

02/11/14
Workshop 3-part 2
Chem. 103, Spring 2014

Completed reports to be submitted by 02/20/2014, 2.00 PM (no late submission)

Chapter 3: Quantum theory and Electronic structure of Atoms

D. Wave-particle duality: de Broglie's hypothesis (page 74)

- i) Write the equation 3.11 to show how the mass of a particle is related to its wavelength. Please define each quantity in the equation.
- ii) Home-assigned problems: 3.57, 3.59
- iii) Review question 3.54

E. Wave-particle duality: Electron Diffraction (page 76)

Home assignment: Describe how the experiment proved that electron was behaving rather like a wave?

F. Wave-particle duality: Heisenberg's uncertainty principle (page 77)

- i) Describe the uncertainty to locate a subatomic particle in your own words
- ii) Provide equation 3.12 and define each quantity in the equation.
- iii) In class exercise: Worked example 3.7
- iv) Home-assigned problem: 3.67

G. Quantum Mechanical model of atoms

1. Bohr's model (a single quantum number-based electronic structure)

- i) What is the most important findings in Bohr's theory of atom (Page 68-69)?
- ii) Provide equations 3.6 and 3.7, define all the quantities involved.
- iii) Home exercise: calculate out the energies of an electron for $n=1,2,3$, and 4 (*i.e.* in the 1st, 2nd, 3rd, and 4th level of the atom)
- iv) Home assignment. Example 3.5 (page 73). Problems: 3.47, 3.49, 3.51.

2. Newer quantum mechanical model (4-quantum number-based electronic structure)

- i) Define the four quantum numbers of atoms. (page 79)
- ii) Provide Table 3.2
- iii) Home-assigned exercises 3.71, 3.72, 3.73, and 3.74.