2. What is light? How fast does light travel?

3. What is white light? Colored light?

4. Explain, in terms of absorbed and reflected light, why a blue object appears blue.

5. What is the relationship between the wavelength of light and the amount of energy carried by its photons? How are wavelength and frequency of light related?

14. What is an emission spectrum? Use the Bohr model to explain why the emission spectrum of the hydrogen atom consists of distinct lines at specific wavelengths.

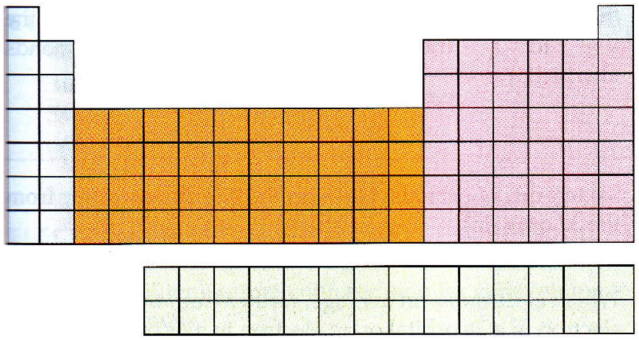
15. Explain the difference between a Bohr orbit and a quantum-mechanical orbital.

16. What is the difference between the ground state of an atom and an excited state of an atom?

24. Explain the difference between valence electrons and core electrons.

25. Identify each block in the blank periodic table.

(a) *s* block
(b) *p* block
(c) *d* block
(d) *f* block



31. Which type of electromagnetic radiation has the longest wavelength?

(a) visible
(b) ultraviolet
(c) infrared
(d) X-ray

37. List these three types of radiation—infrared, X-ray, and radio waves—in order of:

(a) increasing energy per photon
(b) increasing frequency
(c) increasing wavelength

41. Two of the emission wavelengths in the hydrogen emission spectrum are 410 nm and 434 nm. One of these is due to the $n = 6$ to $n = 2$ transition, and the other is due to the $n = 5$ to $n = 2$ transition. Which wavelength corresponds to which transition?

45. Which electron is, on average, closer to the nucleus: an electron in a 2*s* orbital or an electron in a 3*s* orbital?

49. Write full electron configurations for each element.

(a) Sr
(b) Ge
(c) Li
(d) Kr

53. Write electron configurations for each element. Use the symbol of the previous noble gas in brackets to represent the core electrons.

(a) Ga
(b) As
(c) Rb
(d) Sn

55. Write electron configurations for each transition metal.

(a) Zn
(b) Cu
(c) Zr
(d) Fe

57. Write full electron configurations and indicate the valence electrons and the core electrons for each element.

(a) Kr
(b) Ge
(c) Cl
(d) Sr

59. Write orbital diagrams for the valence electrons and indicate the number of unpaired electrons for each element.

(a) Br
(b) Kr
(c) Na
(d) In

61. How many valence electrons are in each element?

(a) O
(b) S
(c) Br
(d) Rb

63. List the outer electron configuration for each column in the periodic table.

(a) 1A
(b) 2A
(c) 5A
(d) 7A

67. Use the periodic table to write electron configurations for each element.

(a) Sr
(b) Y
(c) Ti
(d) Te

69. How many 2*p* electrons are in an atom of each element?

(a) C
(b) N
(c) F
(d) P

73. Name the element in the third period (row) of the periodic table with:

(a) 3 valence electrons
(b) a total of four 3*p* electrons
(c) six 3*p* electrons
(d) two 3*s* electrons and no 3*p* electrons

75. Use the periodic table to identify the element with each electron configuration.

(a) $[Ne]3s^2 3p^5$

(b) $[Ar]4s^2 3d^{10} 4p^1$

(c) $[Ar]4s^2 3d^6$

(d) $[Kr]5s^1$

77. Choose the element with the higher ionization energy from each pair.

(a) As or Bi

(b) As or Br

(c) S or I

(d) S or Sb

79. Arrange the elements in order of increasing ionization energy: Te, Pb, Cl, S, Sn.

81. Choose the element with the larger atoms from each pair.

(a) Al or In

(b) Si or N

(c) P or Pb

(d) C or F

83. Arrange these elements in order of increasing atomic size: Ca, Rb, S, Si, Ge, F.

85. Choose the more metallic element from each pair.

(a) Sr or Sb

(b) As or Bi

(c) Cl or O

(d) S or As

89. What is the maximum number of electrons that can occupy the $n = 3$ quantum shell?

93. Write the electron configuration for each ion. What do all of the electron configurations have in common?

(a) Ca^{2+}

(b) K^+

(c) S^{2-}

(d) Br^-

97. Identify what is wrong with each electron configuration and write the correct ground state (or lowest energy) configuration based on the number of electrons.

(a) $1s^3 2s^3 2p^9$

(b) $1s^2 2s^2 2p^6 2d^4$

(c) $1s^2 1p^5$

(d) $1s^2 2s^2 2p^8 3s^2 3p^1$

103. When an electron makes a transition from the $n = 3$ to the $n = 2$ hydrogen atom Bohr orbit, the energy difference between these two orbits (3.0×10^{-19} J) is emitted as a photon of light. The relationship between the energy of a photon and its wavelength is given by $E = hc/\lambda$, where E is the energy of the photon in J, h is Planck's constant (6.626×10^{-34} J·s), and c is the speed of light (3.00×10^8 m/s). Find the wavelength of light emitted by hydrogen atoms when an electron makes this transition.