

Periodic Table Concepts**Directions:** Answer the following questions.

- In what family are the most active metals located? _____
- In what family are the most active non-metals located? _____
- What family on the periodic table is the least reactive? _____
- Is the periodic table organized by atomic mass or atomic number? _____
- Group 17 or 7A elements are called what family? _____
- Classify the elements as metals, non-metals or metalloids
 - Argon _____
 - Silicon _____
 - Aluminum _____
 - Sulfur _____
 - Calcium _____
 - Boron _____
- Group 1 elements have what family name? _____
- As you go across the periodic table from left to right elements become more metallic or non-metallic? _____
- Identify the charges (oxidation numbers) for each of the elements below when they are in their ion form.

Element	Charge (Oxidation Number)
Magnesium	
Nitrogen	
Neon	
Aluminum	
Sulfur	

10. Match the terms with the definitions provided.

_____ Group
 _____ Period
 _____ Valence Electron

_____ Non metal
 _____ Noble Gas

_____ Atomic Number
 _____ Alkali Metal
 _____ semiconductor

- Horizontal row
- Metalloid
- Located on right side of periodic table
- Unreactive family
- Located in the outermost energy level
- Vertical row
- Group 1 element
- Basis for arrangement of periodic table

Periodic Trends

1. Place the following elements in order of **increasing** atomic radius: Carbon, Aluminum, Oxygen and Potassium.
2. Place the following elements in order of **increasing** electronegativity: sulfur, oxygen, aluminum
3. Why do elements in the same family generally have similar properties?
4. Indicate whether the following properties increase or decrease from left to right across the periodic table.
 - a) atomic radius
 - b) ionization energy
 - c) electronegativity
5. Circle the atom in each pair that has the largest atomic radius.
 - a) Al or B
 - b) Na or Al
 - c) S or O
 - d) Br or Cl
6. Circle the element in each pair that has the greater ionization energy.
 - a) Li or Be
 - b) Ca or Ba
 - c) Cl or Si
 - d) Li or K
7. Define electronegativity.
8. Circle the atom in each pair that has the greater electronegativity.
 - a) Ca or Ga
 - b) Br or As
 - c) Ba or Sr
 - d) O or S
9. Which is larger, Ca^{2+} or Ca and why?
10. Which is larger, F^{-1} or F and why?

Valence Electrons and Valence Dot Diagrams

Directions: Identify the number of valence electrons each of the following elements have. Also draw the valence dot (Lewis dot) structure for each

Valence Electrons

Dot Diagram

1) Fluorine:

2) Oxygen

3) Aluminum

4) Argon

5) Potassium

6) Copper

7) Helium

8) Magnesium

Quantum Theory Concepts

Directions: Fill in the blanks with the words provided in the box below. Each term will only be used once.

Atomic Emission Spectrum	Energy Level	Ground State	Energy
Lower	Amplitude	Wave	Electron
Hertz	Light	Speed	Wavelength

- The lowest allowable energy state of an atom is called its _____.
- The amount of energy required to remove an electron from the excited state is _____ than a ground state electron.
- Bohr's model failed to explain the _____ of elements other than hydrogen.
- Bohr stated that when energy is added to the hydrogen atom its _____ moves to a higher energy level.
- Electromagnetic radiation is a type of _____ that behaves like a _____ as it travels through space.
- The unit of measurement for frequency is _____, which is equivalent to one wave per second.
- The height of a wave is called the _____. All waves travel at the same _____ in a vacuum. The value is 3.0×10^8 m/s.
- Each electron can be found in a different _____ around the nucleus.
- _____ energy is made of electrons.
- The distance between two crests or two troughs are referred to as a wave's _____.

Directions: Use the Bohr Diagram (pg 8 of reference table) to help you with the following questions.

- What wavelength of energy is emitted when electron drops from $n=6$ to $n=3$ in the hydrogen atom? _____
- What color light is emitted when an electron drops from $n=3$ to $n=2$? _____
- What form of radiation is absorbed when an electron moves from $n=1$ to $n=4$? _____

Electron Configuration

Part I Directions: Write the full electron configuration for the following elements.

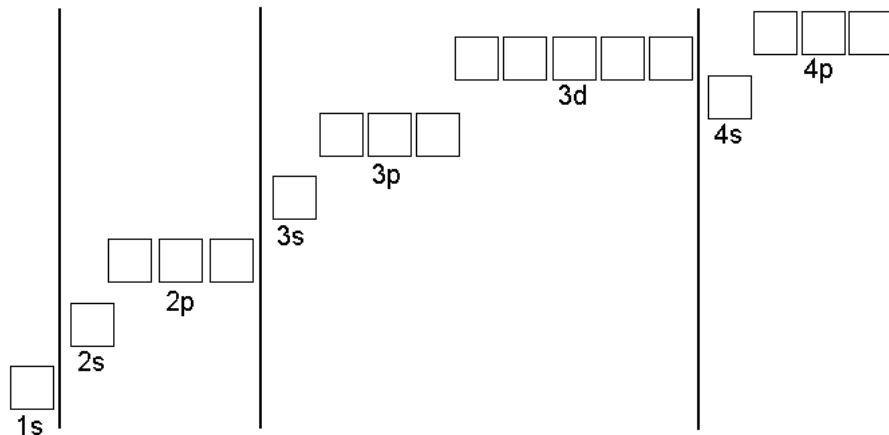
1. Chlorine
2. Nitrogen
3. Aluminum
4. Cobalt
5. Potassium

Part II Directions: Write the noble gas configuration for the following elements.

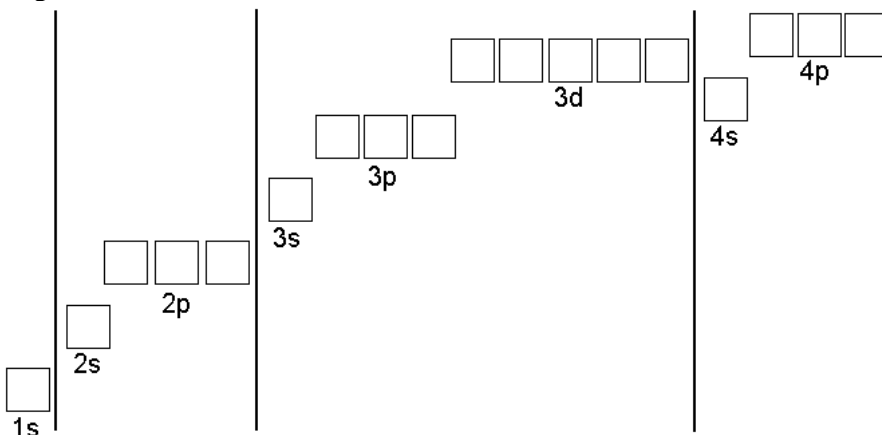
1. Arsenic
2. Calcium
3. Phosphorus
4. Silver

Orbital Diagrams and Electron Configuration

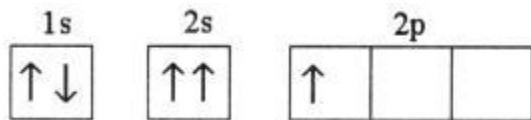
- 1) Fill the boxes below with the arrow notation for electrons showing the correct ground state electron configuration for the element Na.



- 2) Fill the boxes below with the arrow notation for electrons showing the correct ground state electron configuration for the element Ni.



- 3) Identify what is incorrect about the following orbital diagram.



- 4) Element X has the configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^{10}$.

- What group does this element belong to? _____
- What period does this element belong to? _____
- What is the name of this element? _____
- Is it a metal, nonmetal or metalloid? _____