

# Honors Chemistry

## Covalent Bonding Study Guide 1

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Name: Key Date: \_\_\_\_\_  
Period: \_\_\_\_\_

Instructions: Answer the following. Remember, you may have to use your textbook as a resource to answer some of these questions.

1. Differentiate between the following types of bonds (see page 180-181 and the index):

Ionic: Chemical bond where one or more electrons are transferred between atoms.

Nonpolar Covalent: Chemical bond where one or more electron pairs are shared equally between atoms.

Polar Covalent: Chemical bond where one or more electron pairs are shared unequally between atoms.

2. In chapter 6, we discussed the trend in electronegativity on the periodic table. What is electronegativity and what does it help determine?

Electronegativity is the relative tendency for electrons to be drawn towards an atom in a chemical bond. It determines how "polar" a bond is.

3. Determine the difference in electronegativity ( $\Delta EN$ , see page 154 in textbook for chart) between each of the following pairs of elements:

a. Cl and Cl  $\overset{3.2}{\text{Cl}}$  and  $\overset{3.2}{\text{Cl}}$  0  
*neither*

b. H and F  $\overset{2.2}{\text{H}}$  and  $\overset{4.0}{\text{F}}$  1.8

c. O and N  $\overset{3.5}{\text{O}}$  and  $\overset{3.0}{\text{N}}$  0.5

d. K and F  $\overset{0.8}{\text{K}}$  and  $\overset{4.0}{\text{F}}$  3.2

4. For each of the pairs in question 3, circle the element symbol that has the larger draw on electrons in a bond between those elements

5. Rank the pairs of elements in question 3 in order of increasingly polar bonds that would form between them (e.g.  $d < a < b < c$ )

a < c < b < d

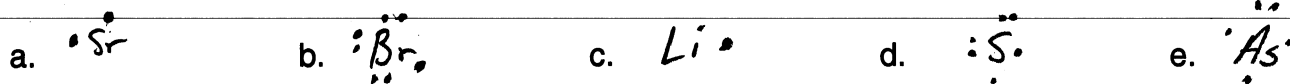
6. Determine the number of valence electrons in each of the following atoms:

a. Sr 2      b. Br 7      c. Li 1      d. S 6      e. As 5

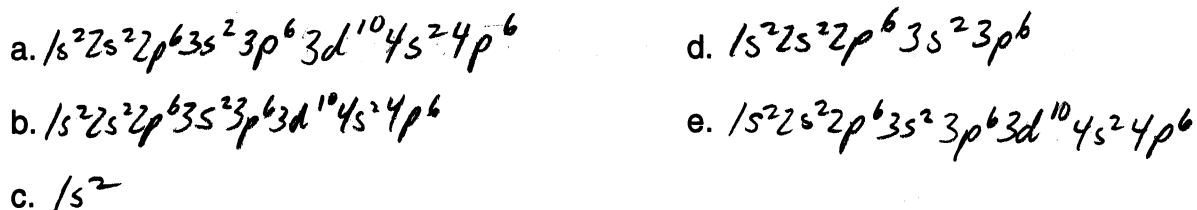
7. Explain what a Lewis dot diagram illustrates:

Shows the number of valence electrons in a given atom.

8. Draw Lewis dot structures (diagrams) for each of the atoms in question 6 (see textbook section 7.1):



9. Give the complete spectroscopic notation for the *nearest* noble gas electron configuration (stable octet) attainable by each of the atoms in question 6.



10. For each of your answers in question 9, how many "dots" would exist in the Lewis dot diagram? Explain.

a, b, d and e would show eight dots (actually a & c would "show" none but would have eight)  
c would show 2

For questions 11-13, use Table 7.1 on page 165 as a reference

11. When the molecule  $\text{O}_2$  forms, how many electrons must each oxygen share in order for each to "see" an octet? (Hint: Remember, electrons shared between atoms are used, or seen, by both atoms in the bond) 2. How many total electrons are in the bond between the atoms? 4 How many pairs of electrons are in the bond? 2

12. When the molecule  $\text{Br}_2$  forms, how many electrons must each bromine share in order for each to "see" an octet? 1. How many total electrons are in the bond between the atoms? 2 How many pairs of electrons are in the bond? 1

13. If carbon wants to achieve a stable octet by bonding with hydrogen, how many hydrogen atoms must carbon bond to? 4 How many electrons is each hydrogen capable of sharing? 1 What is the most likely molecular formula for the molecule  $\text{CH}_x$  (where x is the number of hydrogens in the molecule)?  $\text{CH}_4$

14. Differentiate between a "shared pair" and an "unshared (lone) pair" of electrons:

Shared Pair: electron pairs shared between atoms (bonding electrons)

Unshared (lone) Pair: lone pairs of electrons on atoms that are not bonding

15. What is the maximum number of electron "pairs" that can be shared between any two atoms (see page 165)? 3