

B**ELECTRONS IN ATOMS****PRACTICE PROBLEMS**

4a

*In your notebook, solve the following problems.***SECTION 13.1 MODELS OF THE ATOM**

- How many sublevels are in the following principal energy levels?

| | | |
|------------|------------|------------|
| a. $n = 1$ | c. $n = 3$ | e. $n = 5$ |
| b. $n = 2$ | d. $n = 4$ | f. $n = 6$ |
- How many orbitals are in the following sublevels?

| | | |
|------------------|------------------|---------------------------------|
| a. $1s$ sublevel | d. $4f$ sublevel | g. fifth principal energy level |
| b. $5s$ sublevel | e. $7s$ sublevel | h. $6d$ sublevel |
| c. $4d$ sublevel | f. $3p$ sublevel | |
- What are the types of sublevels and number of orbitals in the following energy levels?

| | | |
|------------|------------|------------|
| a. $n = 1$ | c. $n = 3$ | e. $n = 5$ |
| b. $n = 2$ | d. $n = 4$ | |

SECTION 13.2 ELECTRON ARRANGEMENT IN ATOMS

- Write a complete electron configuration of each atom.

| | | |
|--------------|------------|------------|
| a. hydrogen | d. barium | g. krypton |
| b. vanadium | e. bromine | h. arsenic |
| c. magnesium | f. sulfur | i. radon |

SECTION 13.3 PHYSICS AND THE QUANTUM MECHANICAL MODEL

- What is the wavelength of the radiation whose frequency is $5.00 \times 10^{15} \text{ s}^{-1}$? In what region of the electromagnetic spectrum is this radiation?
- An inexpensive laser that is available to the public emits light that has a wavelength of 670 nm. What are the color and frequency of the radiation?
- What is the energy of a photon whose frequency is $2.22 \times 10^{14} \text{ s}^{-1}$?
- What is the frequency of a photon whose energy is $6.00 \times 10^{-15} \text{ J}$?
- Arrange the following types of electromagnetic radiation in order of increasing frequency.

| | | |
|----------------|------------------|----------------|
| a. infrared | c. visible light | e. microwaves |
| b. cosmic rays | d. radio waves | f. ultraviolet |
- Suppose that your favorite AM radio station broadcasts at a frequency of 1600 kHz. What is the wavelength in meters of the radiation from the station?

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VOCABULARY REVIEW

Select the term from the following list that best matches each description.

quantum

photons

hertz

Pauli exclusion principle

wavelength

Hund's rule.

atomic emission spectrum

photoelectrons

Aufbau principle

quantum mechanical model

1. The lowest-energy arrangement of electrons in a subshell is obtained by putting electrons into separate orbitals of the subshell before pairing electrons.

2. packets/quanta of electromagnetic energy

3. the SI unit of frequency

4. An atomic orbital can hold no more than two electrons.

5. the amount of energy required to move an electron from its present energy level to the next higher one

6. the modern description of the location and energy of electrons in an atom

7. This principle states that electrons enter orbitals of lowest energy first.

8. the distance between two adjacent crests of an electromagnetic wave

9. This is produced by passing the light emitted by an element through a prism.

10. These are sometimes produced when light shines on metals.
