

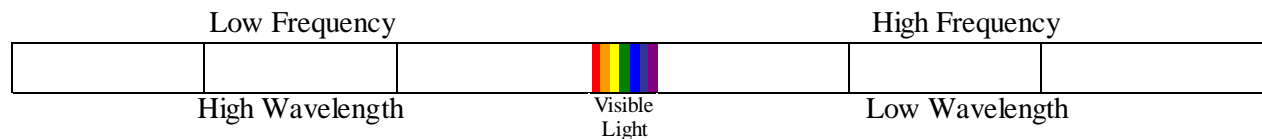
Chapter 05

Study Guide

- Light behaves as both a _____ and _____.
- Describe an electromagnetic wave _____.
- Describe the basic properties of electromagnetic radiation.

| Property | Definition | Determines |
|------------|------------|------------|
| Amplitude | | |
| Wavelength | | |
| Frequency | | |
| Wave speed | | |

- What is the formula that relates wavelength and frequency? _____
- What is Planck's formula? _____
- What type of relationship does Planck's formula express for frequency and energy? _____
- The concept that energy is made up of discrete pieces is called _____.
- Light is made up of packets of energy called _____.
- The model that treats electrons as waves of quantized energy is called the _____.
- Fill in the EM spectrum chart below



- Areas within the electron cloud where electrons are likely to be found are called _____.
- The distribution of electrons among orbitals is given by the atom's _____.
- When electrons are located in the lowest energy orbitals possible the atom is said to be _____.
- When electrons absorb energy, they are said to be _____.
- As electrons lose energy, they give off that energy in the form of _____.
- Define the following:
 Aufbau principle: _____
 Pauli Exclusion principle: _____
 Hund's rule: _____

- Fill in the following table regarding the types of sublevels in each energy level.

| Energy Level | Sublevels | Maximum Number of Electrons |
|--------------|-----------|-----------------------------|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |

- Fill in the following table regarding sublevels and orbitals.

| Sublevel | Shape | Number of Orbitals | Maximum Number of Electrons |
|----------|-------|--------------------|-----------------------------|
| <i>s</i> | | | |
| <i>p</i> | | | |
| <i>d</i> | | | |
| <i>f</i> | | | |

- What are the four symbols that represent the quantum numbers for an electron? _____
- The number of sublevels in an energy level = _____.
- The number of orbitals in a sublevel = _____.

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22. The number of electrons in an orbital = _____.
23. When can two electrons occupy the same orbital? _____
24. Fill in the box orbital diagrams.

O = _____ electrons

| 1s | 2s | 2p | 3s | 3p | 4s | 3d | 4p | 5s | 4d |
|----|----|----|----|----|----|----|----|----|----|
| | | | | | | | | | |

Mn = _____ electrons

| 1s | 2s | 2p | 3s | 3p | 4s | 3d | 4p | 5s | 4d |
|----|----|----|----|----|----|----|----|----|----|
| | | | | | | | | | |

Na⁺ = _____ electrons

| 1s | 2s | 2p | 3s | 3p | 4s | 3d | 4p | 5s | 4d |
|----|----|----|----|----|----|----|----|----|----|
| | | | | | | | | | |

25. Write electron configurations for each of the following:

- a. Sr _____
- b. Cl _____
- c. I _____
- d. Ba _____
- e. P³⁻ _____

26. How many electrons are found in the last sub-level of chlorine? _____
27. What is a valence electron? _____
28. What is the relationship between valence electrons and chemicals properties? _____

29. How many sub-levels are completely filled in:

- a. Sn _____
- b. V _____
- c. Ga _____
- d. Zn _____
- e. I _____

30. How many orbitals are partially filled in:

- a. As _____
- b. Fe _____
- c. Ag _____
- d. Zr _____
- e. Se²⁻ _____

31. Draw Lewis dot diagrams for the following:

- a. N _____
- b. O _____
- c. C _____
- d. Cl _____
- e. Ca _____
- f. As _____
- g. Al _____
- h. Ar _____