

Chemistry Review Set: Covalent Bonds

1. What type of bonding is made between
 - a. metals and nonmetals?
 - b. nonmetals and nonmetals?
 - c. semimetals and nonmetals?
2. What type of bonding creates
 - a. only solids – all are solid at room temperature
 - b. gases, liquids, and low melting solids
3. What is polarity?
4. How are covalent bonds made?
5. What causes nonmetals to take electrons from metals
6. What causes nonmetals to form covalent bonds with nonmetals?
7. What is the “normal” number of covalent bonds made by:
 - a. group 4?
 - b. group 5?
 - c. group 6?
 - d. group 7?
8. What type of bond is:
 - a. made by one atom taking an electron from another atom?
 - b. made by two $\frac{1}{2}$ filled orbitals overlapping?
 - c. made by two sets of $\frac{1}{2}$ filled orbitals overlapping?
 - d. made by three sets of $\frac{1}{2}$ filled orbitals overlapping?
9. What is the theory used to explain the geometry of molecules?
10. Which is more repulsive, lone pair or paired electrons?
11. What are valence electrons doing to form geometric shapes?
12. What is a valence electron?
13. What types of subshells are used for valence electrons?
14. What is the shape of a molecule:
 - a. that has 4 directions of electrons and 4 atoms connected to the center atom (4/4)?
 - b. that has 3 directions of electrons and 3 atoms connected to the center atom (3/3)?
 - c. that has 2 directions of electrons and 2 atoms connected to the center atom (2/2)?
 - d. that has 4 directions of electrons and 3 atoms connected to the center atom (4/3)?
 - e. that has 3 directions of electrons and 2 atoms connected to the center atom (3/2)
 - f. that has 2 directions of electrons and 1 atom connected to the center atom (2/1)
 - g. that has 4 directions of electrons and 2 atoms connected to the center atom (4/2)
 - h. that has 3 directions of electrons and 1 atom connected to the center atom (3/1)
 - i. that has 4 directions of electrons and 1 atom connected to the center atom (4/1)
15. What “types” of electrons count as a direction of electrons?
16. Draw for the following molecules, the Lewis Structure, determine the 3d shape, and polarity:
 - a. CH_4
 - b. SO_2
 - c. SO_3
 - d. NH_3
 - e. N_2
 - f. CH_3OH
 - g. H_2O_2 (HOOH)
 - h. H_2S
 - i. HCN
 - j. CO_3^{-2}
 - k. CF_2Cl_2

Chemistry Review Set: Covalent Bonds

- What type of bonding is made between
 - metals and nonmetals? **ionic**
 - nonmetals and nonmetals? **covalent**
 - semimetals and nonmetals? **covalent**
- What type of bonding creates
 - only solids – all are solid at room temperature **ionic**
 - gases, liquids, and low melting solids **covalent**
- What is polarity? **a neutral body with + and - ends**
- How are covalent bonds made? **overlap of $\frac{1}{2}$ filled orbitals**
- What causes nonmetals to take electrons from metals? **big difference in electronegativity**
- What causes nonmetals to form covalent bonds with nonmetals? **small differences in electronegativity**
- What is the “normal” number of covalent bonds made by:
 - group 4? **4**
 - group 5? **3**
 - group 6? **2**
 - group 7? **1**
- What type of bond is:
 - made by one atom taking an electron from another atom? **ionic**
 - made by two $\frac{1}{2}$ filled orbitals overlapping? **single bond**
 - made by two sets of $\frac{1}{2}$ filled orbitals overlapping? **double bond**
 - made by three sets of $\frac{1}{2}$ filled orbitals overlapping? **triple bond**
- What is the theory used to explain the geometry of molecules? **valence shell electron repulsion VSEPR**
- Which is more repulsive, lone pair or paired electrons? **lone pair**
- What are valence electrons doing to form geometric shapes? **repelling, trying to get as far apart as pos.**
- What is a valence electron? **outermost electron**
- What types of subshells are used for valence electrons? **s and p orbitals**
- What is the shape of a molecule:
 - that has 4 directions of electrons and 4 atoms connected to the center atom (4/4)? **tetrahedral**
 - that has 3 directions of electrons and 3 atoms connected to the center atom (3/3)? **trigonal planar**
 - that has 2 directions of electrons and 2 atoms connected to the center atom (2/2)? **linear**
 - that has 4 directions of electrons and 3 atoms connected to the center atom (4/3)? **pyramidal**
 - that has 3 directions of electrons and 2 atoms connected to the center atom (3/2) **bent**
 - that has 2 directions of electrons and 1 atom connected to the center atom (2/1) **linear**
 - that has 4 directions of electrons and 2 atoms connected to the center atom (4/2) **bent**
 - that has 3 directions of electrons and 1 atom connected to the center atom (3/1) **linear**
 - that has 4 directions of electrons and 1 atom connected to the center atom (4/1) **linear**
- What “types” of electrons count as a direction of electrons? **lone pair, single bond, double bond, triple b.**
- Draw for the following molecules, the Lewis Structure, determine the 3d shape, and polarity:
 - CH₄ **4 single bonds, (tetrahedral) nonpolar**
 - SO₂ **1 single bond, 1 double bond, 1 lone pair electrons (bent) polar**
 - SO₃ **2 single bonds, 1 double bond (trigonal planar) nonpolar**
 - NH₃ **3 single bonds, 1 lone pair (pyramidal) polar**
 - N₂ **1 triple bond, linear nonpolar**
 - CH₃OH **4 single bonds (tetrahedral) attached to 2 single bonds, 2 lone pairs (bent) polar**
 - H₂O₂ (HOOH) **2 lone pairs, 2 single bonds – in a row --- (double bent) polar**
 - H₂S **2 single bonds, 2 lone pairs (bent) polar**
 - HCN **1 single bond, 1 triple bond (linear) polar**
 - CO₃⁻² **2 single bonds, 1 double bond (trigonal planar) negatively charged**
 - CF₂Cl₂ **4 single bonds (tetrahedral) polar**