

Chemistry Chapter 6 Worksheet

Name: _____

Provide a short and specific definition in YOUR OWN WORDS. Do not use the definition from the book

Additional Notes:

Chemical Bond _____

Ionic Bond _____

Covalent Bond _____

Nonpolar-covalent Bond _____

Polar _____

Polar-covalent Bond _____

Molecule _____

Molecular Formula _____

Chemical Formula _____

Bond NRG _____

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Electron-dot Notation _____

Lewis Structure _____

Structural Formula _____

Single Bond _____

Multiple Bond _____

Resonance _____

Ionic Cmp _____

Formula Unit _____

Lattice NRG _____

Polyatomic Ion _____

Metallic Bonding _____

Malleability _____

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Ductility _____

VSEPR Theory _____

Hybridization _____

Hybrid Orbitals _____

Dipole _____

Hydrogen Bonding _____

London Dispersion Forces _____

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Section 6.1

1. What is a valance electron? _____
2. Why do elements in the same family have similar properties?

3. What is a cation? _____
4. What is an anion? _____
5. What type of bond forms between a cation and an anion? _____
6. When electrons are gained or lost, a(n) _____ bond is formed.
7. When electrons are shared, a(n) _____ bond is formed.
8. Compare and contrast nonpolar covalent bonds and polar covalent bonds.

9. The greater the electronegativity difference between 2 atoms, the greater the bonds percentage of
 - a. Covalent attraction
 - b. ionic character
 - c. nonpolar character
 - d. nonpolar attraction
10. How can electronegativity differences be used to determine the bond type?

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11. Using the Electronegativity values of the elements periodic table below, determine if the following chemical bonds will be Ionic, Polar-Covalent, or Nonpolar Covalent.

Electronegativity values of the elements (Pauling scale)

H 2.1																	He
Li 1.0	Be 1.5											B 2.0	C 2.5	N 3.0	O 3.5	F 4.0	Ne
Na 0.9	Mg 1.2											Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0	Ar
K 0.8	Ca 1.0	Sc 1.3	Ti 1.5	V 1.6	Cr 1.6	Mn 1.5	Fe 1.8	Co 1.8	Ni 1.8	Cu 1.9	Zn 1.6	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8	Kr 3.0
Rb 0.8	Sr 1.0	Y 1.2	Zr 1.4	Nb 1.6	Mo 1.8	Tc 1.9	Ru 2.2	Rh 2.2	Pd 2.2	Ag 1.9	Cd 1.7	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5	Xe 2.6
Cs 0.7	Ba 0.9	La 1.1	Hf 1.3	Ta 1.5	W 1.7	Re 1.9	Os 2.2	Ir 2.2	Pt 2.2	Au 2.4	Hg 1.9	Tl 1.8	Pb 1.8	Bi 1.9	Po 2.0	At 2.2	Rn 2.4
Fr 0.7	Ra 0.7	Ac 1.1															

Ce 1.1	Pr 1.1	Nd 1.1	Pm 1.1	Sm 1.1	Eu 1.1	Gd 1.1	Tb 1.1	Dy 1.1	Ho 1.1	Er 1.1	Tm 1.1	Yb 1.1	Lu 1.2
Th 1.3	Pa 1.5	U 1.7	Np 1.3	Pu 1.3	Am 1.3	Cm 1.3	Bk 1.3	Cf 1.3	Es 1.3	Fm 1.3	Md 1.3	No 1.3	Lr 1.3

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Element 1	Element 2	Electronegativity Difference	Bond Type
H	O		
Na	Cl		
Ca	N		
N	O		
H	Cl		
C	O		

12. In a polar covalent bond, describe the electron distribution as well as the impact it has on the partial charges of the compd.

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Section 6.2

13. Write (in proper notation) all of the diatomic molecules.

14. Write down 2 molecular formulas.

a. _____

b. _____

15. Compare AND contrast a chemical formula with a molecular formula.

16. True or False: When atoms join together to form a bond, they gain stability.

17. True or False: When atoms join together to form a bond, they are at a lower NRG state.

18. True or False: Bond NRG is the amount of NRG required to make a bond.

19. Arrange the following bonds from smallest radius to largest radius.

Double Bond, Single Bond, Triple Bond, Resonance Bond

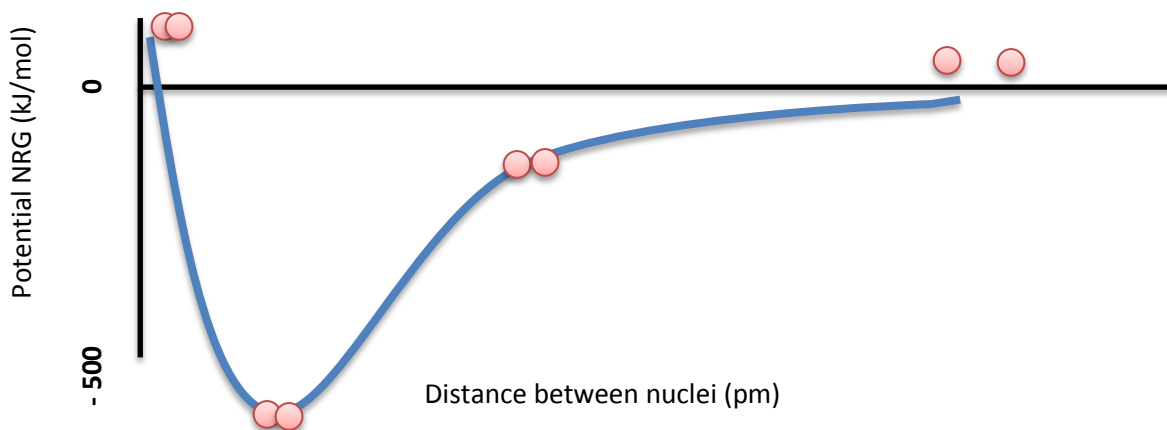
20. Arrange the following bonds from highest bond NRG to lowest bond NRG.

Double Bond, Single Bond, Triple Bond, Resonance Bond

21. What do you notice about the relationship between bond length and bond NRG?

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22. Identify where the atoms are at the optimum bond length with the letter “O”, where the atoms are being pushed closet than the optimum bond length with the letter “C”, and where they are not bonded with the letter “N” in the Potential NRG vs. Distance between nuclei graph below.



23. Looking at where you placed your “O”, “C”, and “N”, what do you notice about the amount of NRG a bonded molecule has vs when they atoms are not bonded or “pushed” together?

24. Draw the electron dot for the following atoms (if not possible, write N/A)

Hydrogen	Magnesium	Fluorine	Aluminum
Calcium	Oxygen	Sulfur	Neon

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25. How do you represent an electron pair in a Lewis structure?

26. How do you represent a bond in a Lewis structure or structural formula?

27. How many electrons does it take to create a single bond between 2 atoms?

28. Identify 3 atoms that can ONLY make single bonds.

a. _____

b. _____

c. _____

29. Identify 3 atoms that can make double bonds.

a. _____

b. _____

c. _____

30. What allows the above (from Q 29) atoms to make double bonds?

31. Identify 2 atoms that can make triple bonds.

a. _____

b. _____

32. What allows the above (from Q 31) atoms to make triple bonds?

33. What number of electrons is “great” and why is this number of electrons “great”?

34. Draw the Lewis Structure for the following cmpds. (if not possible, write N/A)

H ₂	MgO	MgCl ₂	AlOF
O ₂	C ₂ H ₄	N ₂	HCN

35. Draw the Structural Formula for the following cmpds. (if not possible, write N/A)

H ₂	MgO	MgCl ₂	AlOF
O ₂	C ₂ H ₄	N ₂	HCN

36. When it comes to atomic bonding, what is resonance?

37. Draw the resonance structures for NO₂.

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Resonance structure 1	Resonance structure 2
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38. How many pairs of electrons are shared between...

- a. A single bond _____
- b. A double bond _____
- c. A triple bond _____

39. Compare the N-N bond strength between H_2NNH_2 and HNNH .

40. The bond NRG for 3 cmpds is listed below, using the information, rank them from longest bond to shortest bond.

Bond	Bond NRG (kJ/mol)	Bond Length
H - Cl	432	
H - F	569	
H - Br	366	

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Drawing Lewis Structures

1. Find the total number of electrons in the compound

a. NH_3

Element	Valence Electrons	Times the # of the element	= Total
N	5	1	5
H	1	3	3

2. Add total electrons available

b. $5 + 3 = 8$

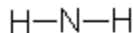
c. You have 8 electrons available for bonding

3. Divide by 2

d. $8 / 2 = 4$

e. You have 4 pairs of electrons

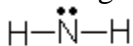
4. Determine the number of bonds



f.

g. $4 - 3$ (3 bonds) = 1 electron pair left

5. Place remaining electrons pair on atoms or create double/triple bonds



h.

6. Check for octet OR make sure each element has enough bonds

Practice

C_2H_4	Nitrogen trifluoride
Carbon disulfide	H_2O

Polyatomic Ions

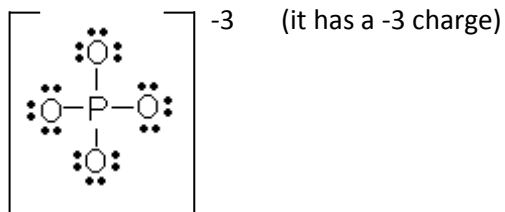
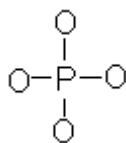
1. Same as above EXCEPT you add/subtract the extra electrons (the charge)

a. PO_4

Element	Valence Electrons	Times the # of the element	= Total
P	5	1	5
O	6	4	24
Charge	-3		3

2. $5 + 24 + 3 = 32$

3. $32 / 2 = 16$



4. Check for octet OR make sure each element has enough bonds

Practice

ClO_4^{-1}	PO_4^{-3}
NH_4^{+1}	SO_4^{-3}

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Section 6.3

41. An ionic bond occurs between a _____ and a _____
42. Write the ionic charges for each family above the family.

43. What is the charge for the following atoms?

H _____ C _____ As _____

44. What is the charge for the ions of the following atoms?

H _____ C _____ Ca _____ P _____

F _____ Al _____ Mg _____ Cl _____

O _____ N _____ I _____ Fr _____

Sr _____ Te _____ S _____ Li _____

45. Compare and contrast a formula unit with a molecular formula.

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46. Circle the binary ionic cmpds below.

NaCl

NaOH

MgCl₂H₂O

PbOH

47. If you did NOT circle some of the cmpds above, explain why.

48. Explain how a cation forms.

49. Give examples, properly written, of 3 different cations.

Cation 1	Cation 2	Cation 3

50. Write the electron configuration notation for the above ions.

Cation 1: _____

Cation 2: _____

Cation 3: _____

51. Explain how an anion forms.

Chemistry Chapter 6 Worksheet

52. Give examples, properly written, of 3 different anions.

Anion 1	Anion 2	Anion 3

53. Write the electron configuration notation for the above ions.

Cation 1: _____

Cation 2: _____

Cation 3: _____

54. Write the atomic symbols for the following ions, with the proper charge in the proper location.

Hydrogen	Chloride	Magnesium	Beryllium
Aluminum	Oxide	Nitride	Calcium
Sulfide	Iodide	Fluoride	Lithium

55. What determines the distance between ions in a crystal lattice?

a. _____

b. _____

56. What is lattice NRG?

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57. Explain how electrostatic force changes as the distance between ions changes.

58. Complete the following table.

Bond Type	Melting Point	Intermolecular strength
Ionic		
Covalent		

59. You are completing a lab in class and are asked to identify if the following cmpds contain ionic or covalent bonds. Identify the type of bond given the following information.

Cmpd Properties	Bond Type
State of matter: gas	
You lightly tap the solid cmpd and it breaks apart into a fine powder	
You dissolve the cmpd in water and it conducts electricity	

60. What is a polyatomic ion?

61. Write down 4 polyatomic ions (with their charges).

Polyatomic Ion 1	Polyatomic Ion 2	Polyatomic Ion 3	Polyatomic Ion 4

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Section 6.4

62. What are the 5 unique properties discussed in class that pertain to metallic bonded compounds?

a. _____

b. _____

c. _____

d. _____

e. _____

63. What are “delocalize” electrons and why are they important when talking about metallic bonding?

64. Draw an electron sea.

65. What does ductile mean?

66. What does malleable mean?

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Section 6.5

67. What does the acronym "VSEPR" stand for?

68. What 2 things impact a molecules shape?

a. _____

b. _____

69. Identify which orbital will combine during hybridization in the following examples.

a. $1s^2 2s^2 2p^1$ _____

b. $1s^2 2s^2 2p^6 3s^2 3p^2$ _____

70. What are intermolecular forces and how are they different than intramolecular forces?

71. Why do some molecules have "dipoles"?

72. On the following cmpd, correctly draw the direction of the dipole.



73. What is a dipole-dipole bond?

74. When molecules are formed, they can be either polar or nonpolar, what determine what type of cmpd they are?

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75. True or False: You can have a nonpolar molecule that contains polar bonds.

76. Draw, and identify, a hydrogen bond between 2 water molecules.

77. Explain what causes London dispersion forces?

78. Arrange the following types of compd attractions from strongest (1) to weakest (4).

Bond Type	Strength
Ionic	
Hydrogen Bonding	
London Dispersion	
Ionic Bonding	

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79. Complete the following table.

Molecular shape	Atoms bonded to the central atom	Lone pairs	Type of molecule	Lewis Structure (drawing)
Linear				
Trigonalplanar				
Bent (Angular)		1		
Tetrahedral				
Trigonalpyramidal				
Bent (Angular)		2		

80. Complete the following table

Molecular Formula	Molecular Shape (Name)	# of Lone Pairs	Lewis Structure (properly drawn)
H_2O			
PI_3			
CCl_4			
NCl_3			
BF_3			