GHW # 2: Chapter 1- Your Name:_____

Key Questions (relatively simple to answer using the Focus Information)

1. What was discovered and the significance of each experiment:

   a) J.J. Thompson using cathode-ray tubes or Crook's tubes:

   b) Millikan's Oil Drop Experiment:

   c) Rutherford's a-particle Experiments:

   d) Moseley's X-ray experiment:

   f) Chadwick's bombardment of ^{9}Be with á-particles

2. (**Spectroscopic Information)** What are following series of lines in hydrogen emission spectrum?
   a. Paschen
   b. Blamer
   c. Lyman
   d. Brakett

3. What is Bohr model of atom?

4. Calculate the wavelength of light that can excite the electron in a ground state hydrogen atom to n = 7 energy level.

5. Why was a wave mechanical model required to describe the arrangement of electrons around the nucleus of an atom?

6. What are the characteristics of waves?

7. What is a standing wave?

8. What is electromagnetic radiation (EMR)?

9. What is wave-particle duality of matter and its significance?

10. What is Schrödinger Wave Equation and Its Significance to atomic structure?

11. Describe the sub-level in the n= 4 energy level with l= 2.

12. Degeneracy of following sub-levels:
    i) s-sub-level: ii) p-sub-level: iii) d-sub-level: iv) f-sub-level:

13. How many angular nodes are in 2p, 3p and 3d orbitals?

14. Draw the boundary surface of s, p_x, p_y and p_z orbitals and identify the angular nodal planes.

15. What is:

a) Wave function?

b) Heisenberg uncertainty principle and significance to atomic structure?

c) Max Born interpretation of wave function?

d) Nodal surface?

e) d) Atomic orbitals?

16. Construct a quantum number tree for the principal quantum number n = 5

17. Identify the orbital that has $n = 5$ and $l = 1$,

18. Describe the radial and angular component of a wave function.

19. Explain the general rule used to find the number of radial and angular nodes of a wave function.

20. Nodes in a 4d orbital:
a) Total nodes =
b) Radial nodes =
c) Angular nodes =

21. Plots of radial probability function: $[R_{n,l}(r)]^2$ **Vs** r (radius) for various *n* and *l* values
    a) n =2 and l =0
    b) n =3 and l =1

22. Describe the classification of elements in the Mendeleyev's periodic tables.

23. Describe the classification of elements in the modern periodic tables.

24. What is Effective Nuclear charge of an electron in a multi-electron atom?

25. Penetration & Shielding of an Electron in multi-electron atom and how does it affect the filling order as given by "Building Up" principle?