

Future AP Chemistry Students,

I am excited that you have decided to accept the challenge of Advanced Placement Chemistry for the 2017-2018 school year. This class will be a new adventure for you and undoubtedly present new material and challenges we did not come close to in Honors Chemistry. Since it is a college level class and the pace is rigorous I will ask you to do some work over the summer to hone your chemical foundations knowledge. This summer work is essential, as it will cover introductory chapters in our text.

The summer work packet will be due on Monday, August 21st. The packet will be graded for accuracy so you should do your best on each and every question. Without adequate work justifying your answer (written with correct units) it will not be counted as correct – clearly showing work with proper units will be imperative throughout this course. You should find any help that you need in the textbook or your Honors Chemistry notes. If you find that you need additional assistance please let me know via email: [mckenzie.brastow@pinelakeprep.org](mailto:mckenzie.brastow@pinelakeprep.org) and I will direct you to a site that may help. Be sure that the work you complete is YOUR work only. On August 21 you will have a quiz on all of the ions and on August 22 you will quiz on solubility rules (potential to change – we will set definite dates in class). Test covering chapters 1-3 will be scheduled during the week of August 21. *Please take this assignment seriously.*

Summer work outline:

1. Purchase an AP Chemistry Review Book. There are many to choose from. The Princeton Review is a great study guide, but you may purchase any type. You should research and try to find the one that fits you best. If you have questions, please email me.
2. On the following pages you will find a list of common ions. **Please memorize them.** You will find that you already have most of them memorized. **To help you accomplish this, you may need to make 3 x 5 flashcards for each one.** For the quiz on Aug 21 you will need to know names and formulas.
3. On the following pages you will find a list of solubility rules. **Please memorize them.** You will find that you already have most of them memorized. **To help you accomplish this, you may need to make 3 x 5 flashcards for each one.** For the quiz on Aug 22 you will need to know and APPLY the rules.
4. Read through Chapters 1-3 in your book and take notes. At the end of the chapters complete the problems below (20-25 per chapter). Please work the problems in order and label them clearly. You must show appropriate work/units to receive credit. It is better to show something and not need it than vice versa.
  - a. Chapter 1: Matter, Measurement, and Problem Solving
    - i. Problems: 38, 44, 48, 50, 54, 60, 62, 68, 70, 72, 74, 76, 78, 82, 84, 86, 88, 94, 102, 128
  - b. Chapter 2: Atoms and Elements
    - i. Problems: 30, 32, 40, 48, 54, 62, 68, 70, 72, 76, 78, 80, 82, 88, 90, 102, 104, 114, 122, 126
  - c. Chapter 3: Molecules, Compounds, and Chemical Equations
    - i. Problems: 32, 34, 42, 44, 48, 50, 52, 54, 66, 68, 74, 76, 82, 84, 86, 88, 90, 96, 100, 108, 112, 114, 116, 118, 120
5. Test covering chapters 1-3 will be scheduled for the week of August 21.

# Formulas and Charges of Ions

## AP Chemistry

### Positive Ions

1+		2+		3+		4+		5+	
Group IA (1)		Group IIA (2)		Group IIIA (3)		Group IVA (4)		Group VA (5)	
Li <sup>+</sup>	Lithium	Be <sup>2+</sup>	Beryllium	Al <sup>3+</sup>	Aluminum	Si <sup>4+</sup>	Silicon (IV)	As <sup>5+</sup>	Arsenic (V)
Na <sup>+</sup>	Sodium	Mg <sup>2+</sup>	Magnesium	Ga <sup>3+</sup>	Gallium (III)	Ge <sup>4+</sup>	Germanium (IV)	Bi <sup>5+</sup>	Bismuth (V)
K <sup>+</sup>	Potassium	Ca <sup>2+</sup>	Calcium			Sn <sup>4+</sup>	Tin (IV)		
Rb <sup>+</sup>	Rubidium	Sr <sup>2+</sup>	Strontium			Pb <sup>4+</sup>	Lead (IV)		
Cs <sup>+</sup>	Cesium	Ba <sup>2+</sup>	Barium						
Fr <sup>+</sup>	Francium	Ra <sup>2+</sup>	Radium						
NH <sub>4</sub> <sup>+</sup>	Ammonium	Cd <sup>2+</sup>	Cadmium	Bi <sup>3+</sup>	Bismuth (III)				
Cu <sup>+</sup>	Copper (I)	Cr <sup>2+</sup>	Chromium (II)	Cr <sup>3+</sup>	Chromium (III)				
H <sup>+</sup>	Hydrogen	Co <sup>2+</sup>	Cobalt (II)	Co <sup>3+</sup>	Cobalt (III)				
H <sub>3</sub> O <sup>+</sup>	Hydronium	Cu <sup>2+</sup>	Copper (II)	Fe <sup>3+</sup>	Iron (III)				
Ag <sup>+</sup>	Silver	Fe <sup>2+</sup>	Iron (II)	Mn <sup>2+</sup>	Manganese (II)				
		Pb <sup>2+</sup>	Lead (II)	Ni <sup>2+</sup>	Nickel (II)				
		Mn <sup>2+</sup>	Manganese (II)						
		Hg <sub>2</sub> <sup>2+</sup>	Mercury (I)						
		Hg <sup>2+</sup>	Mercury (II)						
		Ni <sup>2+</sup>	Nickel (II)						
		Sn <sup>2+</sup>	Tin (II)						
		Zn <sup>2+</sup>	Zinc						

### Negative Ions

1-		2-		3-		4-	
Group VII (17)		Group VI (16)		Group VA (15)		Group IVA (14)	
F <sup>-</sup>	Fluoride	O <sup>2-</sup>	Oxide	N <sup>3-</sup>	Nitride	C <sup>4-</sup>	Carbide
Cl <sup>-</sup>	Chloride	S <sup>2-</sup>	Sulfide	P <sup>3-</sup>	Phosphide		
Br <sup>-</sup>	Bromide	Se <sup>2-</sup>	Selenide				
I <sup>-</sup>	Iodide						
C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> <sup>-</sup> (CH <sub>3</sub> COO <sup>-</sup> )	Acetate	CO <sub>3</sub> <sup>2-</sup>	Carbonate				
CN <sup>-</sup>	Cyanide	CrO <sub>4</sub> <sup>2-</sup>	Chromate	PO <sub>4</sub> <sup>3-</sup>	Phosphate		
H <sup>-</sup>	Hydride	Cr <sub>2</sub> O <sub>7</sub> <sup>2-</sup>	Dichromate	PO <sub>3</sub> <sup>3-</sup>	Phosphite		
OH <sup>-</sup>	Hydroxide	C <sub>2</sub> O <sub>4</sub> <sup>2-</sup>	Oxalate	AsO <sub>4</sub> <sup>3-</sup>	Arsenate		
NO <sub>3</sub> <sup>-</sup>	Nitrate	O <sub>2</sub> <sup>2-</sup>	Peroxide				
NO <sub>2</sub> <sup>-</sup>	Nitrite	SiO <sub>3</sub> <sup>2-</sup>	Silicate				
MnO <sub>4</sub> <sup>-</sup>	Permanganate	SO <sub>4</sub> <sup>2-</sup>	Sulfate				
ClO <sub>4</sub> <sup>-</sup>	Perchlorate	SO <sub>3</sub> <sup>2-</sup>	Sulfite				
ClO <sub>3</sub> <sup>-</sup>	Chlorate	HPO <sub>4</sub> <sup>2-</sup>	Hydrogen Phosphate				
ClO <sub>2</sub> <sup>-</sup>	Chlorite						
ClO <sup>-</sup>	Hypochlorite						
Similar for bromine and iodine:							
e.g., BrO <sub>3</sub> <sup>-</sup> Bromate							
HCO <sub>3</sub> <sup>-</sup>	Hydrogen Carbonate (Bicarbonate)						
HSO <sub>4</sub> <sup>-</sup>	Hydrogen Sulfate (Bisulfate)						
HSO <sub>3</sub> <sup>-</sup>	Hydrogen Sulfite (Bisulfite)						
H <sub>2</sub> PO <sub>4</sub> <sup>-</sup>	Dihydrogen Phosphate						

## Solubility Rules

The following set of rules is very useful in predicting which salts are soluble in water and which are not.

1. Salts containing alkali metal cations or ammonium are soluble.
2. Salts containing nitrate, acetate chlorate or perchlorate anions are soluble.
3. Salts containing chloride, bromide or iodide are soluble. (Except for  $\text{Cu}^+$ ,  $\text{Ag}^+$ ,  $\text{Hg}_2^{+2}$  and  $\text{Pb}^{+2}$ )
4. Salts containing sulfate or sulfite are soluble. (Except  $\text{Ca}^{+2}$ ,  $\text{Ba}^{+2}$ ,  $\text{Sr}^{+2}$  and  $\text{Pb}^{+2}$ )
5. Oxide and hydroxide salts are insoluble. (Except with group IA cations and ammonium.)
6. Sulfide and hydrogen sulfide salts are insoluble. (Except with group IA cations and ammonium.)
7. Carbonate and chromate salts are insoluble. (Except with group IA and ammonium cations and ammonium.)