

Summer Assignment 2017

The summer assignment is to help prepare you for the beginning of AP chemistry. The assignment is not graded, but the test on the second day of school covering the material will be the summer assignment grade.

The packet contains the following:

1. My general chemistry notes (Most of the pages ☺)
2. Element and polyatomic ion lists
3. Practice problems

For the test, you must know the following:

1. Have all the common elements memorized – name and symbol
2. Have ALL the polyatomic ions memorized
3. Be able to write from symbol to word and word to symbol covalent and ionic compounds.
4. Be able to balance an equation
5. Memorize the diatomic molecules

The test will have the following:

1. 10 equations where the products and reactants will be in word form. You will write the symbol and balance the reaction.

Example: Sodium chloride and magnesium oxide make sodium oxide and magnesium chloride.

Answer: $2\text{NaCl} + \text{MgO} \rightarrow \text{Na}_2\text{O} + \text{MgCl}_2$

I will be having a study session June 26th – the last day of school. It is not required but it will be a good introduction to what you need to know for the summer assignment test. I would recommend attending; it takes an hour at the most. I will be sending out a letter in early June with the time of the session.

I will be having two study sessions in August to help with the summer assignment. Those dates have not been determined and will not be until August. PLEASE EMAIL ME YOUR EMAIL ADDRESS AT THE BEGINNING OF THE SUMMER SO I CAN EMAIL YOU THE DAYS AND TIMES OF THE STUDY SESSIONS! These sessions are not required, but helpful.

PLEASE EMAIL ME YOUR EMAIL ADDRESS AT: chscarmichael@gmail.com This will allow me to email you the summer study sessions dates and times and will be able to email notes throughout the school year. Please add your name to the email and let me know you are an AP chemistry student.

Please feel free to come down to my room 716 if you have any questions, otherwise feel free to email me during the summer, I will be able to check my email most of the summer.

Mrs. Carmichael

AP Notes

I was given these two links from previous students who claim it helped them learn the material for the summer assignment. Please feel free to look up any online help you can find, there are endless videos helping you with naming ionic and covalent bonds and balancing equations.

<https://www.khanacademy.org/science/chemistry/chemical-reactions-stoichiome/balancing-chemical-equations/v/balancing-chemical-equations-introduction>

<https://m.youtube.com/watch?v=-GrA2J0ZHIE>

Ionic Bonding

Chemical bond – The force that holds two atoms together

How many bonds an element makes is based on their valence shell.

Li – has one valence electron, makes one bond (gives away electron)

Al – has 3 valence electrons, makes three bonds

N – has 5 valence electrons, makes three bonds

F – has 7 valence electrons, makes one bond

Ionic bond – the electrostatic force that holds oppositely charged particles together.

A typical ionic bond is between metal and non-metal. Metals are on the left side of the periodic table, non-metals are on the right side.

Oxidation number – the charge of an element based on the valence shell. All the elements in a group have the same number based on the valence shell.

Within an ionic bond, the positive metal gives its electrons to the negative non-metal.

Formula unit – simplest ratio of the ions represented in an ionic compound.

Monatomic ion – one atom ion EX: Mg²⁺

Transition metals have multiple oxidation numbers due to varying ions that can be formed.

Binary ionic compounds – when two single elements bond together

Subscript – the little number at the lower left of an atom in a compound

Name → Symbol

1. Write down the pos. element's symbol, which is the first word.
2. Write down the neg. element's symbol
3. Figure out the charges of each, one should be positive, the other negative
4. Write a subscript down after the element to make the whole compound's charge zero.

Symbol → Name

1. Write down the full name of the metal
2. Write down the root of the non-metal, it usually the first half.
EX O = ox- , Cl = chlor-
3. Add -ide to the end of the root
4. If the metal is a transition metal, roman numerals need to be placed after the metal to convey the charge. EX: Copper (II) sulfide

Covalent Bonding

Covalent Bond = A chemical bond where atoms share electrons.

Molecule = When two or more atoms bond covalently.

Diatomic molecule = Elements that don't exist by themselves, they are always bonded at least with each other. This is because they are very reactive trying to get valence electrons.

List (**Memorize**): H₂, N₂, O₂, F₂, Cl₂, Br₂, I₂

Memorization sentence: **H**ave **no** fear **o**ver **i**ce **c**old **b**rew **s**kies.

Binary Covalent Compounds = Formed between non-metals and non-metals

Some pairs of non metals can form more than one combination. EX: nitrogen and oxygen can make N₂O, NO, NO₂, N₂O₅. If you name it the ionic way, every single one of them is nitrogen oxide, which causes problems. If you have two non-metals, you have to put a pre-fix in front of every element.

Prefixes: **Memorize**

- 1 – mono
- 2 – di
- 3 – tri
- 4 – tetra
- 5 – penta
- 6 – hexa
- 7 – hepta
- 8 – octa
- 9 – nano
- 10 – deca

If the first element is one, you do not need to put mono, but you do for the second one.

EX: CO₂ – carbon dioxide
CO – Carbon monoxid

Balancing Equations

Chemical Reaction = When atoms of one or more substances are rearranged to form different substances

Indicators: Temperature change, color change, odor, gas bubbles, new solid formation

Reactions have two parts: Reactants (on left side of arrow) and products (right sides of arrow)

Common symbols:

(s) = solid state

(l) = liquid state

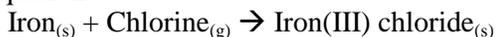
(g) = gas state

(aq) = aqueous state

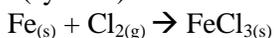
Aqueous state = When a solid has dissolved in water

Two ways to write an equation

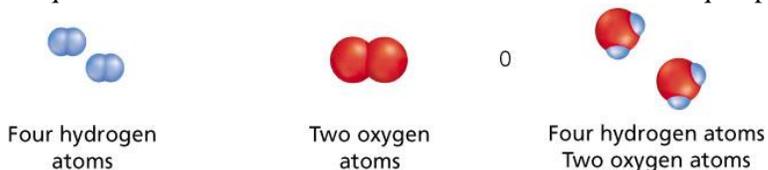
Word equation:



Skeleton (symbol)



Chemical equation = When the amount of substances as reactants equal products



Coefficient – The whole number in front of the compound

Steps for balancing equations

1. Write skeleton equation
Please leave room for in class example
2. Count number of **each** atom of reactants
Please leave room for in class example
3. Count number of **each** atom of products
Please leave room for in class example
4. Change coefficients to make balanced equation
Please leave room for in class example
5. Write coefficients in their lowest ration
6. **Double check work!!!**

Element List:

Know the name (spelling counts!) and symbols for the following:

Elements 1-38 on the periodic table, plus numbers 58, 48, 50, 53, 54, 55, 56, 74, 78, 79, 80, 82, 92

Polyatomic ion list:

Name	Symbol	Charge
ammonium	NH ₄	+1
acetate	C ₂ H ₃ O ₂	-1
bromate	BrO ₃	-1
chlorate	ClO ₃	-1
chlorite	ClO ₂	-1
cyanide	CN	-1
hypochlorite	ClO	-1
hydroxide	OH	-1
iodate	IO ₃	-1
nitrate	NO ₃	-1
nitrite	NO ₂	-1
perchlorate	ClO ₄	-1
permanganate	MnO ₄	-1
thiocyanate	SCN	-1
carbonate	CO ₃	-2
chromate	CrO ₄	-2
dichromate	Cr ₂ O ₇	-2
oxalate	C ₂ O ₄	-2
selenate	SeO ₄	-2
silicate	SiO ₃	-2
sulfate	SO ₄	-2
sulfite	SO ₃	-2
phosphate	PO ₄	-3
phosphite	PO ₃	-3

Formula Writing and Nomenclature – By the end of these worksheets, you should be able to do the naming pretty easily.

Part I

1. potassium hydroxide
2. mercury(I) hydroxide
3. potassium chloride
4. iron(III) chloride
5. ammonium hydroxide
6. copper(I) oxide
7. aluminum sulfate
8. dinitrogen pentoxide
9. sodium hydroxide
10. carbon dioxide
11. lead(II) hydroxide
12. ammonium nitrate
13. sodium hydrogen carbonate or sodium bicarbonate
14. mercury(II) oxide
15. zinc (II) nitrite
16. cesium hydroxide
17. lithium oxide
18. calcium hydroxide
19. calcium bromide
20. iron(III) oxide
21. iron(II) carbonate
22. sulfur trioxide
23. barium bromate
24. aluminum hydroxide
25. sodium acetate
26. sodium sulfite
27. carbonic acid
28. ammonium iodate
29. carbon monoxide
30. magnesium bromide
31. tin(II) bromide
32. Zinc nitrite
33. dinitrogen monoxide
34. ammonium fluoride
35. arsenic pentachloride
36. potassium oxide
37. barium phosphate
38. zinc (II) oxide
39. sodium hypochlorite
40. strontium sulfide
41. aluminum bromate
42. sulfur trifluoride

43. palladium (III) cyanide
44. zinc (II) silicate
45. calcium sulfide
46. magnesium acetate
47. calcium permanganate
48. beryllium nitrate
49. nickel(II) selenate
50. radium bromide
51. sodium permanganate
52. lead(II) iodide
53. bismuth telluride
54. potassium perchlorate
55. cobalt(II) silicide
56. triphosphorus pentanitride
57. copper(II) sulfite
58. iron(III) phosphate
59. lead(II) telluride
60. mercury(I) nitrate
61. potassium silicate
62. tellurium tetraiodide
63. silver (I) acetate
64. silver (I) sulfide
65. zinc (II) fluoride
66. zinc (II) phosphate
67. barium hydroxide
68. ammonium acetate
69. lead(II) sulfide
70. silver (I) nitride
71. silicon tetraiodide
72. zinc(II) carbonate
73. tin(IV) iodide
74. lead(II) nitrate
75. sodium fluoride
76. potassium phosphite
77. platinum(II) chloride

Part II

1. NaOH
2. NaBr
3. Ba(OH)₂
4. CaO
5. Li₂SO₄
6. CO
7. SO₂
8. MnO
9. FeSO₄
10. KMnO₄
11. AgCl
12. (NH₄)₂S
13. Cu(OH)₂
14. NiBr₂
15. Fe₂O₃
16. Hg₂SO₄
17. MgSO₄
18. Zn(OH)₂
19. Cu(NO₃)₂
20. AlPO₄
21. Cu(NO₂)₂
22. NO₂
23. P₂Cl₃
24. Na₃PO₄
25. K₂CO₃
26. CO₂
27. NH₄OH
28. Fe(OH)₂
29. N₂O₅
30. Ag₂O
31. AlN
32. Al₂O₃
33. (NH₄)₂CO₃
34. BaCO₃
35. Sb₂S₅
36. Ca₃(PO₄)₂
37. Cs₂CO₃
38. K₂SiO₃
39. Ag₂CrO₄
40. MgSO₃
41. CrP
42. ZnI₂

Balancing equations:

1. $\text{H}_2 + \text{Cl}_2 \rightarrow \text{HCl}$
2. $\text{H}_2\text{SO}_4 + \text{NaOH} \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$
3. $\text{Fe}_3\text{O}_4 + \text{H}_2 \rightarrow \text{Fe} + \text{H}_2\text{O}$
4. $\text{KClO}_3 \rightarrow \text{KCl} + \text{O}_2$
5. $\text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
6. $\text{K} + \text{MgBr}_2 \rightarrow \text{KBr} + \text{Mg}$
7. $\text{P} + \text{O}_2 \rightarrow \text{P}_2\text{O}_5$
8. $\text{NaCl} + \text{F}_2 \rightarrow \text{NaF} + \text{Cl}_2$
9. $\text{Zn} + \text{Pb}(\text{NO}_3)_4 \rightarrow \text{Zn}(\text{NO}_3)_2 + \text{Pb}$
10. $\text{H}_2 + \text{NO} \rightarrow \text{H}_2\text{O} + \text{N}_2$
11. $\text{H}_3\text{PO}_4 + \text{HCl} \rightarrow \text{PCl}_5 + \text{H}_2\text{O}$

For the following, write the symbol for each one first and balance the reaction:

1. Silver (I) nitrite and barium sulfate makes silver (I) sulfate and barium nitrite.
2. When dissolved beryllium chloride reacts with dissolved silver nitrate in water, aqueous beryllium nitrate and silver chloride powder are made.
3. Nitrogen and oxygen make dinitrogen trioxide
4. Sodium oxide decomposes into sodium and oxygen gas
5. Aluminum nitrate reacts with gallium to make gallium nitrate and aluminum
6. Methane (CH_4) reacts with oxygen to make carbon dioxide and water

7. Lithium bromide and cobalt (IV) sulfite react to make cobalt (IV) bromide and lithium sulfite
8. Benzene (C_6H_6) reacts with oxygen to make carbon dioxide and water
9. When isopropanol (C_3H_8O) burns in oxygen, carbon dioxide, water, and heat are produced.
10. Calcium carbonate decomposes into calcium oxide and carbon dioxide
11. When dissolved sodium hydroxide reacts with sulfuric acid (H_2SO_4), aqueous sodium sulfate, water, and heat are formed.
12. When fluorine gas is put into contact with calcium metal at high temperatures, calcium fluoride powder is created in an exothermic reaction.
13. When sodium metal reacts with iron (II) chloride, iron metal and sodium chloride are formed.
14. mercury(II) nitrate + ammonium sulfide \rightarrow mercury(II) sulfide + ammonium nitrate
15. iron(III) hydroxide \rightarrow iron(III) oxide + water
16. phosphorus + oxygen \rightarrow diphosphorous pentoxide
17. silver sulfate + aluminum chloride \rightarrow silver chloride + aluminum sulfate