Study Guide **Chapters 3 and 4**

Section 3.1 Early Atomic Theories and the Origins of Quantum Theory

1. What was Democritus first thinking about matter? (p. 134)
2. What did Dalton’s theory include? (p. 134)
3. Define an electron (p. 134)
4. What did J.J Thomson discover? (p. 134)
5. What was Rutherford’s contribution to the theory?(p. 136)
6. Define the particle (electron, proton, neutron, their respective masses and charge). (p. 137)
7. What is a nucleus? (p. 137)
8. Define an isotope, atomic number and mass number. (p. 138)
9. Define photoelectric effect. (p. 139)
10. Define quantum. (p. 140)
11. Define photons. (p. 1410

Do practice problems, p. 142, Review 3.1, # 1, 2, 3, #7.

Section 3.2 Bohr’s Model of the Atom

1. Summarize in point form notes the limits of theory. (p. 143)
2. Define: spectroscopy (p. 143); emission spectrum, continuous spectrum, line spectrum (p. 144)
3. Communication: Explain energy levels and the orbital model and the line spectrum of a hydrogen atom (p. 145);
4. Define transition, ground state (p. 146).

Do practice problems, 3. 2 review, p. 147, # 1-5

Section 3.3 The Quantum Mechanical Model of the Atom

1. Define quantum mechanics. (p. 148)
2. Define orbital. (p. 150)
3. What is the Heisenberg’s uncertainty principle and how does it apply to the electron configuration, specifically compared to the Bohr- Ruterford understanding of the atom? (p. 150).
4. Define wave function. (p. 151)
5. What is the electron probability density and how does apply to the radius? (p. 151)

Do Review Questions, p. 152, # 2, 3 and 4

Section 3.4: Quantum Numbers

1. Define quantum numbers. (p. 153)
2. Complete the following table (p. 153-157)

|  |  |  |
| --- | --- | --- |
| Concept | Definitions | Number or Short form or symbol |
| Shell |  |  |
| Principal quantum number (p. 153) |  |  |
| Subshells (p. 153) |  |  |
| Secondary quantum numbers (p. 154) |  |  |
| Magnetic quantum number (ml) |  |  |

1. Draw out the following:

1 Hydrogen \_\_\_\_\_\_\_\_\_

2 Helium \_\_\_\_\_\_\_\_\_

3 Boron \_\_\_\_\_\_\_\_\_\_