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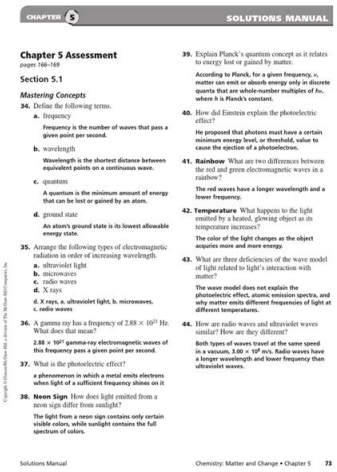

CHAPTER 5 SOLUTIONS MANUAL

**Chapter 5 Assessment**

*pages 166–169*

**Section 5.1**

***Mastering Concepts***

34. Define the following terms.
    a. frequency
    **Frequency is the number of waves that pass a given point per second.**
    b. wavelength
    **Wavelength is the shortest distance between equivalent points on a continuous wave.**
    c. quantum
    **A quantum is the minimum amount of energy that can be lost or gained by an atom.**
    d. ground state
    **An atom's ground state is its lowest allowable energy state.**
35. Arrange the following types of electromagnetic radiation in order of increasing wavelength.
    a. ultraviolet light
    b. microwaves
    c. radio waves
    d. X rays
    **d. X rays, a. ultraviolet light, b. microwaves, c. radio waves**
36. A gamma ray has a frequency of $2.88 \times 10^{25}$ Hz. What does that mean?
    **$2.88 \times 10^{25}$ gamma-ray electromagnetic waves of this frequency pass a given point per second.**
37. What is the photoelectric effect?
    **a phenomenon in which a metal emits electrons when light of a sufficient frequency shines on it**
38. **Neon Sign** How does light emitted from a neon sign differ from sunlight?
    **The light from a neon sign contains only certain visible colors, while sunlight contains the full spectrum of colors.**
39. Explain Planck's quantum concept as it relates to energy lost or gained by matter.
    **According to Planck, for a given frequency, $\nu$, matter can emit or absorb energy only in discrete quanta that are whole-number multiples of $h\nu$, where h is Planck's constant.**
40. How did Einstein explain the photoelectric effect?
    **He proposed that photons must have a certain minimum energy level, or threshold, value to cause the ejection of a photoelectron.**
41. **Rainbow** What are two differences between the red and green electromagnetic waves in a rainbow?
    **The red waves have a longer wavelength and a lower frequency.**
42. **Temperature** What happens to the light emitted by a heated, glowing object as its temperature increases?
    **The color of the light changes as the object acquires more and more energy.**
43. What are three deficiencies of the wave model of light related to light's interaction with matter?
    **The wave model does not explain the photoelectric effect, atomic emission spectra, and why matter emits different frequencies of light at different temperatures.**
44. How are radio waves and ultraviolet waves similar? How are they different?
    **Both types of waves travel at the same speed in a vacuum, $3.00 \times 10^8$ m/s. Radio waves have a longer wavelength and lower frequency than ultraviolet waves.**

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