Name _____ Date _____ Class _____

CHAPTER 5 STUDY GUIDE FOR CONTENT MASTERY

Electrons in Atoms

Section 5.1 Light and Quantized Energy

In your textbook, read about the wave nature of light.

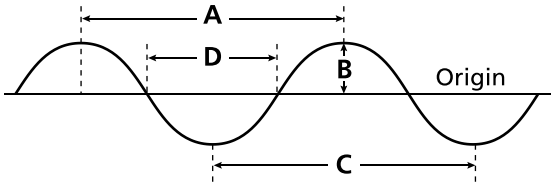
Use each of the terms below just once to complete the passage.

amplitude	energy	frequency	hertz
light	wave	wavelength	speed

Electromagnetic radiation is a kind of **(1)**_____ that behaves like a(n) **(2)**_____ as it travels through space. **(3)**_____ is one type of electromagnetic radiation. Other examples include X rays, radio waves, and microwaves.

All waves can be characterized by their wavelength, amplitude, frequency, and **(4)**_____. The shortest distance between equivalent points on a continuous wave is called a(n) **(5)**_____. The height of a wave from the origin to a crest or from the origin to a trough is the **(6)**_____. **(7)**_____ is the number of waves that pass a given point in one second. The SI unit for frequency is the **(8)**_____, which is equivalent to one wave per second.

Use the figure to answer the following questions.



9. Which letter(s) represent one wavelength? _____

10. Which letter(s) represent the amplitude? _____

11. If twice the length of A passes a stationary point every second, what is the frequency of the wave?

_____

Section 5.1 *continued*

In your textbook, read about the particle nature of light.

Circle the letter of the choice that best completes the statement or answers the question.

12. A(n) _____ is the minimum amount of energy that can be lost or gained by an atom.

a. valence electron **b.** electron **c.** quantum **d.** Planck's constant

13. According to Planck's theory, for a given frequency, ν, matter can emit or absorb energy only in

a. units of hertz.

b. whole-number multiples of $h\nu$.

c. entire wavelengths.

d. multiples of $\frac{1}{2}h\nu$, $\frac{1}{4}h\nu$, and so on.

14. The _____ is the phenomenon in which electrons are emitted from a metal's surface when light of a certain frequency shines on it.

a. quantum **b.** Planck concept **c.** photon effect **d.** photoelectric effect

15. Which equation would you use to calculate the energy of a photon?

a. $E_{\text{photon}} = h\nu \times$ Planck's constant

b. $E_{\text{photon}} = h\nu$

c. $E_{\text{photon}} = \frac{1}{2}\,h\nu$

d. $c = \lambda\nu$

In your textbook, read about atomic emission spectra.

For each statement below, write *true* or *false*.

_____ **16.** Like the visible spectrum, an atomic emission spectrum is a continuous range of colors.

_____ **17.** Each element has a unique atomic emission spectrum.

_____ **18.** A flame test can be used to identify the presence of certain elements in a compound.

_____ **19.** The fact that only certain colors appear in an element's atomic emission spectrum indicates that only certain frequencies of light are emitted.

_____ **20.** Atomic emission spectra can be explained by the wave model of light.

_____ **21.** The neon atoms in a neon sign emit their characteristic color of light as they absorb energy.

_____ **22.** When an atom emits light, photons having certain specific energies are being emitted.