Chapter 5

1. $c = \lambda\nu$

3.00×10^8 m/s $= (4.90 \times 10^{-7}$ m$)\nu$

$$\nu = \frac{3.00 \times 10^8 \text{ m/s}}{4.90 \times 10^{-7} \text{ m}} = 6.12 \times 10^{14} \text{ s}^{-1}$$

2. $c = \lambda\nu$

3.00×10^8 m/s $= (1.15 \times 10^{-10}$ m$)\nu$

$$\nu = \frac{3.00 \times 10^8 \text{ m/s}}{1.15 \times 10^{-10} \text{ m}} = 2.61 \times 10^{18} \text{ s}^{-1}$$

3. The speed of all electromagnetic waves is 3.00×10^8 m/s.

4. $c = \lambda\nu$

94.7 MHz $= 9.47 \times 10^7$ Hz

3.00×10^8 m/s $= \lambda(9.47 \times 10^7$ Hz$)$

$$\lambda = \frac{3.00 \times 10^8 \text{ m/s}}{9.47 \times 10^7 \text{ s}^{-1}} = 3.17 \text{ m}$$

5. a. $E_{photon} = h\nu =$
$(6.626 \times 10^{-34}$ J·s$)(6.32 \times 10^{20}$ s$^{-1})$
$E_{photon} = 4.19 \times 10^{-13}$ J

b. $E_{photon} = h\nu =$
$(6.626 \times 10^{-34}$ J·s$)(9.50 \times 10^{13}$ s$^{-1})$
$E_{photon} = 6.29 \times 10^{-20}$ J

c. $E_{photon} = h\nu =$
$(6.626 \times 10^{-34}$ J·s$)(1.05 \times 10^{16}$ s$^{-1})$
$E_{photon} = 6.96 \times 10^{-18}$ J

6. a. gamma ray or X ray
b. infrared
c. ultraviolet

18. a. bromine (35 electrons): $[Ar]4s^23d^{10}4p^5$
b. strontium (38 electrons): $[Kr]5s^2$
c. antimony (51 electrons): $[Kr]5s^24d^{10}5p^3$
d. rhenium (75 electrons): $[Xe]6s^24f^{14}5d^5$
e. terbium (65 electrons): $[Xe]6s^24f^9$
f. titanium (22 electrons): $[Ar]4s^23d^2$

19. Sulfur (16 electrons) has the electron configuration $[Ne]3s^23p^4$. Therefore, 6 electrons are in orbitals related to the third energy level of the sulfur atom.

20. Chlorine (17 electrons) has the electron configuration $[Ne]3s^23p^5$, or $1s^22s^22p^63s^23p^5$. Therefore, 11 electrons occupy p orbitals in a chlorine atom.

21. indium (In)

22. barium (Ba)

23. a. ·Mg·
b. :S:
c. :Br:
d. Rb·
e. ·Tl·
f. :Xe:

Chapter 6

7.

Electron configuration	Group	Period	Block
a. $[Ne]3s^2$	2A	3	s-block
b. $[He]2s^2$	2A	2	s-block
c. $[Kr]5s^24d^{10}5p^5$	7A	5	p-block

8. a. $[Ar]4s^2$
b. [Xe]
c. $[Ar]\ 4s^23d^{10}$
d. $[He]2s^22p^4$

9. a. Sc, Y, La, Ac
b. N, P, As, Sb, Bi
c. Ne, Ar, Kr, Xe, Rn

16. Largest: Na
Smallest: S

17. Largest: Xe
Smallest: He

18. No. If all you know is that the atomic number of one element is 20 greater than that of the other, then you will be unable to determine the specific groups and periods that the elements are in. Without this information, you cannot apply the periodic trends in atomic size to determine which element has the larger radius.

Chapter 7

No Practice Problems