Naming Compounds Class Notes

OBJECTIVE : What are ions, how do they form, why do they form, what happens once they form?

1. All atoms are neutral because they have _____

2. _____, so that's okay.

To start, Noble gases never make any bonds because they are "perfect" (think noble) Remember in story books how noblemen or noblewomen could never marry a peasant? Same here.

3. Noble Gases Do Not Make Bonds because they are "_____"!

   Which really means they have only FULL _____ _____

   They feel fine just the way they are.
4. All other atoms have their outer-most electron orbitals _____ _____.

5. Giving up negative electrons changes them into charged particles called IONS. Metal ions _____ electrons, only electrons, so they end up + charged.

   If a metal loses 1 electron they form +1 ions. If they lose 2 electrons they become +2 charged ions. If they lose 3 electrons they become +3 ions.

6. To make bonds, metal atoms lose enough electrons to become _____ with a noble gas. That means they lose only enough electrons to match electron configurations.

7. They _____ _____ BECOME noble gases! (write this BIG!)

   8. Noble gases are "noble" because they have completely _____.
   "Noble like means won't bond, like the nobles of thrones and castles don't mix with the peasants. Noble gases don't bond to peasant elements either. Noble gases are all in GROUP _____

9. Noble gases do not bond because they don't need to share their electrons with other atoms to "get" full orbitals. They don't want to lose electrons or gain any either. They're "_____" already.

   Since electrons are negatively charged, it becomes a
   _____

10. Let's Look at our "standard atom" sodium. How many electrons does sodium need to "lose" to get a noble gas configuration? Hint: Look at Neon on the periodic table.

11. Na 2-8-1 will _____ , which will give it an electron configuration of 2-8

12. This 2-8 is the same electron configuration as _____. Which is just like neon, a noble gas. Since e^- are negatively charged, it becomes a sodium +1 ion.

14. The sodium + ion, with _____ p^+, but only _____ e^-, which gives it an over all charge of _____ It is written like this:

15. Metal atoms will lose one, two or three electrons to get the same electron configuration as a noble gas. They will form positive ions with charges of:

_____ or _____ or _____

Depending if they lose one, two, or three electrons.

16. Nonmetal atoms will do the opposite. They must gain _____ electrons to be _____ with a noble gas. They will end up with a

_____ or _____ or _____

Depending if they gain 1, 2 or 3 electrons.

17. Ions form when a metal can lose electrons and give them to a non metal that can gain the same electrons.

Electrons are NOT LOST really, they are _____ from a metal to a nonmetal at the same time. Positive and negative ions only form simultaneously.

18. Ions do not have to form, but in order for a metal and a nonmetal to bond together, there needs to be a transfer of electrons that is PERFECT, so that the metal ends up

_____, and the nonmetal ends up

_____

19. The noble gases in _____ are sort of the electron configuration "models" for other atoms to match in order for bonding to occur.

20. Bonds between metal and nonmetal ions are called _____ and they are the strongest bonds in chemistry

Atom	Atom e^- config	Ion e^- config	Ion symbol
Li	2-1		
Na	2-8-1		
K	2-8-8-1		
Rb	2-8-18-8-1		
Be	2-2		
Mg	2-8-2		
Ca	2-8-8-2		
Al	2-8-3		

21. All metals LOSE electrons to become positive ions. POSITIVE IONS are called _____.

22. They are give up their neutrality for a _____ charge, but get that _____ e– configuration.

23. Non metals become _____ which are negative ions, because they gain negative electrons

Atom	Atom e^- config	Anion e^- config	Ion symbol
F	2-7		
Cl	2-8-7		
Br	2-8-18-7		
I	2-8-18-18-7		
O	2-6		
S	2-8-6		
N	2-5		
P	2-8-5		

23b. Metals lose electrons becoming, or forming into _____ cations.

23c. Nonmetals gain those electrons from metals, so they become, or form into _____ anions.

23d. Cations + anions will bond together with _____

The attraction between the positive + negative ions is _____.

23e. The bonding requires _____ of positive and negative charges.
For example sodium chloride, NaCl requires 1 Na^{+1} cation for every Cl^{-1} anion to form.
The positive charge = the negative charge in the compound.

Magnesium oxide forms when the _____ cation and the _____ anion form together.

This is also a 1:1 ratio of cations to anions, keeping the _____ = _____ here too.

Naming Compounds Class #2

24. OB: _____

25. Ionic compounds form when _____ (metals) come together with _____ (non-metals) and are _____ attracted due to opposite charge.

26. Cations form when metals _____ electrons to nonmetals, which simultaneously form – anions.

27. Opposites attract, it's like _____!!!

28. There is ALWAYS a _____ of electrons, and if not, nothing happens.

29. There are 2 rules to name ionic compounds: the 1st name rule, and the 2nd name rule

30. 1st name rule: _____

31. 2nd name rule: _____

32. F_____ Cl _____Br_____

I_____ O_____S_____

(Se)_____ N_____ P_____

and (As) _____

33. Name these compounds: LiBr _____ CaO_____

BeS _____ MgO _____

CsF _____ SrS _____

AlP _____

35. What happens if we combine something like calcium and chlorine?

Ca^{+2} ion forms when calcium atoms lose _____ electrons

Combine it with a Chloride ion, which forms when a chlorine atom _____ electron.
2 electrons transfer from calcium do not match up to 1 electron gain by chlorine??

36. Ca^{+2} + Cl^{-1} _____ a _____ ratio

37. The Ca^{+2} must transfer _____ to _____ chlorine atoms, forming 2 chloride anions.

38. Calcium chloride is therefore written this way: _____

39. Cation	Anion	Formula of compound	Name of compound
Na^{+1}	P^{-3}		
Ca^{+2}	S^{-2}		
Al^{+3}	P^{-3}		
Mg^{+2}	Br^{-1}		
Li^{+1}	O^{-2}		

40. Cation	Anion	Formula of compound	Name of compound
Be^{+2}	F^{-1}		
Sr^{+2}	Cl^{-1}		
Ba^{+2}	N^{-3}		
K^{+1}	I^{-1}		
Al^{+3}	O^{-2}		

41. Criss-Cross Method of nonthinking, but getting it right What's the formula for aluminium oxide?

Al^{+3} O^{-2}

42. Name these compounds (aloud and write their names too)

LiCl _____

CsF _____

BeO _____

MgS _____

MgF_2 _____

Ca_3P_2 _____

Li_3P _____

Na_3N _____

Al_2O_3 _____

43. The compounds formed when ions bond together are called _____ Compounds

44. They have _____ bonds holding them together, so,

they have _____ points, and _____ BP's.

45. Ionic compounds only form when

_____,

"perfectly". No loose electrons, and NO IOU electrons either!

OB: Transitional Metals become ions too.
The rules for ionic bonding and naming ionic compounds from the middle of the table.

46. Group 1 all make only _____ , because all _____ 1 electron in the outer orbital

47. Group 2 all make _____, because they all _____ from their outer orbital

48. Aluminum makes a _____, because it would _____ when it forms a cation

49. Group 17 atoms all make _____, because they _____ to become

_____ (get same electron configuration as a noble gas).

50. Group 16 all make _____, they need to _____ to fill their outer orbital

51. Group 15 atoms become _____

52. Scandium makes a _____. See that +3 in the corner? That's what it's for.

53. Yttrium too, makes a _____. Peek at zinc, it only makes a _____.

54. The transitional metals make the cations that are indicated, they _____,

_____like metals we've seen in groups 1 and 2 and Aluminum.

55. When the transitional metals form cations and bond to anions they make _____.
Naming these compounds works the same way as the ones you have already met.

56. React these atoms of scandium and chlorine by changing them to ions, write formulas and names…

Sc + Cl _____ _____ name: _____

Combine these atoms together into ionic compounds Show ion charges, and formula and name the compound

57. Zr and P _____ _____ stock name: _____

58. In and F _____ _____ stock name: _____

59. Titanium is our first special case. What ions does Titanium seem to make? _____ _____ and _____

60. From this list of transitional metals, list all the ions each can form into

Cr-24 _____ Fe-26 _____ Cu-29 _____

Ga-31 _____ Cd-48 _____ Nb-41_____

Hg-80 _____

61. Combine gold with chlorine (do both cations, one at a time) Write the formulas. And Names.

Au + Cl Au^{+1} + Cl^{-1} _____ stock name: _____

Au + Cl Au^{+3} + Cl^{-1} _____ stock name: _____

62. Combine all manganese cations with bromine. Write ions, formulas and stock names for each one.

Mn + Br _____ _____ stock name: _____

Mn + Br _____ _____ stock name: _____

Mn + Br _____ _____ stock name: _____

Mn + Br _____ _____ stock name: _____

63. Do the same for the two kinds of copper ions as they combine with oxygen (we saw them in lab, black + red)

Cu + O _____ _____ stock name: _____

Cu + O _____ _____ stock name: _____

64. Combine Tantalum and Sulfur now, show ions and formula, and the stock name

Ta + S _____ _____ stock name: _____

65. Tricked you (didn't I?) write proper name for NaCl and then write the WRONG name to remind you how to think about transitional metal ionic compounds and their roman numerals.

NaCl _____ _____ stock name: _____

WRONG name _____ why is it wrong? _____

Naming Compounds Class #4 OBJECTIVE: Table E, the polyatomic ions, making more ionic compounds!

66. Table E shows us the _____.
Poly means more than one, here, atomic means atoms that are stuck together.

POLYATOMIC IONS are 2 or more atoms bonded together in certain ways that act as a single ion (positive cations, or negative anions). All are on table E. Let's read the names now, bottom to top.

67. They have special names, and you never ever change their names. Most end in –ide, like good little anions, but some don't. Why? _____

68. We'll start talking about ammonium.

Ammonium is _____ atom bonded with _____ atoms,

but they act as a +1 cation (like Na^{+1} or Li^{+1}). They just come hand cuffed (bonded) together.

69. Working with the polyatomic ions, remember these rules:

_____ still go first, always. _____ still always go second.

_____ a table E polyatomic ion.

70. Let's try to bond (name then formula)

Na^{+1} and $C_2H_3O_2^{-1}$ will form _____ _____

K^{+1} and CN^{-1} will form into _____ _____

71. These are really easy, except when the polyatomics have to _____, like these:

Magnesium cation + hydroxide ion forms magnesium hydroxide

Write the ion formulas _____ How many Magnesium ions do we need? _____

How many Hydroxide ions do we need? _____ (get them)

72. The formula for magnesium hydroxide is _____ (the parenthesis show _____)

73. Combine (show ions, show formulas, name stock names):

Lithium + the chromate anion _____ _____ stock name: _____

Aluminum + hypochlorite anion _____ _____ stock name: _____

Magnesium + thiocyanate anion _____ _____ stock name: _____

Calcium + permanganate anion _____ _____ stock name: _____

74. Try a few more formula from names:

What is the formula for beryllium phosphate? _____

What's the formula for sodium hydrogen carbonate? _____

ammonium nitrate? _____

ammonium dichromate? _____

Bismuth (V) thiosulfate _____

Cobalt (III) chlorate _____

Naming Comopunds Class #5

OBJECTIVE: molecular compounds, naming and formulas, and determining how for form molecular compounds using selected oxidation states.

75. Ionic compounds form when _____ combine in proper ratio with

_____, attracting to each other because of opposite charge.

* except for that weird ammonium: _____.

76. With molecular compounds have _____ _____.

Molecular compounds form when 2 or more nonmetals bond together—in proper ratios.

There are NO ions, no ionic bonds either.

77. When two or more non metals bond together they form a _____.

78. A molecule is the _____ of a molecular compound.

79. The bonds that hold these atoms together is called a _____bond.

80. Co- means _____ -valent refers to the _____ or outermost _____

81. When 2 or more ions bond, they make ionic bonds, and they form into _____.

We can abbreviate that _____

82. NaCl _____ come in molecules, since it does not exist as a single particle.

It's a crystal, or dissolved in water. Ionic Compounds _____.

83. What 3 compounds to remember to KNOW how to name molecular compounds: _____

Names: _____

84. First Name Rule to name molecular compounds:

a single atom to start: _____

a multiple atom start: _____

85. Second Name Rule to name molecular compounds: _____

86. List the Latin Prefixes for 1 through 10, memorize these at your earliest convenience.

87. Using the 2 rules, and the Latin Prefixes, let's name these 10 example molecules.

HF _____ CS_2 _____

SO_3 _____ CCl_4 _____

PF_5 _____ SF_6 _____

Cl_2O_8 _____ I_4O_9 _____

N_2F_{10} _____

88. Write the formulas for each molecule:

Phosphorous tribromide _____ Diphosphorous trioxide _____

Oxygen difluoride _____ Dihydrogen monoxide _____

Nitrogen monoxide _____

89. Now in reverse, name these compounds

NO_2 _____ CI_4 _____

N_20 _____ SO_3 _____

N_2O_5 _____ HCl _____

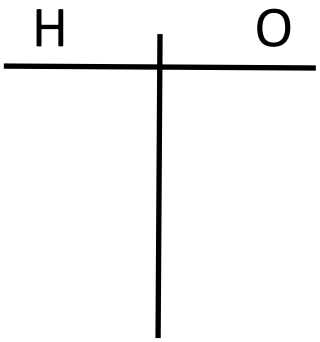
90. The 7 atoms on the periodic table that only exist AS PAIRS of ATOMS (a molecule) when pure include the

_____ twins, with these formulas: _____

91. How do we decide what ratios of nonmetal atoms fit together to make compounds? Why is water H_2O and NO OTHER hydrogen-oxygen compounds exist in any other ratio (like H_3O or H_4O_2)?

92. We will use the _____ from the periodic table to think.

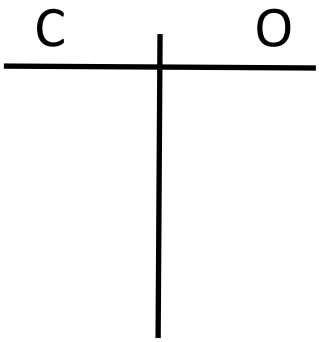
93. Here's a chart:



We will use these oxidation numbers to figure out possible ratios that balance out to ZERO.
Only the ratios that balance to zero are possible compounds. No exceptions.

94. The only possible "Zero" balance ratio is _____. This is THE ONLY hydrogen/oxygen compound in our class. Sometimes other oxidation numbers exist, and other compounds can be made.
We are using "SELECTED" oxidation states, to let us practice and learn but NOT KNOW everything. It's okay.

95. Let's determine all of the possible carbon and oxygen compounds that could form with their selected oxidation states. (use the chart)



96. List names and formulas of ALL carbon/oxygen compounds in our course:

96. Let's do the big one: All Nitrogen + Oxygen Compounds (there are 5) Formulas and names