Chemistry Study Guide – Reactions
(Chemistry I-HD Chapters 8 and 18)

Students should be able to...

- **Know symbols used in equations. (solid, liquid, gas, aqueous, yields, etc.)**
- **Define: reactants, products**
- **Identify type of reaction (synthesis, decomposition, single replacement, double replacement, combustion)**
- **Balance molecular equations**
- **Predict products for molecular equations**
- **Write total and net ionic equations**

Review Problems

F 1. (aq)	a. gas
C 2. (s)	b. left side of arrow
E 3. (l)	c. solid
B 4. Reactants	d. right side of arrow
D 5. Products	e. liquid
A 6. (g)	f. dissolved in water
G 7. -->	g yields

First, write the type of reaction in the margin. (1 point).
Second, predict the products for each of the following reactions. (3 points)
Third, balance each equation. (1 point)

1. $2Mg + O_2 \rightarrow 2MgO$ — synthesis
2. $3Ca(OH)_2 + 2H_3PO_4 \rightarrow Ca_3(PO_4)_2 + 6H_2O$ — double repl.
3. $2Li + Cl_2 \rightarrow 2LiCl$ — synthesis
4. $C_7H_{16} + 11O_2 \rightarrow 7CO_2 + 8H_2O$ — combustion
5. $2NH_3 \rightarrow N_2 + 3H_2$ — decomposition
6. $HCl + AgNO_3 \rightarrow HNO_3 + AgCl$ — double repl.
14. $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$ — combustion
15. $MgCl_2 \rightarrow Mg + Cl_2$ — decomposition
16. $2H_2 + O_2 \rightarrow 2H_2O$ — synthesis
17. $K_2CO_3 \rightarrow CO_2 + K_2O$ — decomposition
18. $Ca + H_2O \rightarrow Ca(OH)_2 + H_2$ — single repl.
19. $FeS \rightarrow Fe + S$ — decomposition
20. $Ba + Cl_2 \rightarrow BaCl_2$ — synthesis
21. $FeS + 2HCl \rightarrow FeCl_2 + H_2S$ — double repl
22. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$ — single repl,
23. $2H_2O \rightarrow 2H_2 + O_2$ — decomposition
24. $2KOH + H_2SO_4 \rightarrow K_2SO_4 + 2H_2O$ — double repl
25. $2NaCl + H_2SO_4 \rightarrow Na_2SO_4 + 2HCl$ — double repl,
26. $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$ — combustion
27. $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$ — double repl
28. $2HgO \rightarrow 2Hg + O_2$ — decomposition
29. $2Al + O_2 \rightarrow 2MgO$ — synthesis
23. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ — combustion

Write the total and net ionic equations for #2, 6, and 20.

(2) TIE: $3Ca(OH)_2 + 2H_3PO_4 \rightarrow Ca_3(PO_4)_2 + 6H^+ + 6OH^-$
NIE: same

(20) TIE: $Ba + Cl_2 \rightarrow Ba^{+2} + 2Cl^-$
NIE: same

(6) TIE: $H^+ + Cl^- + Ag^+ + NO_3^- \rightarrow AgCl_{(s)} + H^+ + NO_3^-$
NIE: $Ag^+ + Cl^- \rightarrow AgCl_{(s)}$

Chemistry I – Chemical Bonding Study Guide

You should be able to…

- **Define: chemical bond, ionic, covalent, metallic, diatomic, polar, nonpolar, VSEPR**
- **Use difference in electronegativity to determine the type of bond formed between two elements**
- **Know which elements are diatomic.**
- **Draw Lewis structures for covalent molecules, including double and triple bonds.**
- **Draw Lewis structures for polyatomic ions**
- **Use VSEPR chart to determine molecular geometry.**
- **Use VSEPR chart to write Lewis structures that include bond angles.**

Sample Problems.

1. Determine the type of bond (ionic, polar covalent, nonpolar covalent, metallic) for each bond. You may use the electronegativity table.

a. N_2 nonpolar covalent b. LiOH ionic c. HI polar covalent d. NaH polar covalent e. KBr ionic

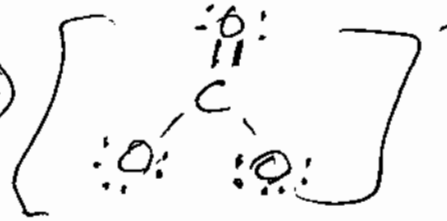
f. H_2O (both bonds are the same) polar covalent g. CH_3Cl C-H polar covalent C-Cl polar covalent h. Al metallic

2. Which of the following are diatomic?

a. oxygen b. sodium c. sulfur d. chlorine e. hydrogen

3. Draw the Lewis structure (at the appropriate bond angles) and state the molecular geometry for each. You may use the VSEPR table.

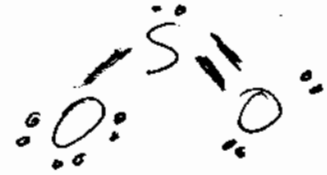
a. H_2O
b. PH_3
c. carbonate
d. SO_2
e. nitrate
f. CO_2

c) 

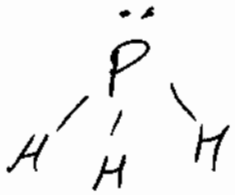
EG: trigonal planar
MG: trigonal planar

a) 

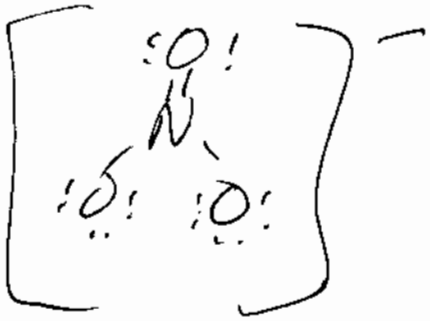
EG: tetrahedral
MG: bent

d) 

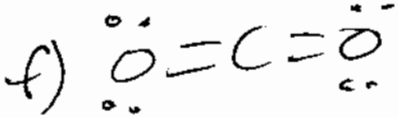
EG: trigonal planar
MG: bent

b) 

EG: tetrahedral
MG: trigonal pyramid

e) 

EG: trigonal planar
MG: trigonal planar

f) 

EG: linear
MG: linear