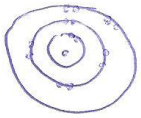
Chapter 4 and 5 Review

1. Discuss and draw the Bohr Model of the atom.



Bohr constructed this model based on spectral lines that were observed. Electrons have energy levels that can allow energy transitions producing different bands of light

2. Atomic Orbitals

Complete the table

Energy Level	Number of sublevels possible	Type of sublevel(s)	Total number of Electrons Possible
N=1	1	s	2
N=2	2	s, p	8
N=3	3	s, p, d	18
N=4	4	s, p, d, f	32

3. Electron Configuration – Write the regular and short hand configuration for each element, underline and identify the number of valence electrons.

Calcium $1s^2 2s^2 2p^6 3s^2 3p^6 \underline{4s^2}$, $[Ar]\,4s^2$, $2e^-$

Phosphorous $1s^2 2s^2 2p^6 3s^2 3p^3$, $[Ne]\,3s^2 3p^3$, $5e^-$

Zinc $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10}$, $[Ar]\,4s^2 3d^{10}$, $2e^-$

4. What are the three rules for writing electron configuration?

- ① Aufbau principal
- ② Pauli's exclusion principal
- ③ Hunds rule

} Look up these rules

5. Write the definition; give the Greek symbol and units for wavelength and frequency

Wavelength → λ , distance from crest to crest or trough to trough

Frequency → ν , ~~how~~ number of cycles that occur per second.

7. a. What is the wavelength of a gamma wave that has the frequency of 3.0×10^{29} Hz?

$$\lambda = \frac{c}{\nu} = \frac{3.0\times10^{8}\ m/s}{3.0\times10^{29}\ Hz} = 1.9\times10^{-21}\ m$$

b. What is the energy of this wave?

$$E = h\nu = (6.626\times10^{-34}\ J\cdot s)(3\times10^{29}\ \tfrac{1}{s}) = 2.0\times10^{-4}\ J$$

8. a. What is the frequency of a radio wave that has a wavelength of 1.04×10^2m?

$\nu = \frac{c}{\lambda} = \frac{3.0 \times 10^8 \frac{m}{s}}{1.04 \times 10^2 m} = 2.14 \times 10^6 \frac{1}{s}$

b. What is the energy of this wave?

$E = h\nu = (6.626 \times 10^{-34} J \cdot s)(2.14 \times 10^6 \frac{1}{s})$

$E = 1.41 \times 10^{-27} J$

9. Why are all noble gases inert (unreactive)?

They have their outermost shell (valence) full.

10. What charge do all Alkaline Earth Metals form? Why does this happen? Is this a cation or anion?

+2 they lose $2e^-$ leaving an overall + charge. Cation.

11. Name the elements that have the following subshell as their last electron filled subshell.

a. $4s^2$ Calcium b. $6p^3$ Bismuth c. $4f^{13}$ Ytterbium

12. How do you know if an element is a S, P, D or F block element?

Based on the last subshell that is filled in the electron configuration.

13. Rank the following elements 1-4 based on largest atomic radius.

1 = largest ↓ 4 = smallest

Arsenic	Nitrogen	Bismuth	Fluorine
2	3	1	4

14. Rank the following elements 1-4 based on having the <u>smallest of ionization energy.</u>

1 = smallest, 2, 3, 4 = largest

Potassium	Rubidium	Cesium	Lithium
(3)	(2)	(1)	(4)

15. Rank the following elements 1-4 based on the having the <u>greatest ionization energy</u>.

1 = largest

Phosphorous	Magnesium	Argon	Chlorine
(3)	(4)	(1)	(2)

16. Rank the following elements 1-5 by the most <u>electronegative atom</u>. (1) largest (most) electronegative

Aluminum	~~Boron~~	Fluorine	Chlorine	Thallium
3		1	2	4

17. Explain the shielding effect.

Energy Level containing electrons that act as a shield blocking the nucleus from outside electrons (valence electrons).