

Dear Future AP Chemistry Students and Their Parents,

It is a pleasure to have you express an interest in taking AP Chemistry course for the upcoming school year. The College Board sponsors the Advanced Placement Program, which allows students in high school to obtain college credit and/or placement above introductory course level at the college they attend. This is a program of credit by examination. The College Board hires the Educational Testing Service (ETS) to write and grade the AP Chemistry Exams. Grades are assigned on a basis of 1-5 with a 4 as a “passing” score.

This privilege, however, does not mean that the road to success in this class will be easy. Both the student and the parent should not be surprised at the amount of work required for this class. It will not be unusual for you to be responsible for several assignments at one time. For example, there will be regular reading assignments and problem sets, on-line assignments, labs to write up, and time to study for tests and exams. Students should spend at least five- ten hours a week outside of class studying for this class. Also, do not be surprised if some students who are accustomed to “making all A’s”, will suddenly begin “making B’s or C’s” on tests and start to doubt themselves, their teacher, and their decision to enter this course. You must keep in mind that you are taking a college level course with standards that are higher than usual. Students do not have to have A’s on every test to do very well on the AP Exam.

Not only must AP Chemistry class provide evidence of learning chemistry concepts, it must also provide a strong laboratory component. The problem comes with sufficient time in class to incorporate the appropriate labs to reinforce these concepts. The challenge here lies in the student. It is not necessary to spend class time working out large numbers of example problems when developing a specific concept. A few types of problems can be addressed and then we move on the next topic. The course can move faster and not lose quality if more of the responsibility for learning is placed on the student. Extra class time before and/or after school and on some weekends will be a must.

Because of the vast amount of time required for this class or any other AP class, your extracurricular activities should be chosen wisely. The AP student must truly be able to budget their time and keep organized. Self-discipline and self-motivation is a key part of being successful in the AP Chemistry course.

As you probably already know, AP Chemistry is a very challenging course with an equally challenging AP test. The material is detailed and we have several topics to cover. Our course is designed to be the equivalent of the general chemistry course usually taken during the first college year. In addition, the program has been specifically designed for first year chemistry students so they can take two years of curriculum in one. Our course meets the objectives of a good general chemistry college course. Usually the AP chemistry course is designed to be taken only after the successful completion of a first course in high school chemistry. This program has been modified to allow students to take the course as a first year high school chemistry course.

The students and the program will be evaluated by taking three exit exams:

- College Board Advanced Placement Chemistry Exam
- SAT II exam in chemistry
- The New York State Chemistry Regents Exam

Your goal should be to complete the summer assignment and email questions as they arise. We will reinforce this review with some lab activities during the beginning of the semester. We will have an exam on the summer assignment during the first week of class.

You can email me at [mkromer@emufsd.us](mailto:mkromer@emufsd.us) if you need assistance or have questions. Also, we will use Google docs, Google Drive, Remind, Vimeo, Bozeman Science and a plethora of other online materials. Students are encouraged to use the online resources available.

Have a wonderful summer and see you in September! I look forward to next year and I hope that this information has been helpful.

Sincerely,

Mrs. Kromer

W. T. Clarke High School

**The student should have the following on the first day of class:**

**Required materials:**

1. A 3 Ring Binder: 1 Inch, with Pockets - Any Color
2. A Package of Lined Notebook Paper with 3-Holes
3. Mechanical pencils, refills, erasers, and **BLACK** Pens
4. A Set of Highlighters - 4 Different Colors
5. TI 30XII-S Calculator (Standard)
6. A composition notebook

**Completed summer assignment**

**Completed and signed contracts (student and parent)**

**Signed up for college board access: <http://student.collegeboard.org/>**

**Signed up vimeo <https://vimeo.com/join>**

# **AP Chemistry Summer Packet**

Academic Year: 2018-2019

## **Welcome to AP Chemistry**

### **Your summer assignment**

#### **Safety in the Chemistry Laboratory**

#### **PRACTICE: Mental math**

**MEMORIZE** the name and charge of every ion. You will also need to memorize the names of acids as they are derived from their anions.

**MEMORIZE** the solubility rules so you will know what compounds are soluble and what compounds are insoluble.

#### **Chapter 1: read and create an outline**

#### **Answer the following questions:**

The scientific method

Units of measurement and their conversion

Uncertainty in measurement

Significant figures

Dimensional analysis

Temperature and temperature conversions

Length, volume, mass and density

Classification of matter

Physical and chemical properties

Separation Science

#### **Chapter 2: read and create an outline**

#### **Answer the following questions:**

Naming Simple Compounds

Binary ionic compounds

Ionic Compounds with Polyatomic ions

Binary covalent compounds

Acids

## Mental Math Problems—no calculator

1) Complete the following chart – have the fractions in lowest terms.

	Decimal	Fraction		Decimal	Fraction
a)	0.375		j)	0.67	
b)	0.75		k)	0.125	
c)	0.875		l)	0.33	
d)	0.60		m)	0.5	
e)	0.25		n)	0.20	
f)	0.020		o)		$\frac{3}{4}$
g)	0.075		p)		$\frac{1}{4}$
h)	0.005		q)		$\frac{1}{5}$
i)	0.625		r)		$\frac{1}{16}$

2) solve the following by rewriting them as fractions (if needed) and **show your work**.

Express answers in this column as a fraction or whole number		Express answers in this column as a decimal (may approximate if needed)	
a)	$\frac{0.5}{0.125}$	g)	$\frac{1}{1.25}$
b)	$\frac{0.25}{0.50}$	h)	$\frac{0.5}{0.2}$
c)	$\frac{0.025}{0.075}$	i)	$\frac{\frac{1}{8}}{\frac{1}{5}}$
d)	$\frac{0.125}{0.075}$	j)	$\frac{1}{2\frac{1}{5}}$
e)	$\frac{0.6}{0.02}$	k)	$\frac{\frac{3}{8}}{2.5}$
f)	$\frac{0.6}{0.2}$	l)	$\frac{2.625}{1.75}$

3) Solve the following, showing all of your work.

a)	$\frac{6 \times 10^{18}}{4 \times 10^{-5}} =$
b)	$\frac{1}{4 \times 10^{-5}} =$
c)	$\frac{(4 \times 10^{-5})(1.5 \times 10^{13})}{1.5 \times 10^4} =$
d)	$(4 \times 10^{-5})(1.5 \times 10^{13}) =$
e)	$\frac{(2 \times 10^7)(1.5 \times 10^4)}{4.5 \times 10^8} =$
f)	$(4 \times 10^{-5})^3 =$

4) Solve the following problems, using cross canceling of numbers. Show your work.

a)  $9 \times \frac{1}{18} \times \frac{2}{4} \times \frac{44}{1} = \underline{\hspace{2cm}}$

e)  $87 \times \frac{1}{174} \times \frac{3}{2} \times \frac{28}{1} = \underline{\hspace{2cm}}$

b)  $280 \times \frac{1}{28} \times \frac{3}{1} \times \frac{6}{1} = \underline{\hspace{2cm}}$

f)  $12 \times \frac{1}{2} \times \frac{1}{2} \times \frac{42}{1} = \underline{\hspace{2cm}}$

c)  $70 \times \frac{1}{28} \times \frac{1}{1} \times \frac{42}{1} = \underline{\hspace{2cm}}$

g)  $165 \times \frac{1}{55} \times \frac{2}{4} \times \frac{158}{1} = \underline{\hspace{2cm}}$

$$\text{d)} \quad 48 \times \frac{1}{32} \times \frac{2}{3} \times \frac{158}{1} = \underline{\hspace{2cm}}$$

$$\text{h)} \quad 0.33 \times \frac{1}{44} \times \frac{1}{1} \times \frac{100}{1} = \underline{\hspace{2cm}}$$

5) Solve for "x".

$$\text{a)} \quad \frac{(x)(x)}{0.5} = 5.0 \times 10^{-5}$$

$$\text{b)} \quad \frac{(x)(x)}{0.25} = 6.4 \times 10^{-7}$$

$$\text{c)} \quad \frac{(x)(x)}{0.125} = 3.2 \times 10^{-9}$$

$$\text{d)} \quad (x)(2x)^2 = 3.2 \times 10^{-8}$$

$$\text{e)} \quad \frac{(x)(x)}{0.5} = 8.0 \times 10^{-16}$$

$$\text{f)} \quad (3x)^3(2x)^2 = 1.08 \times 10^{-3}$$

**Convert to scientific notation: —no calculator**

1. 67,001 \_\_\_\_\_

2. 54.65 \_\_\_\_\_

3. .00453 \_\_\_\_\_

4. 123.4 \_\_\_\_\_

5. .0992 \_\_\_\_\_

6. 4,009,001 \_\_\_\_\_

7. .0078500 \_\_\_\_\_

8. 890.00 \_\_\_\_\_

**Convert to regular notation: —no calculator**

1.  $1.5 \times 10^3$  \_\_\_\_\_

2.  $1.5 \times 10^{-3}$  \_\_\_\_\_

3.  $3.75 \times 10^{-2}$  \_\_\_\_\_

4.  $3.75 \times 10^2$  \_\_\_\_\_

5.  $2.2 \times 10^5$  \_\_\_\_\_

6.  $3.35 \times 10^{-1}$  \_\_\_\_\_

7.  $1.2 \times 10^{-4}$  \_\_\_\_\_

8.  $1 \times 10^4$  \_\_\_\_\_

9.  $1 \times 10^{-2}$  \_\_\_\_\_

10.  $4 \times 10^0$  \_\_\_\_\_

**Units of Measurement: Convert the following: —no calculator**

mega	kilo	hecto	deca
(M)	(k)	(h)	(da)
1,000,000	1000	100	10
$10^6$	$10^3$	$10^2$	$10^1$

<b>Basic Unit</b>			
gram (g)	liter (L)	meter (m)	

deci	centi	milli	micro
(d)	(c)	(m)	( $\mu$ )
.1	.01	.001	.000001
$10^{-1}$	$10^{-2}$	$10^{-3}$	$10^{-6}$

1.  $35 \text{ mL} =$  \_\_\_\_\_ dL      6.  $4,500 \text{ mg} =$  \_\_\_\_\_ g
2.  $950 \text{ g} =$  \_\_\_\_\_ kg      7.  $25 \text{ cm} =$  \_\_\_\_\_ mm
3.  $275 \text{ mm} =$  \_\_\_\_\_ cm      8.  $0.005 \text{ kg} =$  \_\_\_\_\_ ug
4.  $1,000 \text{ L} =$  \_\_\_\_\_ kL      9.  $0.075 \text{ m} =$  \_\_\_\_\_ cm
5.  $1,000 \text{ mL} =$  \_\_\_\_\_ L      10.  $15 \text{ g} =$  \_\_\_\_\_ mg

**Significant Figures:** Determine the number of significant figures for each number

- |     |                       |       |     |                        |       |
|-----|-----------------------|-------|-----|------------------------|-------|
| 1.  | 357                   | _____ | 2.  | 10000                  | _____ |
| 3.  | 51015                 | _____ | 4.  | $6.060 \times 10^{-2}$ | _____ |
| 5.  | 0.0007                | _____ | 6.  | $4.556 \times 10^{-9}$ | _____ |
| 7.  | 5050                  | _____ | 8.  | 5050.0                 | _____ |
| 9.  | $6.8 \times 10^3$     | _____ | 10. | 0.002110               | _____ |
| 11. | 33.303                | _____ | 12. | 170                    | _____ |
| 13. | $15.0 \times 10^{-5}$ | _____ | 14. | 0.7007                 | _____ |
| 15. | 0.70070               | _____ | 16. | 4206                   | _____ |
| 17. | 0.02                  | _____ | 18. | 10.01                  | _____ |
| 19. | 0                     | _____ | 20. | 0.0                    | _____ |

### Calculations Using Significant Figures—no calculator

Perform the following operations expressing the answer to the correct number of significant figures. Include units.

1.  $1.35 \text{ m} \times 2.467 \text{ m} =$  \_\_\_\_\_
2.  $1,035 \text{ m}^2 \div 42 \text{ m} =$  \_\_\_\_\_
3.  $12.01 \text{ mL} + 35.2 \text{ mL} + 6 \text{ mL} =$  \_\_\_\_\_
4.  $55.46 \text{ g} - 28.9 \text{ g} =$  \_\_\_\_\_
5.  $0.021 \text{ cm} \times 3.2 \text{ cm} \times 100.1 \text{ cm} =$  \_\_\_\_\_
6.  $0.15 \text{ cm} + 1.15 \text{ cm} + 2.051 \text{ cm} =$  \_\_\_\_\_
7.  $150 \text{ L}^3 \div 4 \text{ L} =$  \_\_\_\_\_
8.  $505 \text{ kg} - 450.25 \text{ kg} =$  \_\_\_\_\_
9.  $1.252 \text{ mm} \times 0.115 \text{ mm} \times 0.012 \text{ mm} =$  \_\_\_\_\_
10.  $1.278 \times 10^3 \text{ m}^2 \div 1.4267 \times 10^2 \text{ m} =$  \_\_\_\_\_

## **Dimensional analysis- solve using dimensional analysis only**

1. The highway department wants to plant trees along the highway from Colorado Springs to Denver. They plan to plant 18 trees per mile along this 97 mile strip of highway. How many trees are needed?
2. There are .621 miles in one km. How many km is it to “Wendy’s” if the distance is 2.3 miles? Hungry yet?
3. A good milk cow can produce 19 gallons of milk per day. If a typical family consumes 0.80 gallons of milk a day, how many cows are needed to provide for 5 families?
4. How many feet are in 1742 meters? (Hint 1 inch = 2.54 cm and 1 foot = 12 inches)
5. How many kilograms of golf balls are in 4155 balls that weigh 28.4 grams each?
6. How many  $\text{cm}^3$  are in 10  $\text{dm}^3$ ?
7. You have just been promoted to manager of your neighborhood McDonalds, and you have 453 kg of frozen burger in stock. If one burger uses 113.5 grams of “meat” how many burgers can you make?
8. Mr. Hatak has said that anyone over 190,000 hours old does not have to take the next test. Calculate what this age is in years and if you need to take the next test.
9. It has been determined that an average high school student uses 13,000 yards of pencil lead during their time in school. What is this distance in km? (1 yard = 3 feet and 1 in = 2.54 cm)
10. How many minutes are in 3.65 days?

11. How many eight hour days will a person who works for \$15.00 per hour have to work to make \$21,500?
12. How many liters are in 6.30 quarts of soft drinks? (1 liter = 1.06 quarts)
13. How many meters are in 3.46 miles? (2.54 cm = 1 inch)
14. Joe wants to take a vacation to San Francisco next summer and he needs to save some money for his trip. He figures it will take 568 dollars to make the trip. If Joe earns \$6.75 per hour, how many hours will he have to work to have enough to pay for the trip? If he only has ten 8-hour work days before his vacation, will he make enough to go on the trip?
15. There are 14.0 glibs in 3.0 glubs; 5.1 glibs in 6.8 grogs; and 6820 grogs in 13.0 blabs.  
If you were the proud owner of 1,344 glubs, how many blabs would your glubs be worth?

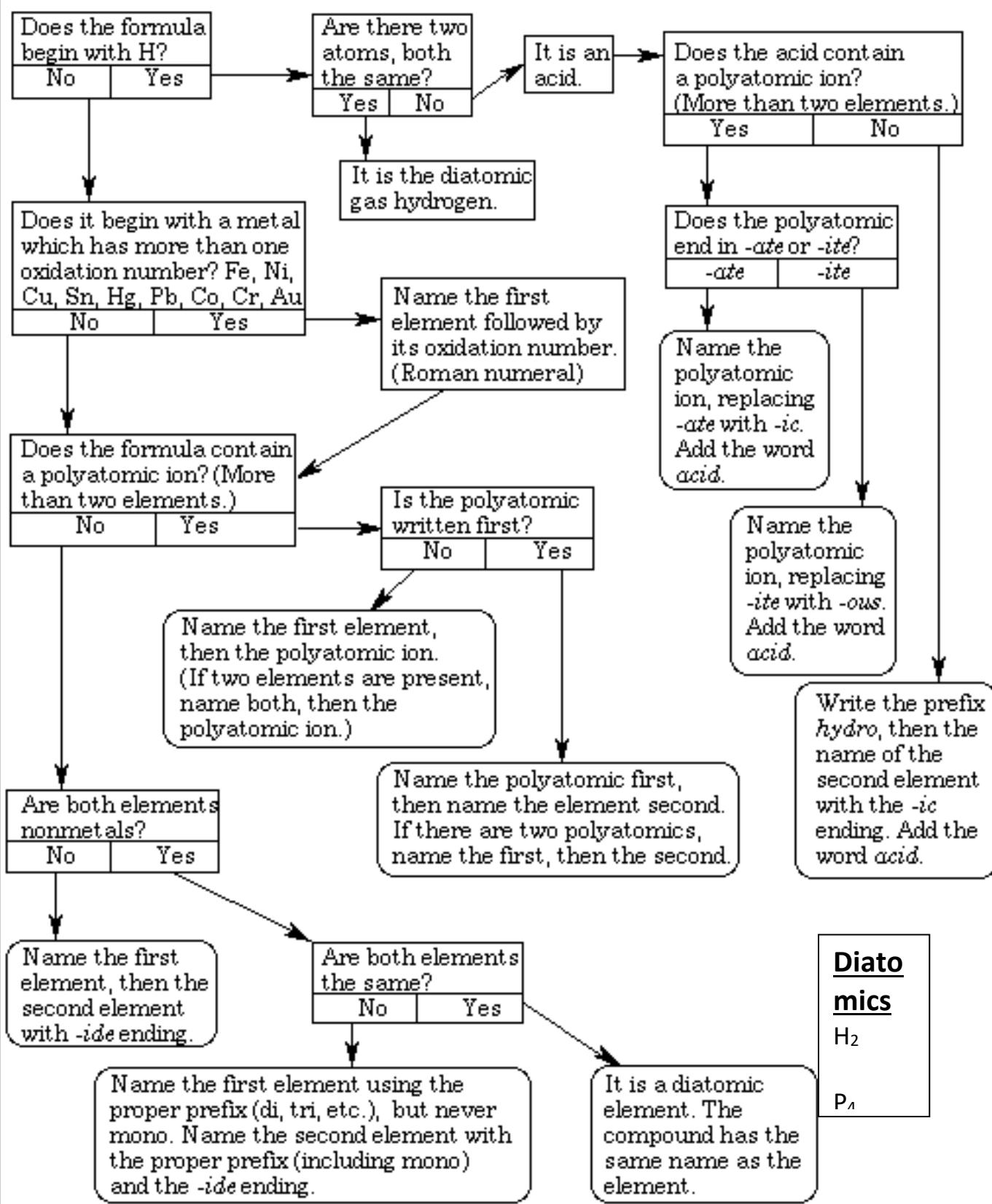
## **Density problems: answer to the correct number of significant figures**

1. A sample of zinc has a volume of 65 ml and a density of 7.1 g/ml. What is its mass?
  
  
  
  
  
  
2. The density of wood is 0.8 g/cm<sup>3</sup>. How many cm of wood must be measured to obtain 70. grams of wood?
  
  
  
  
  
  
3. A block of metal has a mass of 650 grams and has the dimension of 25. cm by 40. cm by 50. cm. Determine its density.
  
  
  
  
  
  
4. What volume will 400. grams of a substance occupy if its density is 8 g/ml?
  
  
  
  
  
  
5. The density of gold is 19.3 g/ml. What volume would a gold bar have if its mass were 193. grams?

What is the mass of 100. ml of alcohol having a density of 0.8 g/ml?

## Flow Chart for Naming Simple Inorganic Compounds

The flowchart is adapted from p. 131-132 of the February 1983 issue of the *Journal of Chemical Education*.



## Naming Compounds Practice:

**Nomenclature: Classify each of the following as molecular (M) or ionic (I).**

**Then, name each compound:**

	Name	M or I		Name	M or I
1) $\text{CaF}_2$			10) $\text{SrI}_2$		
2) $\text{P}_4\text{O}_{10}$			11) CO		
3) $\text{K}_2\text{S}$			12) $\text{Cs}_2\text{Po}$		
4) $\text{NaH}$			13) $\text{ZnAt}_2$		
5) $\text{Al}_2\text{Se}_3$			14) $\text{P}_2\text{S}_3$		
6) $\text{N}_2\text{O}$			15) $\text{AgCl}$		
7) $\text{O}_2\text{F}$			16) $\text{Na}_3\text{N}$		
8) $\text{SBr}_6$			17) $\text{Mg}_3\text{P}_2$		
9) $\text{Li}_2\text{Te}$			18) $\text{XeF}_6$		

## More Nomenclature

Formula	Name	Formula	Name
1) $\text{FeSO}_3$		16) $\text{Fe}_2\text{O}_3$	
2) $\text{Cu}(\text{NO}_3)_2$		17) $(\text{NH}_4)_2\text{SO}_3$	
3) $\text{SrCl}_2$		18) $\text{Ca}(\text{MnO}_4)_2$	
4) $\text{AgBr}$		19) $\text{PF}_5$	
5) $\text{KClO}_3$		20) LiH	
6) $\text{MgCO}_3$		21) $\text{KClO}_3$	
7) $\text{BaO}_2$ *think*		22) $\text{NaBrO}_2$	
8) $\text{KO}_2$		23) $\text{Ca}_3(\text{PO}_4)_2$	
9) $\text{SnO}_2$		24) $\text{LiClO}_4$	
10) $\text{Ni}_3(\text{PO}_4)_2$		25) $\text{Fe}(\text{IO}_2)_3$	
11) $\text{Pb}(\text{OH})_2$		26) $\text{N}_2\text{I}_5$	
12) $\text{CuCH}_3\text{COO}$		27) $\text{C}_6\text{H}_5$	
13) $\text{N}_2\text{O}_4$		28) $\text{Hg}_2(\text{IO})_2$	
14) $\text{Rb}_3\text{P}$		29) $\text{H}_3\text{PO}_3$	

**15) S<sub>8</sub>**

**30) NH<sub>4</sub>BrO<sub>3</sub>**

# Review and know ALL Polyatomics. You will have an assessment week 2 when you return to school

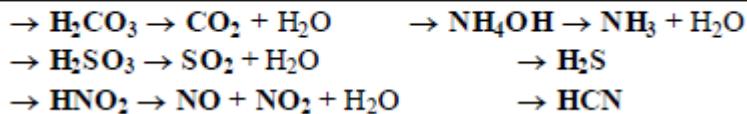
Name	Formula	Name	Formula
Nitrate**	$\text{NO}_3^-$	Carbonate**	$\text{CO}_3^{2-}$
Hydroxide**	$\text{OH}^-$	Chromate**	$\text{CrO}_4^{2-}$
Permanganate	$\text{MnO}_4^-$	Dichromate	$\text{Cr}_2\text{O}_7^{2-}$
Acetate	$\text{C}_2\text{H}_3\text{O}_2^-$ or $\text{CH}_3\text{COO}^-$	Sulfate**	$\text{SO}_4^{2-}$
Hydrogen sulfate	$\text{HSO}_4^-$	Peroxide	$\text{O}_2^{2-}$
Bromate	$\text{BrO}_3^-$	Oxalate	$\text{C}_2\text{O}_4^{2-}$
Ammonium**	$\text{NH}_4^+$	Phosphate**	$\text{PO}_4^{3-}$
Nitrite	$\text{NO}_2^-$	Hypochlorite	$\text{ClO}^-$
Hydrogen Carbonate (bicarbonate)	$\text{HCO}_3^-$	Chlorite	$\text{ClO}_2^-$
Cyanide	$\text{CN}^-$	Chlorate**	$\text{ClO}_3^-$
Sulfite	$\text{SO}_3^{2-}$	Perchlorate** (Hyperchlorate)	$\text{ClO}_4^-$
Hydrogen phosphate	$\text{H PO}_4^{2-}$	Arsenite	$\text{AsO}_3^{3-}$
All group 1 metals	$1^+$	Zinc**and Cadmium	$\text{Zn}^{2+}$ and $\text{Cd}^{2+}$
All group 2 metals	$2^+$	Silver**	$\text{Ag}^+$
All group 13 metals	$3^+$	Iron**	$\text{Fe}^{2+}$ or $\text{Fe}^{3+}$
All group 16 (6) nonmetals	$2^-$	Copper**	$\text{Cu}^+$ or $\text{Cu}^{2+}$
All group 17 (7) nonmetals	$1^-$	Lead**	$\text{Pb}^{2+}$ or $\text{Pb}^{4+}$
All group 15 (5) nonmetals <u>except</u> Bismuth	$3^-$ $\text{Bi}^{3+}$	Cobalt	$\text{Co}^{2+}$ or $\text{Co}^{3+}$
Tin	$\text{Sn}^{2+}$ or $\text{Sn}^{4+}$	Nickel	$\text{Ni}^{2+}$ or $\text{Ni}^{3+}$
Chromium	$\text{Cr}^{3+}$ or $\text{Cr}^{2+}$	Manganese** (there are even more charges)	$\text{Mn}^{2+}$ or $\text{Mn}^{7+}$ or $\text{Mn}^{4+}$

<b>Formula</b>	<b>Name</b>	<b>Ion</b>	<b>Ion Name</b>
H <sub>2</sub> SO <sub>4</sub>	sulfuric acid	SO <sub>4</sub> <sup>2-</sup>	sulfate ion
H <sub>2</sub> SO <sub>3</sub>	sulfurous acid	SO <sub>3</sub> <sup>2-</sup>	sulfite ion
HNO <sub>3</sub>	nitric acid	NO <sub>3</sub> <sup>1-</sup>	nitrate ion
HNO <sub>2</sub>	nitrous acid	NO <sub>2</sub> <sup>1-</sup>	nitrite ion
H <sub>3</sub> PO <sub>4</sub>	phosphoric acid	PO <sub>4</sub> <sup>3-</sup>	phosphate ion
H <sub>2</sub> CO <sub>3</sub>	carbonic acid	CO <sub>3</sub> <sup>2-</sup>	carbonate ion
HMnO <sub>4</sub>	permanganic acid	MnO <sub>4</sub> <sup>1-</sup>	permanganate ion
HCN	hydrocyanic acid	CN <sup>1-</sup>	cyanide ion
HO CN	cyanic acid	OCN <sup>1-</sup>	cyanate ion
HSCN	thiocyanic acid	SCN <sup>1-</sup>	thiocyanate ion
HC <sub>2</sub> H <sub>3</sub> O <sub>2</sub>	acetic acid	C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> <sup>1-</sup>	acetate ion
H <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	oxalic acid	C <sub>2</sub> O <sub>4</sub> <sup>2-</sup>	oxalate ion
H <sub>2</sub> CrO <sub>4</sub>	chromic acid	CrO <sub>4</sub> <sup>2-</sup>	chromate ion
H <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>	dichromic acid	Cr <sub>2</sub> O <sub>7</sub> <sup>2-</sup>	dichromate ion
H <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	thiosulfuric acid	S <sub>2</sub> O <sub>3</sub> <sup>2-</sup>	thiosulfate ion
H <sub>3</sub> AsO <sub>4</sub>	arsenic acid	AsO <sub>4</sub> <sup>3-</sup>	arsenate ion
H <sub>3</sub> AsO <sub>3</sub>	arsenous acid	AsO <sub>3</sub> <sup>3-</sup>	arsenite ion

Nick the Camel ate a Clam Supper in  
Phoenix.

Nick - N with 3 consonants and 1 vowel

### GASES THAT FORM



\*\*Make sure you know that ANY "carbonate" breaks down into CO<sub>2</sub> and H<sub>2</sub>O or formed from those two things!\*\*

Solubility Rules are a MUST KNOW!!! You CAN'T do AP without these. There will be an assessment Week 2 on the following:

### Solubility Rules—Mostly Soluble

Element/Ion	Exceptions
Group I, NH <sub>4</sub> <sup>+</sup> , ClO <sub>3</sub> <sup>-</sup> , ClO <sub>4</sub> <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , CH <sub>3</sub> COO <sup>-</sup> (C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> <sup>-</sup> )	None (Takes precedence)
Cl <sup>-</sup> , Br <sup>-</sup> , I <sup>-</sup>	Pb <sup>2+</sup> Ag <sup>+</sup> Hg <sub>2</sub> <sup>2+</sup> “heavy metal bad guys”
SO <sub>4</sub> <sup>2-</sup>	Pb <sup>2+</sup> Ag <sup>+</sup> Hg <sub>2</sub> <sup>2+</sup> Ca <sup>2+</sup> Ba <sup>2+</sup> Sr <sup>2+</sup>
F <sup>-</sup>	Pb <sup>2+</sup> Ag <sup>+</sup> Hg <sub>2</sub> <sup>2+</sup> [Ca <sup>2+</sup> Ba <sup>2+</sup> Sr <sup>2+</sup> Be <sup>2+</sup> Mg <sup>2+</sup> ] group II

### Solubility Rules—Mostly Insoluble

Element/Ion	Exceptions
-------------	------------

$\text{CO}_3^{2-}$	Group I and $\text{NH}_4^+$
$\text{C}_2\text{O}_4^{2-}$	***
$\text{CrO}_4^{2-}$	***
$\text{PO}_4^{3-}$	***
$\text{OH}^-$	*** $\text{Ca}^{2+}$ $\text{Ba}^{2+}$ $\text{Sr}^{2+}$
$\text{S}^{2-}$	*** $[\text{Ca}^{2+}$ $\text{Ba}^{2+}$ $\text{Sr}^{2+}$ $\text{Be}^{2+}$ $\text{Mg}^{2+}]$ group II
*** NOTE: All of the above are subject to Group I and $\text{NH}_4^+$ *exceptions hence, asterisks.	Those were the ones that “take precedence” under “Mostly Soluble” .

## ALL OF THESE ARE 100% SOLUBLE!!

<u>Strong Acids</u>	<u>Strong Bases</u>	<u>Stinky gases</u>
HCl, HBr, HI	Group 1 hydroxides	*** $\text{H}_2\text{CO}_3 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$ ***
Sulfuric Nitric	Calcium, Strontium	$\text{NH}_4\text{OH} \rightarrow \text{NH}_3 + \text{H}_2\text{O}$
Perchloric	Barium hydroxides	$\text{H}_2\text{SO}_3 \rightarrow \text{H}_2\text{O} + \text{SO}_2$

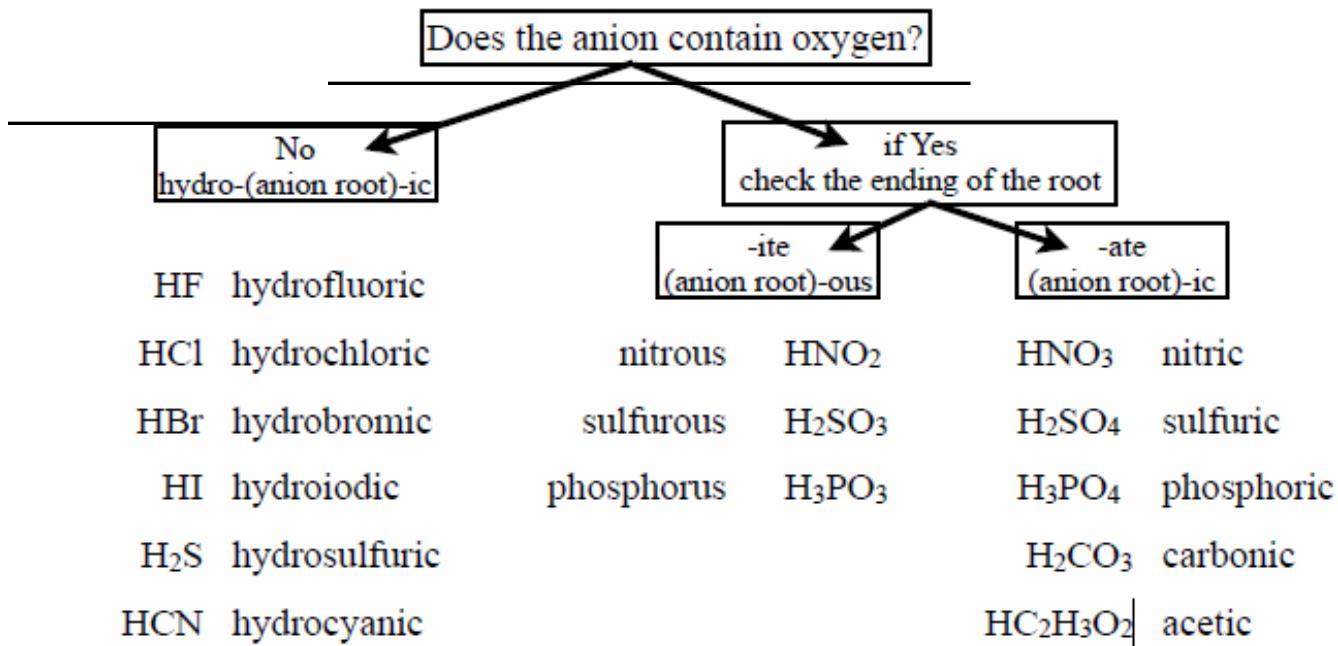
## Solubility Practice:

For the compounds in the table, write the formula for each compound in the first column and then use the solubility rules to determine if each compound is soluble or insoluble in water. In the second column write an *(S)* for those that are soluble and an *(I)* for those that are insoluble in water.

Name	Formula	<i>(S) or (I)</i>
silver nitrate		
cobalt (II) sulfate		
zinc hydroxide		
iron (III) iodide		
nickel (II) chloride		
lead (II) iodide		
sodium carbonate		
barium sulfate		
lead (II) sulfide		
silver phosphate		
lithium phosphate		
nickel (II) carbonate		
copper (II) hydroxide		
tin (IV) sulfate		
lead (II) nitrate		

Naming Acids will take you a LONG ways when we get to Acid Base Unit. There will be an assessment on Naming Acids.

## Demystifying the Naming of Acids (refer to page 61–62 in text)



Oxyhalogen Acids			
Formula	Oxy name	Ion	Ion name
HClO	hypochlorous acid	ClO <sup>-1</sup>	hypochlorite ion
HClO <sub>2</sub>	chlorous acid	ClO <sub>2</sub> <sup>-1</sup>	chlorite ion
HClO <sub>3</sub>	chloric acid	ClO <sub>3</sub> <sup>-1</sup>	chlorate ion
HClO <sub>4</sub>	perchloric acid	ClO <sub>4</sub> <sup>-1</sup>	perchlorate ion

*Br, I, can be substituted for Cl. F may form hypofluorous acid and the hypofluorite ion.*

## The Seven Strong Acids

★ memorize them ★

HNO <sub>3</sub> nitric acid	HCl hydrochloric acid
H <sub>2</sub> SO <sub>4</sub> sulfuric acid	HBr hydrobromic acid
HClO <sub>3</sub> chloric acid	HI hydroiodic acid
HClO <sub>4</sub> perchloric acid	



Practice with acids! Remember:

-IC from -ATE

-OUS from -ITE

HYDRO-, -IC from -IDE

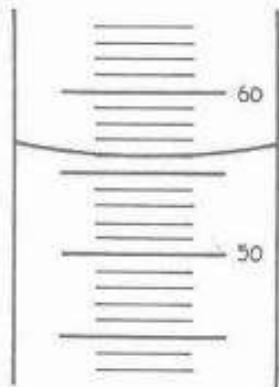
I ATE something that made me sICK

I sayed at the whITE hOUSE

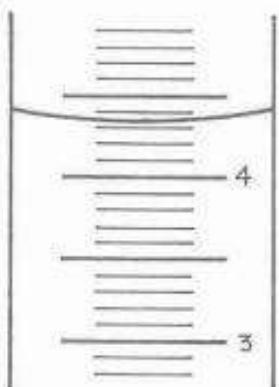
### Practicing Measuring Liquid Volume

#### ESTIMATE ONE DIGIT PAST PRECISE

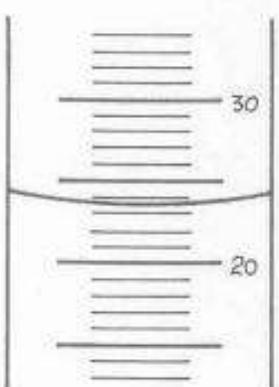
What volume is indicated on each of the graduated cylinders below? The unit of volume is mL.



a) \_\_\_\_\_



b) \_\_\_\_\_



c) \_\_\_\_\_

## Matter multiple choice

1. Matter which is not varied in composition is known as:  
a. homogeneous b. compounds c. elements d. heterogeneous
2. A solution is:  
a. a mixture b. a compound c. an element d. heterogeneous
3. A pure substance:  
**a.** homogeneous **b.** compounds **c.** mixture **d.** heterogeneous **e.** a and b
4. A pure substance:  
a. solution b. mixture c. elements d. heterogeneous
5. A single substance made from two or more elements, but with **ONE** identity:  
a. homogeneous b. compounds c. elements d. heterogeneous
6. Unevenly mixed:  
a. solution b. compounds c. elements d. heterogeneous
7. Two kinds of atoms mixed together:  
a. homogeneous b. compounds c. elements d. heterogeneous
8. Two samples of copper have a mass 20 and 100 grams respectively. You could assume that their \_\_\_\_\_ is equal:  
a. mass b. volume c. weight d. density
9. The slowest moving molecules are found in:  
a. solids b. gases c. liquids
10. A phase of matter with no definite shape and volume is:  
a. solid b. gas c. liquid
11. A change which **does not produce** a new substance with a new identity is:  
a. physical b. chemical c. ordinary d. homogeneous
12. A change which produces a change in form, **with a change** in composition is:  
a. physical b. chemical c. ordinary d. homogeneous

13. Burning gasoline is a \_\_\_\_\_ change.  
a. physical b. chemical c. ordinary d. homogeneous

14. Melting ice is a \_\_\_\_\_ change.  
a. physical b. chemical c. ordinary d. homogeneous

15. The number of states in a solution is:  
a. one b. two or more c. three d. none of these

16. When elements form a compound their properties:  
a. remain the same b. change

17. Mixtures can be separated by \_\_\_\_\_ means:  
a. physical b. chemical c. natural d. simple

18. Salad dressing which you have to shake is:  
a. heterogeneous b. homogeneous c. an element

19. Which of the following is a physical property?  
a. corrosive b. flammable c. density

20. Which of the following is not a pure substance?  
a. sugar b. dirt c. salt d. gold

21. Which of the following is a homogeneous mixture?  
a. salt b. salt water c. dirt d. sulfur

## **Physical vs. Chemical Properties**

A physical property is observed with the senses and can be determined without destroying the object. For example, color, shape, mass, length, and odor are all examples of physical properties.

A chemical property indicates how a substance reacts with something else. The original substance is fundamentally changed in observing a chemical property. For example the ability of iron to rust is a chemical property. The iron has reacted with oxygen, and the original iron metal is changed. It now exists as iron oxide, a different substance.

*Classify the following properties as either chemical or physical by putting a check in the appropriate column.*

	<b>Physical Property</b>	<b>Chemical Property</b>
1. Blue color		
2. Density		
3. Flammability		
4. Solubility		
5. reacts with an acid to form H <sub>2</sub>		
6. supports combustion		
7. sour taste		
8. melting point		
9. reacts with water to form a gas		
10. reacts with a base to form water		
11. hardness		
12. boiling point		
13. can neutralize a base		
14. luster		
15. odor		