



PERIODIC TABLE ACTIVITY

Day 1: Understanding what the periodic table can tell you.

Using the blank periodic table, do the following.

1. Locate and label metals, nonmetals, and metalloids. Color and make a key at the bottom left.
2. At the bottom of the table, list the properties of metals, nonmetals, and metalloids.
3. Locate the noble gases. Color and add to the key at the bottom left.
4. At the bottom, list the properties of noble gases.
5. Locate and label the transition elements.
6. Locate and label the inner transition elements.
7. Locate and label the most active metal.
8. Locate and label the most active nonmetal.
9. Locate and label the *s*, *p*, *d*, and *f* blocks of electrons
10. Above each column of representative elements, IA-VIIIA, label the outer valence electron.
11. On the first element of each column of representative elements write the correct electron dot diagram or Lewis structure using the letter X to represent any element in the group.
12. On the second element of each column of representative elements, write the charge of the ion formed.

Day 2: Trends from the periodic table

Using your labeled periodic table, make the following predictions.

Remember that metals tend to lose electrons when they bond with other atoms and nonmetals tend to gain electrons when they bond with other atoms. To predict the ion charge, metals lose electrons until their valence electrons are that of the preceding noble gas. Nonmetals gain electrons until their valence electrons are that of next noble gas. Noble gases have eight valence electrons. Consider Beryllium. Beryllium is located in the IIA group and has two valence electrons with a core of the noble gas Helium. When bonding, beryllium will lose the two outer electrons forming a +2 ion that now has the valence electrons of the noble gas Helium. Next, consider Chlorine. Chlorine is a member of the group VII A. This atom has 7 valence electrons and is a nonmetal. Chlorine needs to gain one more electron to have the valence electrons of the noble gas Argon. When bonding, chlorine will form a -1 ion by gaining one electron and its valence electrons are the same as the element Argon.

- Using the following key
 - Lose electrons
 - Gain electrons
 - Neither gain or lose electrons

What do you expect the following atoms to do when bonding with other atoms?

- | | |
|-------------------|------------------|
| 1. Calcium _____ | 6. Zinc _____ |
| 2. Fluorine _____ | 7. Lithium _____ |
| 3. Neon _____ | 8. Sulfur _____ |
| 4. Argon _____ | 9. Helium _____ |
| 5. Oxygen _____ | 10. Sodium _____ |

2. Predict the ions formed by the following elements.

- | | |
|-------------------------|----------------------|
| 1. Aluminum, Al _____. | 3. Nitrogen, N _____ |
| 2. Phosphorus, P _____. | 4. Lead, Pb _____ |

3. Predict the number of valence electrons the following atoms.

- | | |
|-----------------------|------------------------|
| 1. Tin, Sn _____ | 3. Silicon, Si _____ |
| 2. Bismuth, Bi _____. | 4. Strontium, Sr _____ |

4. Predict the electron configuration of aluminum, Al.

5. Predict the electron configuration of bromine, Br.

6. A new element, atomic number 114, was discovered. Predict if this element is a metal, nonmetal, or metalloid. Knowing this, predict some of the properties this element may have.

7. Predict the number of valence electrons for the new element 114.

8. Predict the ion formed by the new element 114.

9. A new element, atomic number 118, was discovered. Predict some properties of this element.

Day 3: IONIC BONDS

Using the periodic table you label on Day 1, predict the following chemical formulas. Use M for metallic ions and N for nonmetallic ions.

Ionic Bonds take place between metallic ions and nonmetallic ions. Metals lose electrons and form positive ions while nonmetals gain electrons forming negative ions. Oppositely charged particles attract forming an ionic bond.

1. Predict the formula for a compound formed from a group IA metal and a group VII A nonmetal.
2. Predict the formula for a compound formed from a group IIA metal and a group VII A nonmetal.
3. Predict the formula for a compound formed from a group IIIA metal and a group VII A nonmetal.
4. Predict the formula for a compound formed from a group IIIA metal and a group VIA nonmetal.
5. Predict the formula for a compound formed from a group IVA metal and a group VIIA nonmetal.
6. Predict the formula for a compound formed from a group IIA metal and a group VA nonmetal.
7. Predict the formula for a compound formed from a group IIIA metal and a group VA nonmetal.
8. Predict the formula for a compound formed from a group IA metal and a group VA nonmetal.
9. Predict the formula for a compound formed from a group IA metal and a group IV a nonmetal.
10. Predict the formula for a compound formed from a group IIA metal and a group VIA nonmetal.

Day 4: Covalent Bonding

Nonmetallic atoms gain electrons to become more stable. Remember that atoms with 8 valence electrons are particularly stable. If two nonmetals bond together they both need to gain electrons. These atoms share electrons forming covalent bonds. To predict the formula, consider the nonmetallic atom further left on the periodic table as a positive ion and the atom that falls on the right as the negative ion. The ion charge helps identify the number of electrons involved in bonding. For example consider a compound formed between Carbon and Oxygen. Carbon is further left therefore it would be considered a +4 ion. Oxygen is further right and would be considered a -2 ion. The formula for the compound formed between these two atoms would be CO_2 . Remember that compounds are reduced to the simplest whole numbers. Covalently bonded atoms form molecules. Hydrogen can bond by sharing electrons and acts as a +1 ion.

Predict the formula for the molecule formed when the following atoms bond.

1. Carbon and fluorine _____
2. Silicon and oxygen _____
3. Phosphorus and oxygen _____
4. Hydrogen and sulfur _____
5. Hydrogen and nitrogen _____
6. Sulfur and chlorine _____
7. Arsenic and fluorine _____
8. Carbon and hydrogen _____
9. Hydrogen and fluorine _____
10. Carbon and chlorine _____