

Pre-AP Chemistry

Summer
Summer



Assignment
Assignment

Carroll Senior High School



Dear Students,

Welcome to the exciting world of chemistry! I know you are feeling a little anxiety about the upcoming year and perhaps a little apprehensive about what will be expected of you. I can speak from experience when I say that if you start early with memory work and practice with the skills, your experiences in chemistry will not be so frightening.

I am including for your summer enjoyment, a list of ions that **MUST BE MEMORIZED** and a formula writing activity found on the Internet. Mastering these two topics early will make your life much easier next year. We will have a quiz over the memorized ions within the first week of school. If you make a set of flash cards with the names and symbols you can use these all year to help keep your memory fresh.

It is important that you memorize the ions **EXACTLY** as they are typed. This includes capital or lowercase letters, subscripts, +/-charge and magnitude of charge. The spelling of the ion name must also be exactly correct watch for subtle differences. Look for patterns (especially on the periodic table included) to make the memorization easier.

I would suggest that you learn the ions before you attempt the Internet activity. The chemistry site assumes that you already know the ions when it teaches you formula writing. Completion of this activity will be your first chemistry grade so bring it with you the first day of class.

The compounds we will be naming and writing formulas for will fall into three categories: ionic, molecular, and acids. Use the periodic table and the Internet site to give you a head start with this skill. I promise you won't be sorry.

Have a **GREAT** summer and I look forward to having you in class next year•

Sincerely,

Mrs. Lacava

Pre-AP Chemistry Formulas and Charges of Ions

Positive Ions

1+ 2+ 3+ 4+ 5+ Group IA (1) Group IIA (2) Group IIIA (3) Group IVA (4) Group VA (5)

⁺Li Lithium ²⁺Be Beryllium ³⁺Al Aluminum ⁴⁺Si Silicon (IV) ⁵⁺As Arsenic (V)
⁺Na Sodium ²⁺Mg Magnesium ³⁺Ga Gallium (III) ⁴⁺Ge Germanium (IV) ⁵⁺Bi Bismuth (V)
⁺K Potassium ²⁺Ca Calcium ⁴⁺Sn Tin (IV)
⁺Rb Rubidium ²⁺Sr Strontium ⁴⁺Pb Lead (IV)
⁺Cs Cesium ²⁺Ba Barium
⁺Fr Francium ²⁺Ra Radium

⁺NH₄ Ammonium ²⁺Cd Cadmium ³⁺Bi Bismuth (III)
⁺Cu Copper (I) ²⁺Cr Chromium (II) ³⁺Cr Chromium (III)
⁺H Hydrogen ²⁺Co Cobalt (II) ³⁺Co Cobalt (III)
⁺H₃O Hydronium ²⁺Cu Copper (II) ³⁺Fe Iron (III)
⁺Ag Silver ²⁺Fe Iron (II) ³⁺Mn Manganese (III)

Pb^{2+} Lead (II) Ni^{3+} Nickel (III)
 Mn^{2+} Manganese (II)
 Hg_2^{2+} Mercury (I)
 Hg_2^{2+} Mercury (II)
 Ni^{2+} Nickel (II)
 Sn^{2+} Tin (II)
 Zn^{2+} Zinc

Negative Ions

1234

Group VII (17) Group VI (16) Group VA (15) Group IV (14)

F^{-1} Fluoride O^{2-} Oxide N^{3-} Nitride C^{4-} Carbide
 Cl^{-1} Chloride S^{2-} Sulfide P^{3-} Phosphide
 I^{-1} Iodide Se^{2-} Selenide

$\text{C}_2\text{H}_3\text{O}_2^{-}$ Acetate CO_3^{2-} Carbonate
 ($\text{CH}_3\text{COO}^{-}$)
 CN^{-} Cyanide CrO_4^{2-} Chromate PO_4^{3-} Phosphate
 H^{-} Hydride $\text{Cr}_2\text{O}_7^{2-}$ Dichromate PO_3^{3-} Phosphite
 OH^{-} Hydroxide $\text{C}_2\text{O}_4^{2-}$ Oxalate AsO_4^{3-} Arsenate
 NO_3^{-} Nitrate O_2^{2-} Peroxide
 NO_2^{-} Nitrite SiO_3^{2-} Silicate
 MnO_4^{-} Permanganate SO_4^{2-} Sulfate
 ClO_4^{-} Perchlorate SO_3^{2-} Sulfite
 ClO_3^{-} Chlorate HPO_4^{2-} Hydrogen Phosphate

ClO_2^{-} Chlorite
 ClO^{-} Hypochlorite
 Similar for bromine and
 Iodine:

e.g., BrO_3^{-} Bromate

HCO_3^{-} Hydrogen Carbonate
 (Bicarbonate)

HSO_4^{-} Hydrogen Sulfate
 (Bisulfate)

HSO_3^{-} Hydrogen Sulfite
 (Bisulfite)

$\text{H}_2\text{PO}_4^{-}$ Dihydrogen Phosphate

Pre-AP Chemistry
Internet Nomenclature Worksheet

Name: _____ Date: _____

You may link from Summer Packet page, or type in following address,
<http://dbhs.wvusd.k12.ca.us/webdocs/ChemTeamIndex.html> or search for "ChemTeam" and click on "Nomenclature."

You will do 5 types of compounds listed on this page. 1) binary ionic compounds with fixed charge cations 2) binary ionic compounds with variable charge cations: Stock System 3) ternary ionic compounds containing a polyatomic ion 4) binary molecular/covalent compounds with Greek prefixes 5) acids

For each of these sections you should be able to go both directions:
name • formula & formula • name

Click on Nomenclature Definition List

1. Define CATION and ANION

cation: _____

anion: _____

2. Define Binary Compound

binary compound _____

Section 1: Binary Ionic Compounds with Fixed Charge Cations

The elements involved in this less only have

3. Complete the following points:

- a. The order for names in a binary compound is
- b. Use the name of cation with a fixed oxidation state _____
- c. The name of the anion will be made from the

4. Show yourself two examples of how to write the name from the formula for these types of compounds.

Rules:

- a. write the name of the first element
- b. use the root of the second element but change the ending to "ide"

5. Try these practice problems, then check your answers:

- a. MgS _____
- b. KBr _____
- c. Ba₃N₂ _____
- d. Al₂O₃ _____
- e. NaI _____

Part II, name to formula

6. Complete these points to remember:

- a. The order in a formula is
- b. You must know the charges associated with each cation and anion.

1 The sum of the positive charge and the sum of the negative charges

1 You _____ of the cations or anions to get a total charge of zero.

1 You _____ to get a total charge of zero.

A summary of the rules is as follows:

- a. write the symbol and charge of the first word
- b. write the symbol and charge of the second word
- c. use the minimum number of cations and anions needed to make the sum of all the charges in the formula equal to zero

+2 1

EX: Barium iodide: Ba Iodide's superscript 1 must be multiply by a number that will make the total sum of superscripts equal to zero. Multiplying by 2 (Ba⁺² I⁻¹⁽²⁾) will +

give you a sum of zero. ($2 + 2 = 0$) Answer: BaI₂

7. Practice with these problems then check your answers:

- a. magnesium oxide
- b. lithium bromide
- c. calcium nitride
- d. aluminum sulfide
- e. potassium iodide

8. Complete the following steps: Step #1: first part of the name is the _____
Step #2: result from step one _____

Here is how to determine its value:

- a. multiply _____
- b. divide this result by _____

This is the value of the Roman numeral to use.

- c. The value of the Roman number represents _____

Step #3: anion is named in the usual manner of stem plus "ide"

+3+2+2+1

*Remember, all metals except for those in column IA, IIA, Al, Cd, Aland Ag require roman numerals in their names. The reason the above metals do not have roman numerals is because they only have one charge.

9. Name following examples: CuCl₂

_____ Fe₂O₃ _____

10. Practice with these then check the answers:

- a. NiS _____
- b. PbBr₄ _____
- c. Pb₃N₂ _____
- d. Fe₂O₃ _____
- e. FeI₂ _____

2 What is unusual about Mercury I? Peroxide?

Part II, name to formula

12. What is the following steps: Step#1: the first word tells you the

Step #2: the Roman numeral WILL tell you

Step #3: the anion symbol and charge comes from the second name

Step #4: remembering the rule that a formula

1 Write yourself examples of : Copper (I) oxide _____ Iron (III) sulfide

14. Practice with these, then check your answers:

- a. iron (II) chloride _____
- b. copper (I) sulfide _____
- c. lead (IV) iodide _____
- d. tin (II) fluoride _____
- e. mercury (I) bromide _____

Section III: Ternary Ionic Compounds containing POLYATOMIC IONS

(Note: This is out of order, but do it now, its very similar to above.)

1 How will you recognize this type of compound?

2 How should parentheses be used?

17. Write two steps for determining the formula: Step 1:

Step 2:

3 Give yourself the examples: (note use or absence of parentheses)

Cu_2SO_4 _____

$\text{Ca}(\text{ClO}_3)_2$ _____

19. Practice with these, then check your answers:

- a. AlPO_4 _____
- b. KNO_2 _____
- c. NaHCO_3 _____
- d. Cu_2SO_4 _____
- e. $\text{Ni}(\text{C}_2\text{H}_3\text{O}_2)_2$ _____
- f. HgCO_3 _____

4 Write yourself a set of steps for determining the formula.

5 Give yourself two examples: Copper (II)

chlorate _____ Sodium phosphate

22. Practice with these, then check your answers:

- a. aluminum hydroxide _____
- b. sodium hydrogen carbonate _____
- c. calcium acetate _____
- d. tin (IV) chlorite _____
- e. mercury (II) phosphate _____
- f. copper (I) sulfite _____

Part II, name to formula:

Section IV: Binary Molecular Compounds Greek

1 How will you recognize these compounds?

2 Write the Greek prefixes for 110.

3 Write yourself rules for naming binary molecular compounds.

4 Give yourself two examples (you choose!)

27. Practice with these, then check your answers.

- a. As_4O_{10} _____
- b. BrO_3 _____

- c. BN _____
 d. N₂O₃ _____

Part II, names form formulas

- 1 Write yourself steps for determining formulas of these compounds.
- 2 Give yourself two examples (you choose!)
- 3 What rule can you make about the use of the prefix MONO?
 31. Practice with these, then check your answers.
 - a. dinitrogen monoxide _____
 - b. nitrogen trifluoride _____
 - c. sulfur tetrachloride _____
 - d. xenon trioxide _____

Section V: Acids

- 1 How do you recognize an acid?
 33. Fill in the steps for naming a BINARY ACID
 - a. _____ is used.
 - b. _____ is used.
 - c. _____ is used.
 - d. The word "acid" is used as the second word in the name.
- 2 Give an example.
 35. What are the changes to be made if the acid is ternary (contains a polyatomic ion)?

ate ion • _____ acid ite ion • _____ acid

IMPORTANT: NEVER USE THE PREFIX HYDROIF THE ACID HAS A POLYATOMIC!!!!

36. Practice with these, then check answers.
 - a. H₃PO₄ _____
 - f. HNO₂ _____
37. Write the formula for these acids:
 - a. hydrobromic acid _____
 - b. hydrocyanic acid (cyanide is CN) _____
 - c. nitric acid _____
 - d. sulfurous acid _____
 - e. phosphorous acid _____
 - f. acetic acid _____

- b. H₂CO₃ _____
- c. H₂SO₄ _____
- d. HIO₃ (IO₃ is iodate ion) _____
- e. HF _____

Now try it on your own. (Hint: Determine whether it's an acid, molecular or ionic compound.)

1. Write the formulas for the following compounds:
 - a. sulfurous acid _____

- b. sodium bromide _____
- c. calcium chloride _____
- d. phosphorus pentafluoride _____
- e. hydrochloric acid _____
- f. iron II oxide _____

2. Write the name of the following compounds:

- a. Mg_3PO_4 _____
- b. H_2S _____
- c. CO _____
- d. NH_4NO_3 _____
- e. H_2O_2 _____
- f. Hg_2O _____
- g. Ag_2SO_4 _____

An Updated Traditional Flat Periodic Table

1 H 1.01																	2 He 4.03																																																																																																																																																																																																																																																																																																																																																																																													
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light metals - brittle metals - ductile metals - low melting metals - non-metals - noble gases - lanthanides - actinides
 Updated 1/20/05, by periodictable.com, home of the patented 3D Alexander Arrangement of the Elements