct red light and a distinct blue light in its spectrum. Using Bohr's model, explain where these lights come from.

These specific wavelengths of light are emitted when electrons fall from outer energy levels (excited states) to lower energy levels. This releases photons of energy. If the ground state level is the 2nd energy level then wavelengths in the visible spectrum are released. The farther an electron falls the more energy is released and therefore the wavelengths shift towards blue light

8. A certain color of light with a wavelength of 7.25×10^{-7} m is emitted from a certain atom. (Show all your work)
   a. Calculate the frequency of this wave

$\upsilon = \frac{c}{\lambda} = \frac{2.998 \times 10^{8} \frac{m}{s}}{7.25 \times 10^{-7} m} = 4.14 \times 10^{14}$

   b. Calculate the energy of this wave

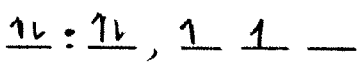
$E = h \cdot \upsilon = h \cdot \frac{c}{\lambda} \quad \frac{6.626 \times 10^{-34} J \cdot s \;\|\; 2.998 \times 10^{8} \frac{m}{s}}{7.25 \times 10^{-7} m} = 2.73 \times 10^{-19} J$

   c. What type of electromagnetic wave is this? (from the spectrum)

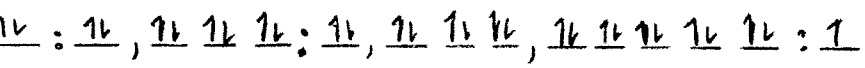
Visible light (into the red color)

9. Write an electron configuration **and** orbital diagram for the following elements

   a. carbon $1s^2 2s^2 2p^2$



   b. copper $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^{10}$ – exceptional to aufbau



   c. germanium. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^2$