

## Spring Chemistry Resources

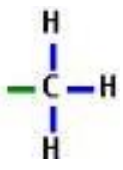
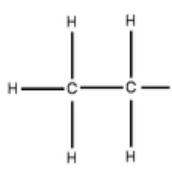
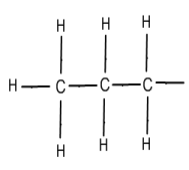
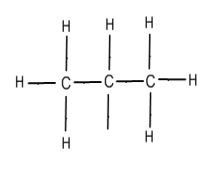
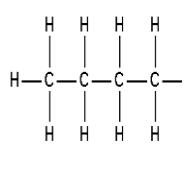

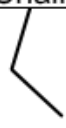

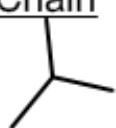

Use these to help you do problems, and on most tests and quizzes. You will have to add your own notes for certain resources.

### Unit 7 Resources – Hydrocarbons and Organic Chemistry

#### **Straight Chain Alkanes (Parent Groups)**

Name	Formula	Name	Formula
Methane	CH <sub>4</sub>	Hexane	C <sub>6</sub> H <sub>14</sub>
Ethane	C <sub>2</sub> H <sub>6</sub>	Heptane	C <sub>7</sub> H <sub>16</sub>
Propane	C <sub>3</sub> H <sub>8</sub>	Octane	C <sub>8</sub> H <sub>18</sub>
Butane	C <sub>4</sub> H <sub>10</sub>	Nonane	C <sub>9</sub> H <sub>20</sub>
Pentane	C <sub>5</sub> H <sub>12</sub>	Decane	C <sub>10</sub> H <sub>22</sub>

#### **Side Chain Groups (Alkyl Substituents)**

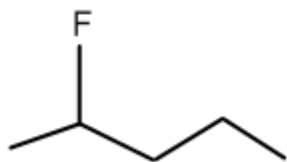
Name	Methyl	Ethyl	Propyl	Isopropyl	Butyl
Structural Formula					
Line Structure:	Parent Chain 	Parent Chain 	Parent Chain 	Parent Chain 	Parent Chain 

Putting the FUN in Functional Groups! Resource

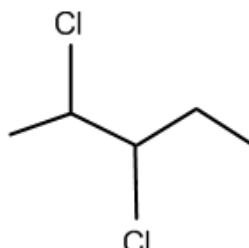
**Note:** "R" stands for any carbon chain or substituent.

Functional Groups with Halogens: Fluoro-, Chloro-, Bromo-, Iodo-

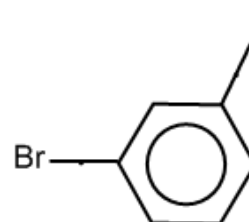
Halogen Examples:



2-fluoropentane



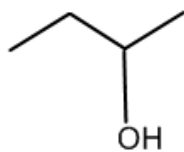
2,3-dichloropentane



1-bromo-3-iodobenzene

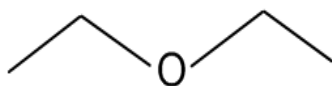
Functional Groups with Oxygen:

Alcohol Ex:



2-butanol

Ether Ex:



Diethyl ether

Compound Type:	Alcohol	Ether
General Structural Formula		
Functional Group	Hydroxyl	Ether
Line Structure Appearance		

**Unit 5 Notes:**

## Unit 8 Resources – Chemical Reactions

### Table of Ions Resource

#### Cations

**1+**  
**Ammonium, NH<sub>4</sub><sup>+</sup>**  
Cesium, Cs<sup>+</sup>  
**Copper (I), Cu<sup>+</sup>**  
**Hydrogen, H<sup>+</sup>**  
**Lithium, Li<sup>+</sup>**  
**Potassium, K<sup>+</sup>**  
**Silver, Ag<sup>+</sup>**  
**Sodium, Na<sup>+</sup>**

**2+**  
**Barium, Ba<sup>2+</sup>**  
**Beryllium, Be<sup>2+</sup>**  
Cadmium, Cd<sup>2+</sup>  
**Calcium, Ca<sup>2+</sup>**  
Chromium (II), Cr<sup>2+</sup>  
Cobalt (II), Co<sup>2+</sup>  
**Copper (II), Cu<sup>2+</sup>**  
**Iron (II), Fe<sup>2+</sup>**  
Lead (II), Pb<sup>2+</sup>  
**Magnesium, Mg<sup>2+</sup>**  
Manganese (II), Mn<sup>2+</sup>  
**Nickel, Ni<sup>2+</sup>**  
**Strontium, Sr<sup>2+</sup>**  
Tin (II), Sn<sup>2+</sup>  
**Zinc, Zn<sup>2+</sup>**

**3+**  
**Aluminum, Al<sup>3+</sup>**  
Chromium (III), Cr<sup>3+</sup>  
Cobalt (III), Co<sup>3+</sup>  
**Iron (III), Fe<sup>3+</sup>**  
Manganese (III), Mn<sup>3+</sup>  
Nickel (III), Ni<sup>3+</sup>

**4+**  
Chromium (IV), Cr<sup>4+</sup>  
Cobalt (IV), Co<sup>4+</sup>  
Lead (IV), Pb<sup>4+</sup>  
Tin (IV), Sn<sup>4+</sup>  
Manganese (IV), Mn<sup>4+</sup>

#### Anions

**1-**  
**Acetate, C<sub>2</sub>H<sub>3</sub>O<sub>2</sub><sup>-</sup>**  
**Bromide, Br<sup>-</sup>**  
Bromate, BrO<sub>3</sub><sup>-</sup>  
Chlorate, ClO<sub>3</sub><sup>-</sup>  
Chlorite, ClO<sub>2</sub><sup>-</sup>  
**Chloride, Cl<sup>-</sup>**  
**Cyanide, CN<sup>-</sup>**  
Dihydrogen Phosphate,  
H<sub>2</sub>PO<sub>4</sub><sup>-</sup>  
**Fluoride, F<sup>-</sup>**  
**Hydrogen Carbonate**  
**OR Bicarbonate, HCO<sub>3</sub><sup>-</sup>**  
Hydrogen Sulfate,  
HSO<sub>4</sub><sup>-</sup>  
**Hydroxide, OH<sup>-</sup>**  
Hypochlorite, ClO<sup>-</sup>  
**Iodide, I<sup>-</sup>**  
Iodate, IO<sub>3</sub><sup>-</sup>  
**Nitrate, NO<sub>3</sub><sup>-</sup>**  
**Nitrite, NO<sub>2</sub><sup>-</sup>**  
**Permanganate, MnO<sub>4</sub><sup>-</sup>**  
Perchlorate, ClO<sub>4</sub><sup>-</sup>  
Periodate, IO<sub>4</sub><sup>-</sup>

**2-**  
**Carbonate, CO<sub>3</sub><sup>2-</sup>**  
**Chromate, CrO<sub>4</sub><sup>2-</sup>**  
Dichromate, Cr<sub>2</sub>O<sub>7</sub><sup>2-</sup>  
Hydrogen Phosphate, HPO<sub>4</sub><sup>2-</sup>  
Manganate, MnO<sub>4</sub><sup>2-</sup>  
**Oxide, O<sup>2-</sup>**  
**Oxalate, C<sub>2</sub>O<sub>4</sub><sup>2-</sup>**  
**Peroxide, O<sub>2</sub><sup>2-</sup>**  
Selenide, Se<sup>2-</sup>  
**Sulfate, SO<sub>4</sub><sup>2-</sup>**  
**Sulfide, S<sup>2-</sup>**  
Sulfite, SO<sub>3</sub><sup>2-</sup>  
Tartrate, C<sub>4</sub>H<sub>4</sub>O<sub>6</sub><sup>2-</sup>  
Thiosulfate, S<sub>2</sub>O<sub>3</sub><sup>2-</sup>

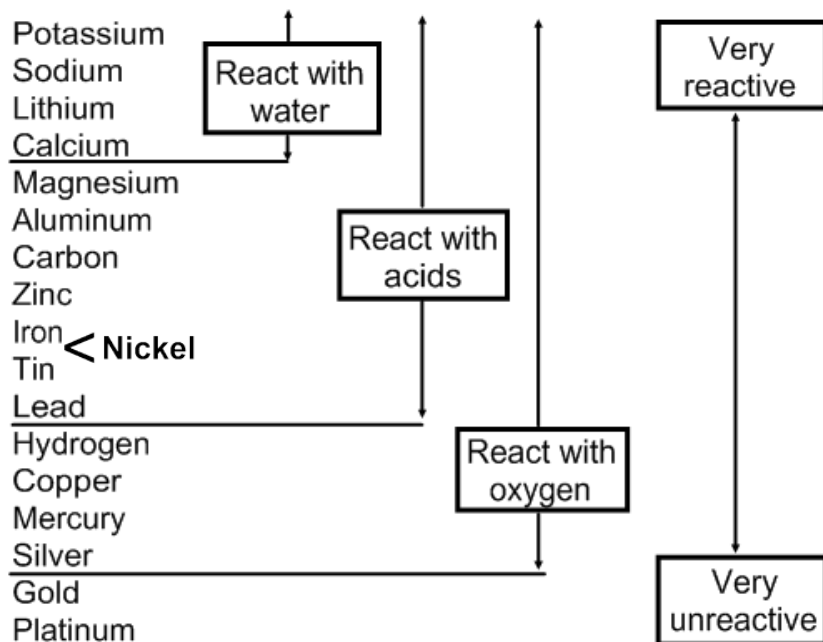
**3-**  
Arsenate, AsO<sub>4</sub><sup>3-</sup>  
Arsenide, As<sup>3-</sup>  
Borate, BO<sub>3</sub><sup>3-</sup>  
**Nitride, N<sup>3-</sup>**  
**Phosphate, PO<sub>4</sub><sup>3-</sup>**  
Phosphide, P<sup>3-</sup>

#### **Diatomic Elements**

H<sub>2</sub>  
N<sub>2</sub>  
O<sub>2</sub>  
F<sub>2</sub>  
Cl<sub>2</sub>  
Br<sub>2</sub>  
I<sub>2</sub>

## Reactivity Series Resource – Only for Single Replacement Reactions!

### Metals



### Halogens

F<sub>2</sub>  
Cl<sub>2</sub>  
Br<sub>2</sub>  
I<sub>2</sub>

## Table of Solubilities Resource

s = insoluble      aq = soluble      – = reacts with water      blank = no data

Ions	Acetate	Bromide	Carbonate	Chlorate	Chloride	Fluoride	Hydrogen Carbonate	Hydroxide	Iodide	Nitrate	Nitrite	Phosphate	Sulfate	Sulfide	Sulfite
<b>Aluminum</b>	s	aq		aq	aq	s		s	—	aq		s	aq	—	
<b>Ammonium</b>	aq	aq	aq	aq	aq	aq	aq	—	aq	aq	aq	aq	aq	aq	aq
<b>Barium</b>	aq	aq	s	aq	aq	s		aq	aq	aq	aq	s	s	—	s
<b>Calcium</b>	aq	aq	s	aq	aq	s		s	aq	aq	aq	s	s	—	s
<b>Cobalt(II)</b>	aq	aq	s	aq	aq	—		s	aq	aq		s	aq	s	s
<b>Copper(II)</b>	aq	aq	s	aq	aq	aq		s		aq		s	aq	s	
<b>Iron(II)</b>	aq	aq	s		aq	s		s	aq	aq		s	aq	s	s
<b>Iron(III)</b>	—	aq			aq	s		s	aq	aq		s	aq	—	
<b>Lead(II)</b>	aq	s	s	aq	s	s		s	s	aq	aq	s	s	s	s
<b>Lithium</b>	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	s	aq	aq	aq
<b>Magnesium</b>	aq	aq	s	aq	aq	s		s	aq	aq	aq	s	aq	—	aq
<b>Nickel</b>	aq	aq	s	aq	aq	aq		s	aq	aq		s	aq	s	s
<b>Potassium</b>	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq
<b>Silver</b>	s	s	s	aq	s	aq		—	s	aq	s	s	s	s	s
<b>Sodium</b>	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq
<b>Zinc</b>	aq	aq	s	aq	aq	aq		s	aq	aq		s	aq	s	s

## Unit 9 Resources – The Mole

### 9.A Mole Calculations Resource

#### Particles to Moles:

$$\text{Particles} \times \frac{1 \text{ Mole}}{6.02 \text{ E } 23 \text{ Particles}} = \text{Moles}$$

#### Moles to Particles:

$$\text{Moles} \times \frac{6.02 \text{ E } 23 \text{ Particles}}{1 \text{ Mole}} = \text{Particles}$$

Particles can be atoms, formula units, molecules, ions, electrons, or anything countable.

#### Molar Mass:

1. Assume that you have one mole of compound.
2. Write the formula of your compound.
3. List each element in the compound, as well as how many moles of each element in the compound.
4. Multiply the moles of each element by that element's molar mass (in grams).
5. Add all the masses together. (Units = g/mol)

**Example:** Find the molar mass of sulfuric acid.

1. I have one mole of sulfuric acid.
2. Formula = H<sub>2</sub>SO<sub>4</sub>
3. Hydrogen: H = 2 moles  
Sulfur: S = 1 mole  
Oxygen: O = 4 moles
4. Hydrogen: H = 2 moles · 1.01 g/mol = 2.02 g  
Sulfur: S = 1 mole · 32.07 g/mol = 32.07 g  
Oxygen: O = 4 moles · 16.00 g/mol = 64.00 g
5. Molar mass = 98.09 g/mol H<sub>2</sub>SO<sub>4</sub>

## 10.1 Stoichiometry Calculations Resource

**Mole Ratio:** A ratio of any two chemicals from a balanced equation.

### Basic Stoichiometric Procedure:

Mass Known → Moles Known → **Mole Ratio** → Moles Seeking → Mass Seeking

$$\text{Mass(Known)} \times \frac{1 \text{ Mole(Known)}}{\text{Mol.Mass(Known)}} \times \frac{\text{Moles(Seeking)}}{\text{Moles(Known)}} \times \frac{\text{Mol.Mass(Seeking)}}{1 \text{ Mole(Seeking)}} = \text{Mass(Seeking)}$$

**Known** chemical = what you're given in the problem (or the limiting reactant).

**Seeking** chemical = what you're looking for.

### 10.2 Limiting Reactant Resource:

Procedure:

1. Balance the reaction.
2. Calculate how many moles of reactants you have in your problem.
3. Make a ratio of moles of reactants from your problem, and then make a proportion so that the moles of the denominator's reactant **equals one mole**.

Example:

$$\begin{array}{ccc} \text{Ratio} \downarrow & & \text{Proportion} \downarrow \\ \frac{0.8 \text{ Moles Of Reactant 1}}{0.5 \text{ Moles Of Reactant 2}} & = & \frac{1.6 \text{ Moles Of Reactant 1}}{1 \text{ Mole Of Reactant 2}} \end{array}$$

4. Make a mole ratio of reactants from the balanced equation, so that the same reactant is on top as from your proportion. If necessary, make a proportion so that you have a 1 in the denominator.
5. Compare the two proportions → If reactant 1 of your problem's ratio is greater than reactant 1 of the balanced reaction's ratio, then reactant 1 is in excess. If not, it is limiting.

Once you determine what the limiting reactant is, you can use stoichiometry to figure out:

- A. Amount of product formed.
- B. The amount of excess reactant left.

**Remember:** Always start with your LIMITING REACTANT to calculate product formed and reactant left over.

### **Percent Yield.**

This is determined by the following equation:

$$\text{Percent Yield} = \frac{\text{Experimental Yield}}{\text{Theoretical Yield}} \times 100\%$$

Where:

Experimental Yield is the amount of product actually generated during a reaction.

Theoretical Yield is the amount of product possible in ideal laboratory conditions. You must calculate this using stoichiometry, starting with the amount of a limiting reactant.

### **10.3 Hydrated Compound Prefixes Resource**

Number of Atoms	Prefix	Number of Atoms	Prefix
1	mono-	6	hexa-
2	di-	7	hepta-
3	tri-	8	octa-
4	tetra-	9	nona-
5	penta-	10	deca-

### **Unit 11 Resources – Gas Laws**

## Unit 12 Resources – Solutions & Acids and Bases

### Common Acids Resource

The three acids in **boldface** are the most common acids.

Acetic acid (vinegar)	$\text{CH}_3\text{COOH}$ (or $\text{C}_2\text{H}_4\text{O}_2$ )	Weak
Carbonic acid	$\text{H}_2\text{CO}_3$	Weak
Chloric acid	$\text{HClO}_3$	Weak
Chlorous acid	$\text{HClO}_2$	Weak
Hydrobromic acid	$\text{HBr}$	Strong
<b>Hydrochloric acid</b>	<b><math>\text{HCl}</math></b>	Strong
Hydrocyanic acid	$\text{HCN}$	Weak
Hydrofluoric acid	$\text{HF}$	Weak
Hydroiodic acid	$\text{HI}$	Strong
Hydrosulfuric acid	$\text{H}_2\text{S}$	Weak
<b>Nitric acid</b>	<b><math>\text{HNO}_3</math></b>	Strong
Nitrous acid	$\text{HNO}_2$	Weak
Phosphoric acid	$\text{H}_3\text{PO}_4$	Weak
<b>Sulfuric acid</b>	<b><math>\text{H}_2\text{SO}_4</math></b>	Strong
Sulfurous acid	$\text{H}_2\text{SO}_3$	Weak

### Common Bases Resource

#### Strong Bases

Barium Hydroxide	$\text{Ba}(\text{OH})_2$
Beryllium Hydroxide	$\text{Be}(\text{OH})_2$
Calcium Hydroxide	$\text{Ca}(\text{OH})_2$
Lithium Hydroxide	$\text{LiOH}$
Magnesium Hydroxide	$\text{Mg}(\text{OH})_2$
Potassium Hydroxide	$\text{KOH}$
Sodium Hydroxide	$\text{NaOH}$
Strontium Hydroxide	$\text{Sr}(\text{OH})_2$

#### Weak Bases All others, including:

Aluminum Hydroxide	$\text{Al}(\text{OH})_3$
Ammonium Hydroxide	$\text{NH}_4\text{OH}$
Copper (I) Hydroxide	$\text{CuOH}$
Copper (II) Hydroxide	$\text{Cu}(\text{OH})_2$
Iron (II) Hydroxide	$\text{Fe}(\text{OH})_2$
Iron (III) Hydroxide	$\text{Fe}(\text{OH})_3$
Zinc Hydroxide	$\text{Zn}(\text{OH})_2$



## Unit 13 Resources – Redox Reactions and Electrochemistry

### Assigning Oxidation Numbers Resource:

- Pure elements (even diatomic ones) have a charge of 0.
- Oxide = -2 when an oxide, but in peroxide ( $O_2^{2-}$ ) = -1.
- Fluoride is always -1.
- First group metals including hydrogen has a charge of +1.
  - Second group metals have a charge of +2.
- The sum of oxidation numbers in neutral compounds is 0.
- The sum of oxidation numbers in a polyatomic ion is equal to its charge.
- Monatomic ions' charges are already present.
- If it's an ionic compound, look at your ions list for the charges.

### Reduction Potentials Resource

Standard Reduction Potentials at 25°C (298 K) for Many Common Half-reactions

Half-reaction	$E^\circ$ (V)	Half-reaction	$E^\circ$ (V)
$F_2 + 2e^- \rightarrow 2F^-$	2.87	$O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$	0.40
$Ag^+ + e^- \rightarrow Ag$	1.99	$Cu^{2+} + 2e^- \rightarrow Cu$	0.34
$Co^{3+} + e^- \rightarrow Co^{2+}$	1.82	$Hg_2Cl_2 + 2e^- \rightarrow 2Hg + 2Cl^-$	0.27
$H_2O_2 + 2H^+ + 2e^- \rightarrow 2H_2O$	1.78	$AgCl + e^- \rightarrow Ag + Cl^-$	0.22
$Ce^{4+} + e^- \rightarrow Ce^{3+}$	1.70	$SO_4^{2-} + 4H^+ + 2e^- \rightarrow H_2SO_3 + H_2O$	0.20
$PbO_2 + 4H^+ + SO_4^{2-} + 2e^- \rightarrow PbSO_4 + 2H_2O$	1.69	$Cu^{2+} + e^- \rightarrow Cu^+$	0.16
$MnO_4^- + 4H^+ + 3e^- \rightarrow MnO_2 + 2H_2O$	1.68	$2H^+ + 2e^- \rightarrow H_2$	0.00
$IO_4^- + 2H^+ + 2e^- \rightarrow IO_3^- + H_2O$	1.60	$Fe^{3+} + 3e^- \rightarrow Fe$	-0.036
$MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$	1.51	$Pb^{2+} + 2e^- \rightarrow Pb$	-0.13
$Au^{3+} + 3e^- \rightarrow Au$	1.50	$Sn^{2+} + 2e^- \rightarrow Sn$	-0.14
$PbO_2 + 4H^+ + 2e^- \rightarrow Pb^{2+} + 2H_2O$	1.46	$Ni^{2+} + 2e^- \rightarrow Ni$	-0.23
$Cl_2 + 2e^- \rightarrow 2Cl^-$	1.36	$PbSO_4 + 2e^- \rightarrow Pb + SO_4^{2-}$	-0.35
$Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$	1.33	$Cd^{2+} + 2e^- \rightarrow Cd$	-0.40
$O_2 + 4H^+ + 4e^- \rightarrow 2H_2O$	1.23	$Fe^{2+} + 2e^- \rightarrow Fe$	-0.44
$MnO_2 + 4H^+ + 2e^- \rightarrow Mn^{2+} + 2H_2O$	1.21	$Cr^{3+} + e^- \rightarrow Cr^{2+}$	-0.50
$IO_3^- + 6H^+ + 5e^- \rightarrow \frac{1}{2}I_2 + 3H_2O$	1.20	$Cr^{3+} + 3e^- \rightarrow Cr$	-0.73
$Br_2 + 2e^- \rightarrow 2Br^-$	1.09	$Zn^{2+} + 2e^- \rightarrow Zn$	-0.76
$VO_2^+ + 2H^+ + e^- \rightarrow VO^{2+} + H_2O$	1.00	$2H_2O + 2e^- \rightarrow H_2 + 2OH^-$	-0.83
$AuCl_4^- + 3e^- \rightarrow Au + 4Cl^-$	0.99	$Mn^{2+} + 2e^- \rightarrow Mn$	-1.18
$NO_3^- + 4H^+ + 3e^- \rightarrow NO + 2H_2O$	0.96	$Al^{3+} + 3e^- \rightarrow Al$	-1.66
$ClO_2 + e^- \rightarrow ClO_2^-$	0.954	$H_2 + 2e^- \rightarrow 2H^-$	-2.23
$2Hg_2^{2+} + 2e^- \rightarrow Hg_2^{2+}$	0.91	$Mg^{2+} + 2e^- \rightarrow Mg$	-2.37
$Ag^+ + e^- \rightarrow Ag$	0.80	$La^{3+} + 3e^- \rightarrow La$	-2.37
$Hg_2^{2+} + 2e^- \rightarrow 2Hg$	0.80	$Na^+ + e^- \rightarrow Na$	-2.71
$Fe^{3+} + e^- \rightarrow Fe^{2+}$	0.77	$Ca^{2+} + 2e^- \rightarrow Ca$	-2.76
$O_2 + 2H^+ + 2e^- \rightarrow H_2O_2$	0.68	$Ba^{2+} + 2e^- \rightarrow Ba$	-2.90
$MnO_4^- + e^- \rightarrow MnO_4^{2-}$	0.56	$K^+ + e^- \rightarrow K$	-2.92
$I_2 + 2e^- \rightarrow 2I^-$	0.54	$Li^+ + e^- \rightarrow Li$	-3.05
$Cu^+ + e^- \rightarrow Cu$	0.52		

### Spring Chemistry Terms Bingo Lists

Put one term in each of 24 cells on your grid. There will be a few terms left over, but all of them MIGHT be selected during the game, good luck with your choices. When you get five in a row, yell out "Oxidation!" and I'll check your grid, and assign points. Don't clear your board yet, we'll have a couple winners per game. You may use this on the final!

#### List 1

Alkene  
Distillation  
Organic Compound  
Benzene  
Cycloalkane  
Single Replacement  
Aqueous  
Skeleton Equation  
Spectator Ion  
Insoluble  
Formula Unit  
Molar Mass  
Empirical Formula  
Hydrated Compound  
Excess Reactant  
Actual Yield

Heterogeneous  
Colloid  
Molarity  
Dilute Solution  
Polyprotic Acid  
Weak Acid/Base  
Saturated  
Percent by Mass  
Arrhenius Acid  
Titration  
Oxidation  
Oxidation Number  
Voltaic Cell  
Primary Battery  
Electrolysis  
Cathode

#### List 1 Grid

		Free!		

## List 2

Alkane  
Alkyne  
Parent Chain  
Substituent  
Alcohol  
Saturated Hydrocarbon  
Combustion  
Double Replacement  
Complete Equation  
Synthesis  
Precipitate  
Soluble  
Mole  
Molecule  
Percent Composition  
Molecular Formula  
Mole Ratio

Limiting Reactant  
Theoretical Yield  
Suspension  
Electrolyte  
Stock Solution  
Monoprotic Acid  
Strong Acid/Base  
Supersaturated  
Indicator  
Reduction  
Electrochemistry  
Electroplating  
Secondary Battery  
Lead-Acid Battery  
Anode  
Ether

### List 2 Grid

		Free!		

Neutralization  
Electrode  
Percent by Volume

**List 3**

Solvation  
Decomposition  
Yay?

**List 3 Grid**

		Free!		

## Spring Semester Review Problems

Chemistry Final Exam Review – These are conceptual problems only. You will also be accountable for mathematical ones – during your review, make sure to practice this type of problem as well. Answers will be posted the second day of finals review.

### Unit 5 Hydrocarbons and Organic Chemistry

1. What is a hydrocarbon?
2. What is an organic compound?
3. What is distillation?
4. What is an alkane?
5. How many carbon atoms does hexane have?
6. What is a substituent group?
7. What is a parent chain?
8. What are alkenes?
9. What are alkynes?
10. What is a saturated fat?
11. What does the prefix “cyclo” mean in organic chemistry?
12. How many carbon atoms are in 1-methyl cyclooctene?
13. How is benzene a special cyclic hydrocarbon?
14. Draw the structure of benzene.
15. What elements could make for a halogenated functional group?
16. Draw an example of an alcohol.
17. Draw an example of an ether.

<b>Points Possible:</b>	<b>20</b>
<b>Late/Inc. Fee:</b>	<b>-2 -4 -6</b>
<b>Final Score:</b>	<b>/ 20</b>

### **Unit 6 – Chemical Reactions**

18. What are three of the five signs that a chemical change may have occurred?
19. What does aqueous mean?
20. What is a skeleton equation?
21. What is a synthesis reaction?
22. What are the products of a combustion reaction?
23. What is a single replacement reaction?
24. List two ions that will always be soluble.
25. What is a precipitate?
26. What is a spectator ion?

### **Unit 7– The Mole and Stoichiometry**

27. How many particles are in a mole?
28. List two types of particles.
29. What is molar mass?
30. How many atoms are in one formula unit of  $\text{CaCO}_3$ ?
31. How many moles of oxygen are there in one mole of  $\text{H}_2\text{SO}_4$ ?
32. What is percent composition?
33. What is empirical formula?
34. What is molecular formula?
35. What is a hydrate?
36. How many water units are there in a “tetrahydrate”?
37. What is stoichiometry?
38. What is a mole ratio?
39. What is a limiting reactant?

40. What is an excess reactant?
41. Why would a chemist use an excess reactant?
42. What is a theoretical yield?
43. What is the actual yield of a reaction?

### **Unit 8 – Gas Laws**

#### **Add Review Questions Here**

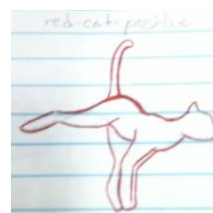
### **Unit 9 - Solutions & Acids and Bases**

44. What is a heterogeneous mixture?
45. What is a suspension?
46. What is a colloid?
47. What is a solvent?
48. What is a solute?
49. In chemistry, what is concentration?
50. What type of concentration would you use when both solute and solvent are liquids?
51. What is the definition of molarity?
52. What is a stock solution?
53. What is the dilution equation?
54. What are two ways you could increase the rate of solvation of a solid in water?
55. What is a supersaturated solution?
56. What is a saturated solution?
57. What is an electrolyte?
58. What does an Arrhenius acid contain?

59. What is a polyprotic acid?
60. What is a strong acid?
61. List three strong acids.
62. List two weak acids.
63. List three strong bases.
64. Will an acid have a high or low pH?
65. What is pOH?
66. What do you neutralize an acid spill with?
67. What is titration?
68. What is a way of determining the end point of a titration?

### **Unit 10 – Redox Reactions & Electrochemistry**

69. What is oxidation?
70. What is reduction?
71. What is a redox reaction?
72. What is an oxidizer?
73. What is a reducer?
74. What is the oxidation number of a pure element?
75. What is the oxidation number of the elements in CO<sub>2</sub>?
76. Can you have an oxidation without a corresponding reduction?
77. What is electrochemistry?
78. How is a voltaic cell made?
79. What does red-cat-positive mean in an electrochemical cell?
80. What does the following notation tell:  $\text{Zn} \mid \text{Zn}^{2+} \parallel \text{Cu}^{2+} \mid \text{Cu}$ ?





81. What is a primary battery?
82. What is a secondary battery?
83. What is the electrolyte in a dry cell battery?
84. Name an example of a secondary battery.
85. What are the reactants of a fuel cell?
86. What is corrosion?
87. What is galvanization?
88. What is electrolysis?
89. What are the products of the electrolysis of water?
90. What are the products of a Down's Cell?
91. What are the products of the electrolysis of brine?
92. In electroplating, will the cathode or anode grow in size?

# The Periodic Table of the Elements

1	<b>H</b> Hydrogen 1.00794											2	<b>He</b> Helium 4.003																								
3	<b>Li</b> Lithium 6.941	4	<b>Be</b> Beryllium 9.012182											9	<b>F</b> Fluorine 18.9984032	10	<b>Ne</b> Neon 20.1797																				
11	<b>Na</b> Sodium 22.989770	12	<b>Mg</b> Magnesium 24.3050											17	<b>Cl</b> Chlorine 35.4527	18	<b>Ar</b> Argon 39.948																				
19	<b>K</b> Potassium 39.0983	20	<b>Ca</b> Calcium 40.078	21	<b>Sc</b> Scandium 44.955910	22	<b>Ti</b> Titanium 47.867	23	<b>V</b> Vanadium 50.9415	24	<b>Cr</b> Chromium 51.9961	25	<b>Mn</b> Manganese 54.938049	26	<b>Fe</b> Iron 55.845	27	<b>Co</b> Cobalt 58.933200	28	<b>Ni</b> Nickel 58.6934	29	<b>Cu</b> Copper 63.546	30	<b>Zn</b> Zinc 65.39	31	<b>Ga</b> Gallium 69.723	32	<b>Ge</b> Germanium 72.61	33	<b>As</b> Arsenic 74.92160	34	<b>Se</b> Selenium 78.96	35	<b>Br</b> Bromine 79.904	36	<b>Kr</b> Krypton 83.80		
37	<b>Rb</b> Rubidium 85.4678	38	<b>Sr</b> Strontium 87.62	39	<b>Y</b> Yttrium 88.90585	40	<b>Zr</b> Zirconium 91.224	41	<b>Nb</b> Niobium 92.90638	42	<b>Mo</b> Molybdenum 95.94	43	<b>Tc</b> Technetium (98)	44	<b>Ru</b> Ruthenium 101.07	45	<b>Rh</b> Rhodium 102.90550	46	<b>Pd</b> Palladium 106.42	47	<b>Ag</b> Silver 107.8682	48	<b>Cd</b> Cadmium 112.411	49	<b>In</b> Indium 114.818	50	<b>Sn</b> Tin 118.710	51	<b>Sb</b> Antimony 121.760	52	<b>Te</b> Tellurium 127.60	53	<b>I</b> Iodine 126.90447	54	<b>Xe</b> Xenon 131.29		
55	<b>Cs</b> Cesium 132.90545	56	<b>Ba</b> Barium 137.327	57	<b>La</b> Lanthanum 138.9055	72	<b>Hf</b> Hafnium 178.49	73	<b>Ta</b> Tantalum 180.9479	74	<b>W</b> Tungsten 183.84	75	<b>Re</b> Rhenium 186.207	76	<b>Os</b> Osmium 190.23	77	<b>Ir</b> Iridium 192.217	78	<b>Pt</b> Platinum 195.078	79	<b>Au</b> Gold 196.96655	80	<b>Hg</b> Mercury 200.59	81	<b>Tl</b> Thallium 204.3833	82	<b>Pb</b> Lead 207.2	83	<b>Bi</b> Bismuth 208.98038	84	<b>Po</b> Polonium (209)	85	<b>At</b> Astatine (210)	86	<b>Rn</b> Radon (222)		
87	<b>Fr</b> Francium (223)	88	<b>Ra</b> Radium (226)	89	<b>Ac</b> Actinium (227)	104	<b>Rf</b> Rutherfordium (261)	105	<b>Db</b> Dubnium (262)	106	<b>Sg</b> Seaborgium (263)	107	<b>Bh</b> Bohrium (262)	108	<b>Hs</b> Hassium (265)	109	<b>Mt</b> Meitnerium (266)	110		111		112		113		114											
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