

Chapter 4 Review

Content Review

Multiple Choice

1. c 5. c
2. b 6. c
3. a 7. a
4. c 8. a

True or False

9. lower
10. true
11. dumbbell
12. true
13. more
14. the same number of
15. eight

Concept Mapping

Row 1: radio
Row 2: wavelength
Row 3: visible light, X-rays

Concept Mastery

16. A continuous spectrum is a composite of all of the visible frequencies of light within a given range of wavelengths. Sources of continuous spectra include a piece of metal being heated "white-hot," sunlight, and moonlight.
17. The photoelectric effect causes electrons to be ejected from the surface of a metal when light shines on the metal. For each metal, a minimum frequency is needed to release electrons. When a single photon with the correct energy strikes a metal atom, the atom absorbs the energy from the photon and emits an electron.
18. Orbits are the paths for electrons proposed by Bohr and Rutherford. They are not included in the quantum-mechanical model of the atom. Orbitals are probability plots that represent regions in space where an electron with a particular energy is likely to be found. Orbitals describe the motion of

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Choose the letter of the answer that best completes each statement.

1. Which of the following radiations is not a part of the electromagnetic spectrum?
(a) microwave (c) beta ray
(b) X-ray (d) infrared
2. The characteristic of an electromagnetic wave that is associated with the energy of that radiation is its
(a) amplitude. (c) speed.
(b) frequency. (d) momentum.
3. Which has the greatest energy?
(a) ultraviolet (c) green light
(b) infrared (d) blue light
4. Which of the following will give rise to a spectrum most different from the other three?
(a) sunlight (c) red fireworks
(b) moonlight (d) white fireworks
5. "Pieces" of energy are known as
(a) isotopes. (c) quanta.
(b) particles. (d) line spectra.
6. The lowest sublevel in each principal energy level is represented by the symbol
(a) f (c) s
(b) p (d) d
7. Which electron transition results in the emission of energy?
(a) 3p to 3s (c) 2s to 2p
(b) 3p to 4p (d) 1s to 2s
8. Which is the ground state electron configuration of a magnesium atom?
(a) $1s^2 2s^2 2p^6 3s^2$ (c) $1s^2 2s^2 3s^2 2p^6$
(b) $1s^2 2s^2 2p^6 3s^1$ (d) $1s^2 2s^2 2p^4 3s^2$

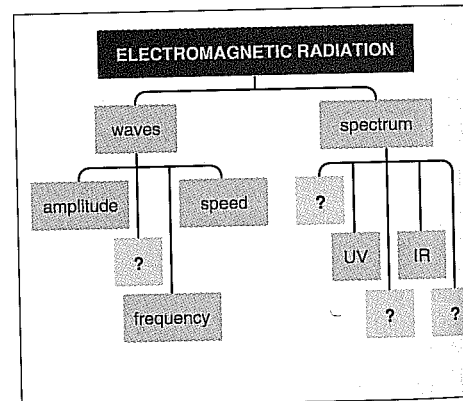
True or False

If the statement is true, write "true." If it is false, change the underlined word or words to make the statement true.

9. The longer the wavelength of light, the higher its frequency.
10. The greater the frequency of light, the higher the energy of its photons.
11. The shape of a typical p orbital is similar to a four-leaf clover.
12. The electron configuration of an atom gives the distribution of electrons in the ground state.
13. The energy of an atom in an excited state is less than its energy in the ground state.
14. Compared to a 2p orbital, a 3p orbital can contain 2 more electrons.
15. The second principal energy level of an atom can hold a total of 10 electrons.

Concept Mapping

Complete the following concept map for Section 4-1. Refer to pages xviii–xix to construct a concept map for the entire chapter.



electrons, but orbitals do not.

19. A line spectrum is a spectrum that contains only certain colors. Line spectra are created when energy is passed through an element in its gaseous state or when an element is vaporized in an intense flame and the light emitted is passed through a prism.

20. (a) 2
(b) 2
(c) 6
(d) 10
(e) 14
(f) 6
(g) 10
(h) 14

21. The electrons in an atom in the ground state occupy the

lowest possible energy level around the nucleus. In an excited state, electrons have absorbed energy and exist in higher, unstable energy levels.

22. The Aufbau principle states that electrons are added one at a time to the lowest energy levels until all of the electrons have been accounted for.