21. Identify the block, period, group, group name (where appropriate), element name, element type, and relative reactivity for the elements with the following electron configurations. (Hint: See Sample Problem D.)
a. $[Ne]3s^2 3p^1$
b. $[Ar]3d^{10} 4s^2 4p^6$
c. $[Kr]4d^{10} 5s^1$
d. $[Xe]4f^1 5d^1 6s^2$

Electron Configuration and Periodic Properties

SECTION 3 REVIEW

22. a. What is meant by atomic radius?
b. What trend is observed among the atomic radii of main-group elements across a period?
c. Explain this trend.

23. a. What trend is observed among the atomic radii of main-group elements down a group?
b. Explain this trend.

24. Define each of the following terms:
a. ion
b. ionization
c. first ionization energy
d. second ionization energy

25. a. How do the first ionization energies of main-group elements vary across a period and down a group?
b. Explain the basis for each trend.

26. a. What is electron affinity?
b. What signs are associated with electron affinity values, and what is the significance of each sign?

27. a. Distinguish between a cation and an anion.
b. How does the size of each compare with the size of the neutral atom from which it is formed?

28. a. What are valence electrons?
b. Where are such electrons located?

29. For each of the following groups, indicate whether electrons are more likely to be lost or gained in compound formation and give the number of such electrons typically involved.
a. Group 1
b. Group 2
c. Group 13
d. Group 16
e. Group 17
f. Group 18

30. a. What is electronegativity?
b. Why is fluorine special in terms of electronegativity?

31. Identify the most- and least-electronegative groups of elements in the periodic table.

PRACTICE PROBLEMS

32. Of cesium, Cs, hafnium, Hf, and gold, Au, which element has the smallest atomic radius? Explain your answer in terms of trends in the periodic table. (Hint: see Sample Problem E.)

33. a. Distinguish between the first, second, and third ionization energies of an atom.
b. How do the values of successive ionization energies compare?
c. Why does this occur?

34. Without looking at the electron affinity table, arrange the following elements in order of *decreasing* electron affinities: C, O, Li, Na, Rb, and F.

35. a. Without looking at the ionization energy table, arrange the following elements in order of decreasing first ionization energies: Li, O, C, K, Ne, and F.
b. Which of the elements listed in (a) would you expect to have the highest second ionization energy? Why?

36. a. Which of the following cations is least likely to form: Sr^{2+}, Al^{3+}, K^{2+}?
b. Which of the following anions is least likely to form: I^-, Cl^-, O^{2-}?

37. Which element is the most electronegative among C, N, O, Br, and S? Which group does it belong to? (Hint: See Sample Problem G.)

38. The two ions K^+ and Ca^{2+} each have 18 electrons surrounding the nucleus. Which would you expect to have the smaller radius? Why?