Summer Mini-Session 3:
Bonding, Nomenclature, and Chemical Reactions

Reading Assignments

Modern Chemistry (2006), Chpt. 6, Chpt. 7 (Sect. 1), Chpt. 8

Homework/Activities

- Sect. Review (Chpt. 6, Sect. 1) (p.177) #1-5
- Sect. Review (Chpt. 6, Sect. 2) (p.189) #1-5
- Sect. Review (Chpt. 6, Sect. 3) (p.194) #1-5
- Sect. Review (Chpt. 6, Sect. 5) (p.207) #5-6
- Chapter Review (Chpt. 6) #6-7, 15, 19-21, 45-47, 63-64, 68-69, 71
- Worksheets: Nomenclature (Ionic Compounds), Nomenclature (Acids/Covalent Compounds)
- Sect. Review (Chpt. 7, Sect. 1) (p.231) #1-4
- Chapter Review (Chpt. 7) #1, 3-11, 14-18
- Sect. Review (Chpt. 8, Sect. 1) (p.274) #1-5
- Sect. Review (Chpt. 8, Sect. 2) (p.284) #1-2
- Sect. Review (Chpt. 8, Sect. 3) (p.287) #1-3
- Chapter Review (Chpt. 8) #1, 7-8, 10-15, 22-27, 29, 34-35, 44
- Worksheets: Balancing Equations, Balancing Equations 2

Concepts/Topics

• Types of bonds: ionic, covalent (polar/nonpolar), electronegativity	[pp. 175-177]
• Octet rule, Lewis dot diagrams and Lewis structures	[pp. 182-185]
• Covalent bonds, bond energy, bond length	[pp. 178-182, 186-189]
• Ionic bonds, polyatomic ions	[pp. 190-194]
• intermolecular forces, hydrogen bonds	[pp. 203-207]
• Molecular/chemical formulas	[pp. 219-220]
• Nomenclature (ionic compounds)	[pp. 220-227]
• Nomenclature (covalent compounds), number prefixes	[pp. 227-229]
• Nomenclature (binary and oxy acids)	[pp. 230-231]
• Evidence of chem change: Δ hν, Δ color, Δ odor, forms gas or solid	[pp. 261-262]
• Chemical rxn notation: reactants, products, coefficients, subscripts Symbols over the arrow in a reaction, reversible reaction arrows Symbols: (s), (l), (g), (aq)	[pp. 262-267]
• Unbalanced (skeleton) equations, balancing chem reactions, N.R.	[pp. 270-274]
• Types of rxns: synthesis, decomposition, single displacement, double displacement, combustion	[pp. 276-284]
• Activity series	[pp. 285-287]
• Energy (in the bonds!); endothermic, exothermic, activation energy	[p. 564]
• Catalysts (and four other ways to speed up reactions)	[pp. 568-570]

Web Resources

Formulas to names	science.widener.edu/svb/tutorial/namingcsn7.html
Names to formulas	science.widener.edu/svb/tutorial/namestoformulascsn7.html
Formulas to names (metals)	science.widener.edu/svb/tutorial/stocknamingcsn7.html
Balancing Eqs., CSU Dom. Hills	proton.csudh.edu/lecture_help/startbalancerxns.html
Balancing Eqs., Widener Univ.	science.widener.edu/svb/tutorial/rxnbalancingcsn7.html
Balancing Eqs., Jefferson Lab	education.jlab.org/elementbalancing/index.html
Formulas to names	science.widener.edu/svb/tutorial/namingcsn7.html
Names to formulas	science.widener.edu/svb/tutorial/namestoformulascsn7.html

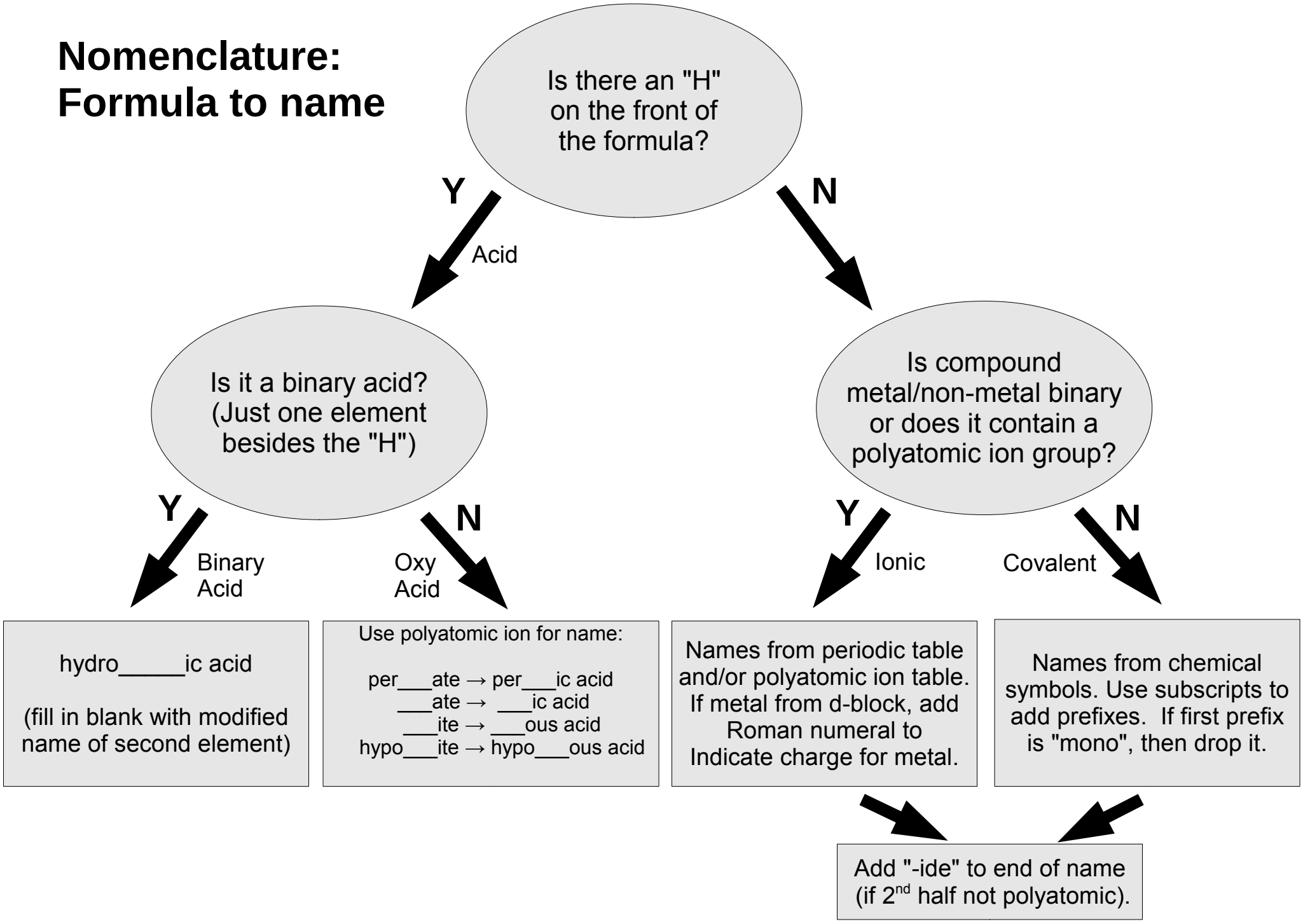
Nomenclature Rules Summary:

How do I know if it's an acid, ionic compound, or covalent compound?

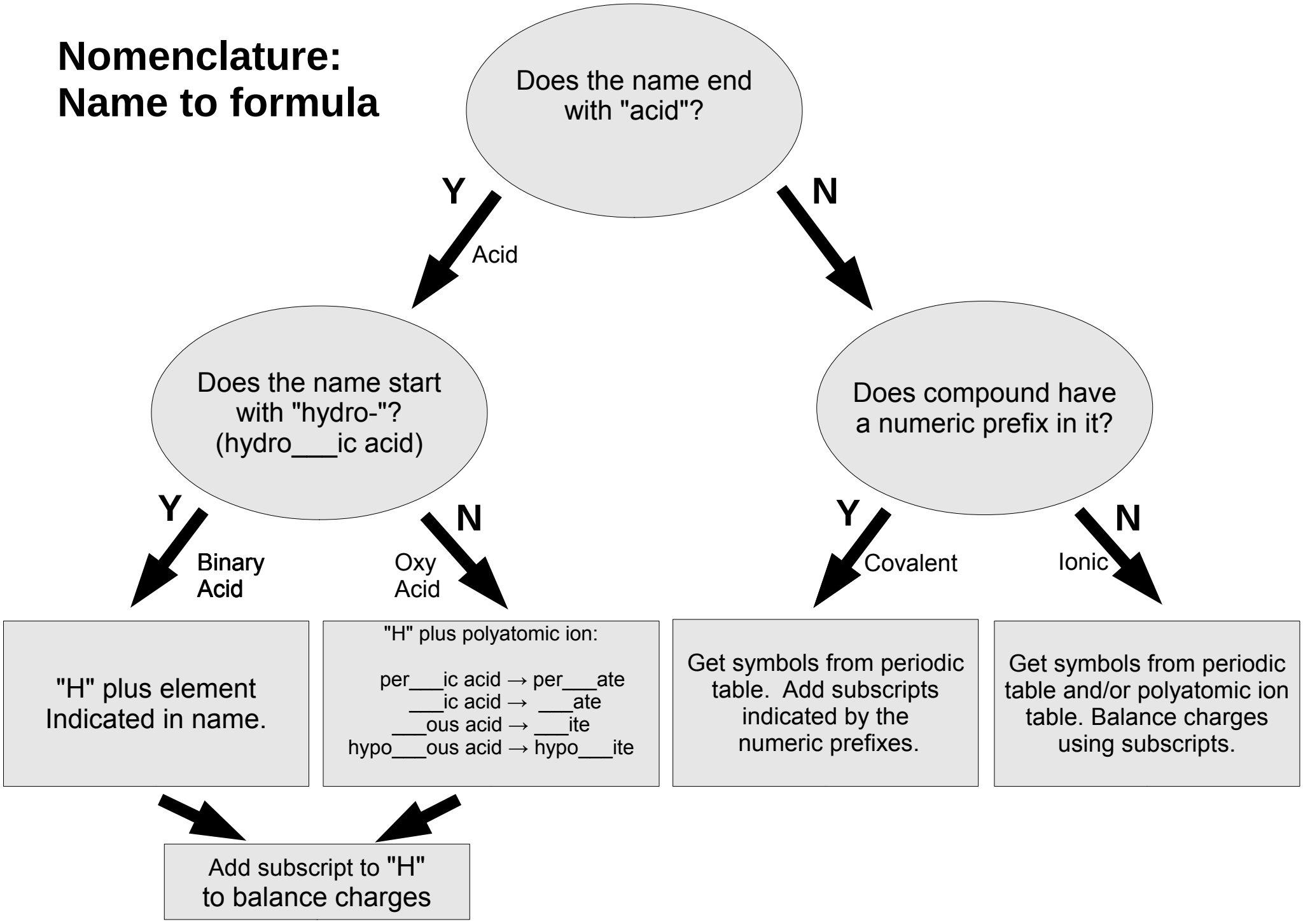
- If it has a hydrogen on the front, it's probably an acid
- If it has no hydrogen on the front and both elements are to the right of the "staircase": covalent
- If no hydrogen on front and elements are on opp. sides of staircase or there's a polyatomic group: ionic

Ionic Compounds **Formula –> Name** **1.** Write down names of elements (or polyatomic ions) **2.** If first element is d block, write down # (as roman numeral) from charge **3.** Change ending to -ide (unless second half is from polyatomic ion chart)	**Ionic Compounds** **Name –> Formula** **1.** Write down symbol for each element (or polyatomic ion) **2.** Write down charges for each (if d block, use roman numeral for charge) **3.** Use subscripts to balance charges (if polyatomic ion needs subscript, put parentheses around it)
Covalent Compounds **Formula –> Name** **1.** Write down names of elements **2.** Use subscripts to assign number prefixes (if first element is "mono-", then drop the "mono-" **3.** Change the ending to -ide	**Covalent Compounds** **Name –> Formula** **1.** Write symbols for each element **2.** Use number prefixes to assign subscripts
Acids **Formula –> Name** **1.** If binary acid (just H and one other element), then hydro_____ic acid **2.** If oxyacid (group from polyatomic ion chart) and group is "hypo___ite", then hypo___ous acid **3.** If oxyacid and group is "-ite", then ____ous acid **4.** If oxyacid and group is "-ate", then ___ic acid **5.** If oxyacid and group is "per___ate", then per___ic acid	**Acids** **Name –> Formula** **1.** If "hydro____ic acid", then write "**H**" and symbol for element. **2.** If "_____ic acid", then write "**H**" and symbol for "-ate" group from polyatomic ion chart **3.** If "_____ous acid", then write "**H**" and symbol for "-ite" group from polyatomic ion chart **4.** Give **H** subscript to balance charge of element or polyatomic ion group

Nomenclature: Formula to name



Nomenclature: Name to formula



Nomenclature (Ionic Compounds)

Give the appropriate chemical formulas for the following compounds. Be sure to include the proper subscripts for each atom.

1. Iron(III) sulfide _____

2. Copper(I) oxide _____

3. Magnesium chloride _____

4. Potassium bromide _____

5. Lithium carbonate _____

6. Beryllium chloride _____

7. Magnesium nitride _____

8. Lead(IV) phosphate _____

9. Ammonium chloride _____

10. Calcium fluoride _____

List the name of each of the compounds represented by the following chemical formulas:

11. NH_4NO_3 _____

12. $Ca(OH)_2$ _____

13. $CaCO_3$ _____

14. $CuSO_4$ _____

15. Fe_2O_3 _____

16. CrS _____

17. $BeBr_2$ _____

18. NaF _____

19. Li_2O _____

20. KCl _____

Nomenclature (Acids/Covalent Compounds)

Give the appropriate chemical formulas for the following compounds. Be sure to include the proper subscripts for each atom.

1. Hydrobromic acid _____

2. Carbon tetrachloride _____

3. Nitrous acid _____

4. Sulfur dioxide _____

5. Nitric acid _____

6. Silicon dioxide _____

7. Hydrofluoric acid _____

8. Chlorine tetrafluoride _____

9. Dinitrogen tetroxide _____

10. Sulfur tetrabromide _____

List the name of each of the compounds represented by the following chemical formulas:

11. ClF_3 _____

12. HI _____

13. SI_6 _____

14. H_2SO_3 _____

15. CO _____

16. H_3PO_4 _____

17. PF_5 _____

18. H_2Se _____

19. $SiSe_2$ _____

20. P_2S_5 _____

Balancing Equations

Balance the following chemical equations by using the appropriate coefficients for the various compounds. Note: not every compound will need a coefficient. Also, for each reaction, indicate the type: synthesis, decomposition, single displacement, double displacement, or combustion.

1. ____ $BaCl_2$ + ____ H_2SO_4 –> ____ $BaSO_4$ + ____ HCl Type: _____

2. ____ P + ____ O_2 –> ____ P_4O_{10} Type: _____

3. ____ C_3H_8 + ____ O_2 –> ____ CO_2 + ____ H_2O Type: _____

4. ____ $KClO_3$ –> ____ KCl + ____ O_2 Type: _____

5. ____ Cu + ____ $AgNO_3$ –> ____ $Cu(NO_3)_2$ + ____ Ag Type: _____

6. ____ NH_4NO_3 –> ____ N_2O + ____ H_2O Type: _____

7. ____ BF_3 + ____ H_2O –> ____ $B(OH)_3$ + ____ HF Type: _____

8. ____ P_4O_{10} + ____ H_2O –> ____ H_3PO_4 Type: _____

9. ____ NH_3 + ____ O_2 –> ____ N_2 + ____ H_2O Type: _____

10. ____ Ag + ____ H_2S –> ____ Ag_2S + ____ H_2 Type: _____

Balancing Equations 2

Balance the following chemical equations by using the appropriate coefficients for the various compounds. Note: not every compound will need a coefficient. Also, for each reaction, indicate the type: synthesis, decomposition, single displacement, double displacement, or combustion.

1. ____ KOH + ____ H_2SO_4 –> ____ K_2SO_4 + ____ H_2O Type: _____

2. ____ Na_2O + ____ H_2O –> ____ $NaOH$ Type: _____

3. ____ C_2H_6 + ____ O_2 –> ____ CO_2 + ____ H_2O Type: _____

4. ____ PbO_2 –> ____ PbO + ____ O_2 Type: _____

5. ____ Fe + ____ H_2O –> ____ Fe_3O_4 + ____ H_2 Type: _____

6. ____ H_2O –> ____ H_2 + ____ O_2 Type: _____

7. ____ $Al(NO_3)_3$ + ____ H_2SO_4 –> ____ $Al_2(SO_4)_3$ + ____ HNO_3 Type: _____

8. ____ CaO + ____ P_2O_5 –> ____ $Ca_3(PO_4)_2$ Type: _____

9. ____ C_2H_2 + ____ O_2 –> ____ CO_2 + ____ H_2O Type: _____

10. ____ Al + ____ $CuCl_2$ –> ____ $AlCl_3$ + ____ Cu Type: _____