

38. Identify each of the following atoms on the basis of its electron configuration:

- $1s^2 2s^2 2p^1$
- $1s^2 2s^2 2p^5$
- $[\text{Ne}] 3s^2$
- $[\text{Ne}] 3s^2 3p^2$
- $[\text{Ne}] 3s^2 3p^5$
- $[\text{Ar}] 4s^1$
- $[\text{Ar}] 3d^6 4s^2$

PRACTICE PROBLEMS

39. List the order in which orbitals generally fill, from the 1s to the 7p orbital.
40. Write the noble-gas notation for the electron configurations of each of the following elements:
- As
 - Pb
 - Lr
 - Hg
 - Sn
 - Xe
 - La
41. How do the electron configurations of chromium and copper contradict the Aufbau principle?

MIXED REVIEW

42. a. Which has a longer wavelength: green light or yellow light?
b. Which has a higher frequency: an X ray or a microwave?
c. Which travels at a greater speed: ultraviolet light or infrared light?
43. Write both the complete electron-configuration and noble-gas notation for each of the following:
a. Ar b. Br c. Al
44. Given the speed of light as 3.00×10^8 m/s, calculate the wavelength of the electromagnetic radiation whose frequency is 7.500×10^{12} Hz.
45. a. What is the electromagnetic spectrum?
b. What units can be used to express wavelength?
c. What unit is used to express frequencies of electromagnetic waves?
46. Given that the electron configuration for phosphorus is $1s^2 2s^2 2p^6 3s^2 3p^3$, answer the following questions:
a. How many electrons are in each atom?
b. What is the atomic number of this element?
- c. Write the orbital notation for this element.
d. How many unpaired electrons does an atom of phosphorus have?
e. What is its highest occupied energy level?
f. How many inner-shell electrons does the atom contain?
g. In which orbital(s) are these inner-shell electrons located?
47. What is the frequency of a radio wave whose energy is 1.55×10^{-24} J per photon?
48. Write the noble-gas notation for the electron configurations of each of the following elements:
a. Hf d. At
b. Sc e. Ac
c. Fe f. Zn
49. Describe the major similarities and differences between Schrödinger's model of the atom and the model proposed by Bohr.
50. When sodium is heated, a yellow spectral line whose energy is 3.37×10^{-19} J per photon is produced.
a. What is the frequency of this light?
b. What is the wavelength of this light?
51. a. What is an orbital?
b. Describe an orbital in terms of an electron cloud.

CRITICAL THINKING

52. **Inferring Relationships** In the emission spectrum of hydrogen shown in **Figure 5**, each colored line is produced by the emission of photons with specific energies. Substances also produce absorption spectra when electromagnetic radiation passes through them. Certain wavelengths are absorbed. Using the diagram below, predict what the wavelengths of the absorption lines will be when white light (all of the colors of the visible spectrum) is passed through hydrogen gas.

