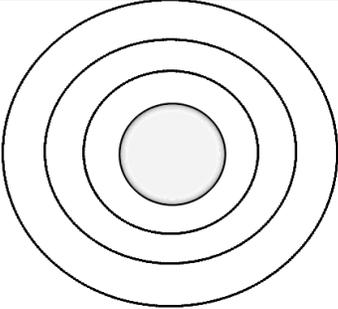


**Bohr Diagram and Electrons Review**

1. What is the maximum number of electrons you can fit in each energy level or shell?

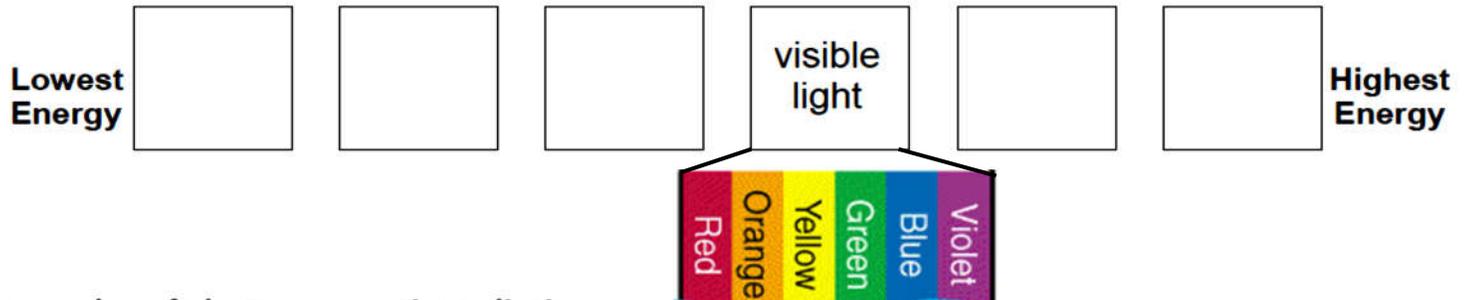
1<sup>st</sup> shell \_\_\_\_\_ 2<sup>nd</sup> shell \_\_\_\_\_ 3<sup>rd</sup> shell \_\_\_\_\_ 4<sup>th</sup> shell \_\_\_\_\_

**Complete the Table Below:**

Element	Subatomic Particles	Bohr Diagram	# Valence Electrons	Lewis Structure
Phosphorus-31	# protons= # neutrons= # electrons=			

**Electromagnetic Radiation**

- a form of \_\_\_\_\_ that has wavelike properties
- all forms found in the \_\_\_\_\_ spectrum
- The different forms of EMR arranged in order from lowest energy to highest energy

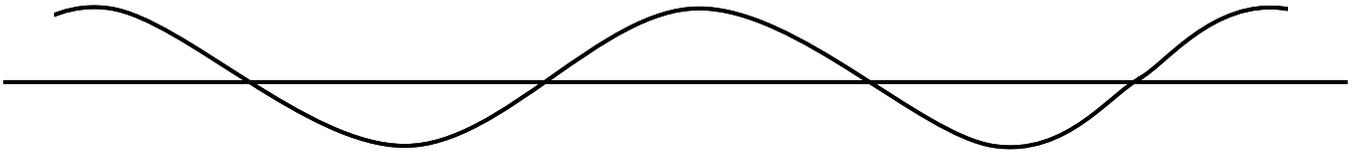


**Examples of Electromagnetic Radiation:**

Type of EMR	Real-life example
Radio waves	
Microwaves	
Infrared	
Visible light	
Ultraviolet (UV) light	
X-rays	

## Properties of Waves

i. Wavelength and frequency are two important properties of waves.



- ii. \_\_\_\_\_ - The shortest distance between two equivalent points (**meters**)
- iii. \_\_\_\_\_ - How many waves pass a certain point per second (1/s or s<sup>-1</sup> or **Hz**).
- iv. \_\_\_\_\_ - The height of a wave from crest to origin.
- v. What kind of relationship do frequency and wavelength have?
- vi. What kind of relationship do frequency and Energy have?
- vii. What kind of relationship do energy and wavelength have?

### **Energy, Wavelength, and Frequency: Qualitative Comparisons:**

1.



- Wave B has a \_\_\_\_\_ frequency than wave A.
  - Wave B has a \_\_\_\_\_ wavelength than wave A.
  - Wave B has a \_\_\_\_\_ energy than wave A.
2. When comparing the radio stations 96.7 MHz and 92.3 MHz
- a. Which one has a higher energy?
  - b. Which one has a longer wavelength?
3. Red light has a longer wavelength than blue light
- a. Which color light has a higher energy associated with it?
  - b. Which color light is emitted at a higher frequency?

## Electrons and Energy Levels

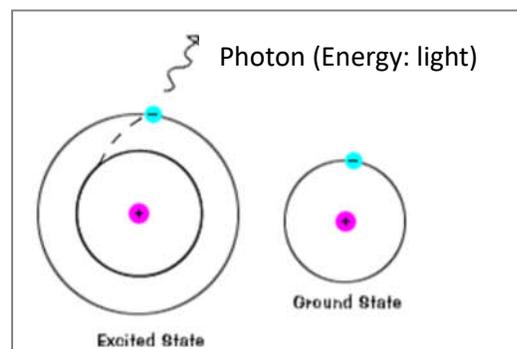
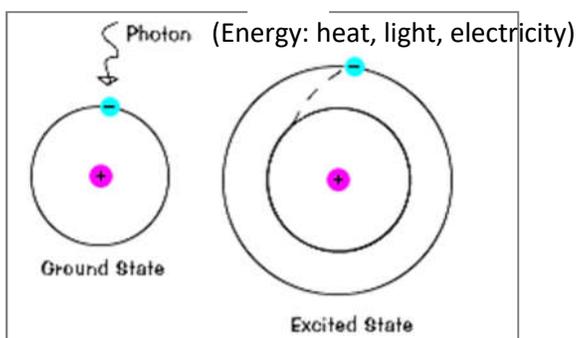
- Each electron has a distinct amount of \_\_\_\_\_ related to the energy level (shell) it is in
- Electrons with the **lowest energy** are found in the shell \_\_\_\_\_
- Electrons with the **highest energy** are found in the shell \_\_\_\_\_
- The \_\_\_\_\_ from the nucleus, the \_\_\_\_\_ of the electron

How many electrons can each energy level (electron shell) hold?

Electron Shell	# of electrons
n=1	
n=2	
n=3	
n=4	

## Ground State vs. Excited State

- **Ground state**=when the electrons occupy the \_\_\_\_\_
- **Excited state**=one or more electrons \_\_\_\_\_ (leaving the lower energy levels to be not completely full)
- When an electron \_\_\_\_\_, it jumps to a \_\_\_\_\_ energy level or shell
  - This is a very \_\_\_\_\_ condition
  - We call this condition the \_\_\_\_\_
- Very rapidly, an electron in the excited state will \_\_\_\_\_ and move back to a \_\_\_\_\_ energy level or shell
  - When excited electrons fall from an excited state to a lower energy level, they release energy in the form of \_\_\_\_\_ (which can be infrared, ultraviolet, or visible)



## Bright Line Emission Spectrum (Visible Light Spectrum)

- Electrons falling from an \_\_\_\_\_ down to the \_\_\_\_\_ give off \_\_\_\_\_ light
- Different elements produce different colors of light or \_\_\_\_\_
- The atomic emission spectrum is \_\_\_\_\_ for \_\_\_\_\_  
(just like a human fingerprint is unique to each person)
- We use spectral lines to identify different elements.

### Demo:

Substance	Color

1. Which statement describes how an atom in the ground state becomes excited?
  - a) The atom absorbs energy, and one or more electrons move to a higher electron shell
  - b) The atom absorbs energy, and one or more electrons move to a lower electron shell
  - c) The atom releases energy, and one or more electrons move to a higher electron shell
  - d) The atom releases energy, and one or more electrons move to a lower electron shell
2. The light emitted from a flame is produced when electrons in an excited state
  - a) Absorb energy as they move to lower energy states
  - b) Absorb energy as they move to higher energy states
  - c) Release energy as they move to lower energy states
  - d) Release energy as they move to higher energy states

**Waves & Energy HW:** Describe the relationships between *energy, frequency, and wavelength*

1. What is the relationship between energy and frequency?
2. What is the relationship between energy and wavelength?
3. What is the relationship between frequency and wavelength?

4. In the diagrams below, which wave has the higher frequency? Higher wavelength? Higher energy?



5. How many valence electrons are in an atom of Mg-24 in the ground state?

Correct Answer: \_\_\_\_\_

Explanation:

6. An atom of aluminum in the ground state and an atom of boron in the ground state have the same

a. Mass

c. Total number of protons

b. Total number of neutrons

d. Total number of valence electrons

Correct Answer: \_\_\_\_\_

Explanation:

7. Which Bohr electron configuration represents the electrons of an atom in an excited state?

a. 2-4

c. 2-7-2

b. 2-6

d. 2-8-2

Correct Answer: \_\_\_\_\_

Explanation:

8. An atom in the excited state has a Bohr electron configuration of 2-7-4. Write the electron configuration of this atom in the ground state.

Correct Answer: \_\_\_\_\_

Explanation:

9. The light produced by signs using neon gas results from electrons that are

- a. Moving from a higher to a lower principal energy level
- b. Moving from a lower to a higher principal energy level
- c. Being lost by the Ne atoms
- d. Being gained by the Ne atoms

Correct Answer: \_\_\_\_\_

Explanation:

10. Compared to a sodium atom in the ground state, a sodium atom in the excited state must have

- a. A greater number of electrons
- b. A smaller number of electrons
- c. An electron with greater energy
- d. An electron with less energy

Correct Answer: \_\_\_\_\_

Explanation: