Lesson Check Answers

1. Chemists used the properties of elements to sort them into groups.
2. atomic mass
3. in order of increasing atomic number
4. metals, metalloids, nonmetals
5. **a.** metal **b.** metalloid **c.** nonmetal **d.** metal
6. b
7. lithium, potassium, rubidium, cesium, or francium
8. **BIG**IDEA It is a good way to organize elements because atomic number is unique for each element, while other properties, such as atomic mass, can vary for atoms of an element.

Sample Problems

FIGURE 6.13 five

9. **a.** $1s^2 2s^2 2p^2$
   b. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 5s^2$
   c. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3 4s^2$

The BEST electron configuration (according to the Aufbau principle):

9b $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 \mathbf{5s^2}$

9c $1s^2 2s^2 2p^6 3s^2 3p^6 \mathbf{4s^2} 3d^3$

The answers for the sample problems in the textbook do not follow the Aufbau principle, but show the VALENCE (outermost "s" and "p" sublevels). In the case of 9b, 5 is the highest energy level and it has an "s" orbital. Therefore, 5s is the valence and is listed last.

For 9c, 4 is the highest energy level and it has an "s" orbital. Therefore, 4s is the valence and is listed last.

However, according to Aufbau principle, the 4s sublevel is actually lower energy than 3d and should come BEFORE it.

The textbook chose to simply show the energy levels (1-5 for 9b and 1-4 for 9c) with their respective sublevels (s, p) in order RATHER than according to the amount of energy in each sublevel.

10. **a.** B, Al, Ga, In, Tl
b. F, Cl, Br, I, At
c. Ti, Zr, Hf, Rf

Lesson Check Answers

11. symbols and names of the elements, atomic number and atomic mass, information about electron configuration

12. representative elements, noble gases, transition metals, and inner transition metals

13. They are in the same group and have the same number of electrons in the highest occupied energy level.

14. **a.** alkaline earth metal
b. halogen
c. alkali metal
d. alkaline earth metal

15. **a.** noble gas
b. transition metal
c. representative element

16. 5

17. Cu, Cd, Au, Co

Lesson Check Answers

18. Atomic size generally increases within a group and decreases from left to right across a period.

19. Ions form when electrons are transferred between atoms.

20. First ionization energy generally decreases within a group and increases from left to right across a period.

21. Anions are larger and cations are smaller than the atoms from which they form.

22. Electronegativity values generally decrease from top to bottom within a group and increase from left to right across a period.

23. The trends can be explained by variations in atomic structure.

24. sodium, aluminum, sulfur, chlorine; periodic trend

25. **a.** sodium **b.** phosphorus