

02/06/14
Workshop 3-part 1
Chem. 103, Spring 2014

Completed reports to be submitted by 02/13/2014, 2.00 PM (no late submission)

Chapter 3: Quantum theory and Electronic structure of Atoms

A. Energy forms: The Universe is made up of matter and energy. According to Einstein they are inter-convertible

1. a) Read page 57 and define the following terms: energy, kinetic energy, potential energy.
- b) Derive the fundamental units for energy (page 58)
- c) One type of potential energy is electrostatic energy. Define the mathematics form of the energy
- d) Do the exercises: 3.1.1, 3.1.2, 3.13

B. The nature of light

2. a) Read page 61 and discuss the justification to call light as electromagnetic wave.
- b) Home assignment: define, wavelength, frequency, and amplitude (page 60)
- c) Home assignment: Sketch the Figure 3.1 in your own way and place the specific appliance below the appropriate wavelength range at which it functions.
- d) Do the exercises: 3.2.1, 3.2.2, 3.2.3, and 3.2.4
- e) Write Planck's law and define all quantities in the expression
- f) Problems: 3.15, 3.17, and 3.19

C. Quantum mechanics and wave-particle duality

3. a) Explain how classical mechanics failed to explain photo-electric effect
- b) Read page 64 and discuss in groups how photoelectric effect provided the much-sought reasoning supporting the particle nature of light. Write a concise explanation of photo-electric effect. Provide one every-day experience of photoelectric effect.
- c) Provide equation 3.5 and define all quantities. What is binding energy of the electron in the metal?
- d) Discuss the two questions: How can you increase the kinetic energy of the electrons?
How can you increase the current?