

Unit 6 HW Packet

Ionic Bonding and Covalent Bonding: Compare & Contrast

	Ionic Bonding	Covalent Bonding	Similar or Different
What type of compound is formed as a result of this type of bond?			
Definition			
These bonds are formed from what type of atoms?			
What happens to electrons?			
How are these bonds held together?			
What is the strength of the bond?			
Intermolecular attraction?			
Hardness?			
Melting point?			
Boiling point?			

Worksheet: Electron Dot Diagrams and
Lewis Structures

Name _____

I. Draw Electron Dot Diagrams for the following elements.

lithium

oxygen

neon

magnesium

iodine

boron

sulfur

carbon

phosphorus

II. Draw Lewis Structures for the following molecules.

PCl_3

CH_4

CH_3Br

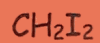
F_2O

IBr

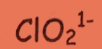
NH_2Cl



I. Draw Lewis Structures for the following molecules.



II. Draw Lewis Structures for the following polyatomic ions.



Honors Chemistry HW Packet: Bonding and IMF's

Polarity of Bonds

Directions: Determine the type of bond (ionic, polar covalent, or non-polar covalent) that will form between atoms of the following elements and show the polarity of the bond using a dipole arrow if it is polar covalent.

1. Mg and Br

2. C and S

3. K and S

4. O and P

5. H and N

6. S and O

7. F and F

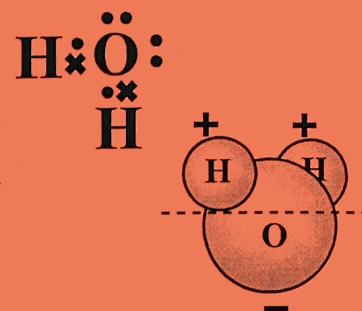
Directions: Arrange the following covalent bonds in order of polarity, naming the most polar bond first.



_____ () _____

Recognizing Polar Molecules

To determine if a compound is polar, you must consider the electronegativity difference within each bond and the three dimensional shape of the compound. If the electronegativity difference is greater than 1.7 or close to zero, the compound is not polar. Electronegativity differences above 1.7 are found in ionic compounds. Electronegativity differences around zero are found in molecules with nonpolar bonds. Electronegativity differences between 0.4 and 1.7 are found in molecules with polar bonds. These molecules can be polar or nonpolar depending on their shapes. Molecules with polar bonds distributed symmetrically are nonpolar. Asymmetrical molecules with polar bonds are polar. Water is polar. An imaginary line can be drawn through a water molecule separating the positive pole from the negative pole. This is because the charges are distributed asymmetrically. Carbon dioxide is nonpolar because the electronegative oxygens are distributed symmetrically around the carbon. (O=C=O)



Water is polar, because the charges are distributed asymmetrically. The electropositive hydrogens are attached to oxygen's two unpaired electrons.

Determine if each of the compounds listed below, IONIC, POLAR, or NONPOLAR as follows: [1] determine the types of bonds. [2] draw electron dot diagrams to determine the shape.

Compound	Type of Bond: IONIC, POLAR, or NONPOLAR	Electron Dot Diagram	Type of Compound: IONIC, POLAR, or NONPOLAR	Compound	Type of Bond: IONIC, POLAR, or NONPOLAR	Electron Dot Diagram	Type of Compound: IONIC, POLAR, or NONPOLAR
HCl				CCl ₄			
CH ₄				CH ₃ Cl			
Cl ₂				N ₂			
KBr				H ₂ S			
NH ₃				NaBr			

Honors Chemistry HW Packet: Bonding and IMF's

Intermolecular Forces

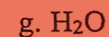
1. Rank the following compounds from weakest intermolecular forces to strongest. Justify your answers.



2. Circle all of the species below that can form a hydrogen bond in its pure form. Explain why the other species couldn't form a hydrogen bond.



3. List **all** the types of IMF's that would occur in each of the following. If there is more than one IMF, **circle the strongest one**.



4. List the intermolecular forces in order of decreasing strength.

5. How are intermolecular forces different from intramolecular forces (bonds)? **Be specific**

_____ { _____ }

More Polarity Practice

Molecule	Lewis Structure	Shape name and bond angle	Polarity? If yes, redraw with dipoles	Strongest IMF present
PCl_3				
NH_3				
H_2O				
CaO				
H_2S				
HCl				
Br_2				

The Periodic Table of the Elements (with Electronegativities)

																								18
Hydrogen 1 H 1.01 2.1																		Helium 2 He 4.00						
Lithium 3 Li 6.94 1.0	Beryllium 4 Be 9.01 1.5																	Boron 5 B 10.81 2.0	Carbon 6 C 12.01 2.5	Nitrogen 7 N 14.01 3.0	Oxygen 8 O 16.00 3.5	Fluorine 9 F 19.00 4.0	Neon 10 Ne 20.18 —	
Sodium 11 Na 22.99 0.9	Magnesium 12 Mg 24.31 1.2																	Aluminum 13 Al 26.98 1.5	Silicon 14 Si 28.09 1.8	Phosphorus 15 P 30.97 2.1	Sulfur 16 S 32.07 2.5	Chlorine 17 Cl 35.45 3.0	Argon 18 Ar 39.95 —	
Potassium 19 K 39.10 0.8	Calcium 20 Ca 40.08 1.0	Scandium 21 Sc 44.96 1.3	Titanium 22 Ti 47.88 1.5	Vanadium 23 V 50.94 1.6	Chromium 24 Cr 52.00 1.6	Manganese 25 Mn 54.94 1.5	Iron 26 Fe 55.85 1.8	Cobalt 27 Co 58.93 1.8	Nickel 28 Ni 58.69 1.8	Copper 29 Cu 63.55 1.9	Zinc 30 Zn 65.39 1.6	Gallium 31 Ga 69.72 1.6	Germanium 32 Ge 72.61 1.8	Arsenic 33 As 74.92 2.0	Selenium 34 Se 78.96 2.4	Bromine 35 Br 79.90 2.8	Krypton 36 Kr 83.80 3.0							
Rubidium 37 Rb 85.47 0.8	Strontium 38 Sr 87.62 1.0	Yttrium 39 Y 88.91 1.2	Zirconium 40 Zr 91.22 1.4	Niobium 41 Nb 92.91 1.6	Molybdenum 42 Mo 95.94 1.8	Technetium 43 Tc (98) 1.9	Ruthenium 44 Ru 101.07 2.2	Rhodium 45 Rh 102.91 2.2	Palladium 46 Pd 106.42 2.2	Silver 47 Ag 107.87 1.9	Cadmium 48 Cd 112.41 1.7	Indium 49 In 114.82 1.7	Tin 50 Sn 118.71 1.8	Antimony 51 Sb 121.76 1.9	Tellurium 52 Te 127.60 2.1	Iodine 53 I 126.90 2.5	Xenon 54 Xe 131.29 2.6							
Cesium 55 Cs 132.91 0.7	Barium 56 Ba 137.33 0.9	57-70 *	Lutetium 71 Lu 174.97 1.1	Hafnium 72 Hf 178.49 1.3	Tantalum 73 Ta 180.95 1.5	Tungsten 74 W 183.84 1.7	Rhenium 75 Re 186.21 1.9	Osmium 76 Os 190.23 2.2	Iridium 77 Ir 192.22 2.2	Platinum 78 Pt 195.08 2.2	Gold 79 Au 196.97 2.4	Mercury 80 Hg 200.59 1.9	Thallium 81 Tl 204.38 1.8	Lead 82 Pb 207.20 1.8	Bismuth 83 Bi 208.98 1.9	Polonium 84 Po (209) 2.0	Astatine 85 At (210) 2.2	Radon 86 Rn (222) 2.4						
Francium 87 Fr (223) 0.7	Radium 88 Ra (226) 0.9	89-102 **	Lanthanum 103 La (262) —	Rutherfordium 104 Rf (267) —	Dubnium 105 Db (268) —	Seaborgium 106 Sg (271) —	Bohrium 107 Bh (272) —	Hassium 108 Hs (270) —	Mtnerium 109 Mt (276) —	Darmstadtium 110 Ds (281) —	Roentgenium 111 Rg (280) —	Copernicium 112 Cn (285) —	Ununtrium 113 Uut (284) —	Ununquadium 114 Uuq (289) —	Ununpentium 115 Uup (288) —	Ununhexium 116 Uuh (293) —	Ununseptium 117 Uus (2947) —	Ununoctium 118 Uuo (294) —						

- Alkali metals
- Alkaline earth metals
- Transition metals
- Lanthanides
- Actinides
- Other metals
- Metalloids (semi-metal)
- Nonmetals
- Halogens
- Noble gases

Element name → Mercury ← Atomic #

Symbol → **Hg** ← Avg. Mass

Electronegativity → 1.9

*lanthanides

**actinides

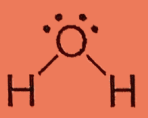
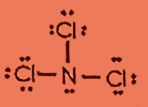
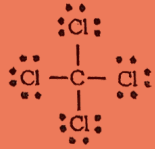
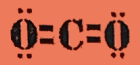

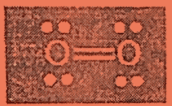
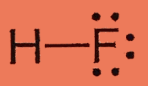
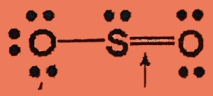

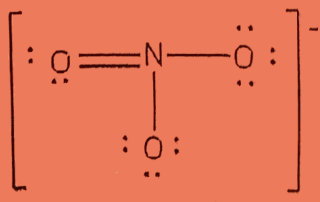
Lanthanum 57 La 138.91 1.1	Cerium 58 Ce 140.12 1.1	Praseodymium 59 Pr 140.91 1.1	Neodymium 60 Nd 144.24 1.1	Promethium 61 Pm (145) 1.1	Samarium 62 Sm 150.36 1.2	Europium 63 Eu 151.97 1.1	Gadolinium 64 Gd 157.25 1.2	Terbium 65 Tb 158.93 1.1	Dysprosium 66 Dy 162.50 1.2	Holmium 67 Ho 164.93 1.2	Erbium 68 Er 167.26 1.2	Thulium 69 Tm 168.93 1.3	Ytterbium 70 Yb 173.04 1.1
Actinium 89 Ac (227) 1.1	Thorium 90 Th 232.04 1.3	Protactinium 91 Pa 231.04 1.5	Uranium 92 U 238.03 1.4	Neptunium 93 Np (237) 1.4	Plutonium 94 Pu (244) 1.3	Americium 95 Am (243) 1.3	Curium 96 Cm (247) 1.3	Berkelium 97 Bk (247) 1.3	Californium 98 Cf (251) 1.3	Einsteinium 99 Es (252) 1.3	Fermium 100 Fm (257) 1.3	Mendelevium 101 Md (258) 1.3	Nobelium 102 No (259) 1.3

VSEPR Test Review
Honors Chemistry

Name _____

1. How many electrons are shared between two atoms in a double covalent bond?
2. Which of the following elements occurs naturally as a diatomic molecule with three covalent bonds? oxygen, fluorine, hydrogen, or nitrogen
3. What causes dipole-dipole interactions?
4. Which of the following is the least strong? Polar covalent bond; ionic bond; hydrogen bond; dipole-dipole IMF
5. Why do atoms share electrons in covalent bonds?
6. What are valence electrons that do not participate in bonds called?
7. According to VSEPR theory, pairs of valence electrons try to stay as far apart as possible, how does this happen?
8. Why does water have a bent shape according to VSEPR theory?
9. What are the weakest attractions between molecules?
10. What does VSEPR stand for?
11. Draw the lewis dot structure and give the AX formula, geometric name and bond angle for SOCl_2 . Note, you need to answer this question without any reference material, only a periodic table.
12. Draw the lewis dot structure and give the AX formula and geometric name and bond angle for H_2Se . Note, you need to answer this question without any reference material, only a periodic table.

13. What is the octet rule?
14. What elements are not surrounded by 8 electrons when bonded in molecules?
15. Think of the DNA structure why does the molecular shape of nitrogen bases matter?
16. What determines the polarity of a bond?
17. How will you demonstrate that a molecule is polar (what are the things you have to draw on your paper)
18. What are the types of Intermolecular forces?
19. Explain how you identify Hydrogen Bonding
20. Explain how you identify if a dipole-dipole is present
21. What are dispersion forces?
22. What are the geometric shapes and bond angles for each of the following AX formulas? Note, you need to answer this without any reference other than a periodic table.
 - a. AX
 - b. AX₂
 - c. AX₃
 - d. AX₂E
 - e. AX₄
 - f. AX₃E
 - g. AX₂E₂

Compounds Lewis Dot	Ball and Stick model	Polar	Non Polar	London Dispersion Forces	Dipole-Dipole	Hydrogen Bonding
						
						
						
						
						
						
						
						
						
 <p>note resonance structures are not provided</p>						

Polarity Test Review

For Each of the following pairs of molecules, draw the Ball and Stick models, add $\delta+$ and $\delta-$ and vectors and circle the molecule that is the most polar. Then explain why.

Carbon disulfide	or	sulfur difluoride	
Nitrogen trichloride	or	oxygen dichloride	
Boron trihydride Note this is an exception with only 6 electrons around Boron)	or	ammonia	
Chlorine	or	phosphorus trichloride	
Silicon dioxide	or	carbon dioxide	
Methane (carbon tetrahydride)	or	CH_2Cl_2	
Silicon tetrabromide	or	HCN	
Nitrogen trifluoride	or	phosphorous trifluoride	
Water	or	Hydrogen sulfide	
Hydrochloric acid	or	Hydroiodic acid	