Week 31 – Modern Physics

Read Page 344 (Wave-Particle Duality)

TQ1. Electromagnetic waves can exhibit many characteristics and properties of _____ and _____.

CQ2. What is a phenomenon that provides evidence that light has a wave nature?

CQ3. Light demonstrates the characteristics of waves only. True or false (explain your answer)

Read Page 345-346 (Blackbody Radiation and Photoelectric Effect)

TQ4. What observation did not align with physicists'' understanding of light as a wave?

TQ5. What did Max Planck propose that energy existed as?

TQ6. When some electromagnetic radiation struck pieces of metal, what was sometimes emitted?

TQ7. What is the equation for the Energy of a photon?

TQ8. What is value for Planck's constant, h, in J·sec?

Note: Planck's constant could also be 4.14 x 10^{-15} eV·sec when calculating for energy in electronvolts (eV)

TQ9. What is the minimum amount of energy that needs to be absorbed by the metal in order for electrons to be released? (And what is its symbol)

TQ10. What is the equation for the kinetic energy of an emitted photoelectron?

QQ11. What is the energy of a photon of light with a wavelength of 4 x 10^{-7} m?

QQ12. What is the frequency of a photon of light with an energy value of 4 x 10^{-19} J?

CQ13. Using the equation found in TQ10, correctly label the graph below at Point A, Point B, and the slope with the following values: h (Planck's constant), Φ (work function), f (cutoff frequency).
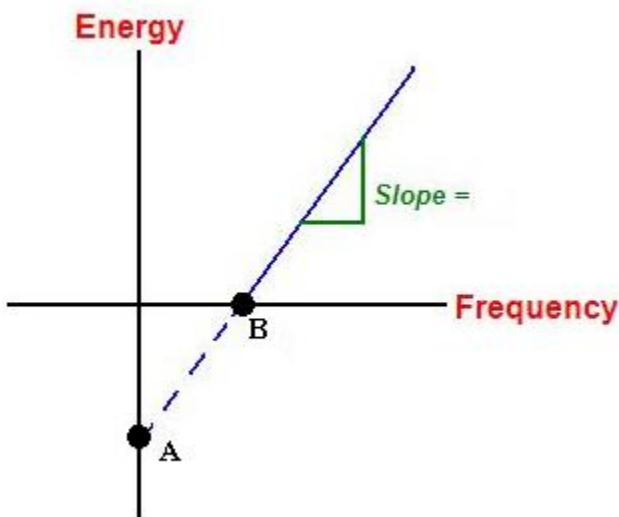
QQ14. Ultraviolet B (UVB) light has approximately 3 x 10^{-7} m for a wavelength.

   (A) Calculate the frequency of this light.

   (B) Calculate the energy in joules of this photon of light.

   (C) Calculate the energy in electronvolts (eV) of this photon of light. (1 eV = 1.6 x 10^{-19} J)