Chapter 5 Goals

Major Goals of Chapter 5:

1. Finding the exact location for valence electrons (outermost electrons)
2. Discuss the octet rule and why "8" is a magic number when Draw Lewis Dots
3. Define what an ionic substance noting that atoms and compounds have no charge.
4. Measuring a charge balance between cations & anions in a compound.
5. Memorizing ion names a) the " —ide be ones" and b) "where'd my —ates"
6. Writing correct ionic compound formulas.

Before viewing this powerpoint, read the Chapter 5 Review:

5.1 Valence Electrons & Electron-Dot Symbols

5.2 Octet Rule & Ions

5.3 Ionic Compounds

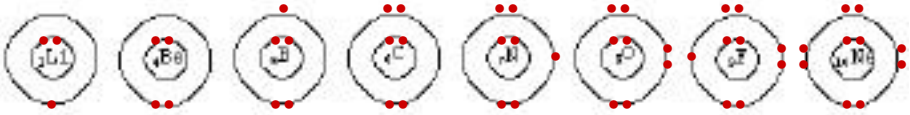
5.4. Naming & Writing Ionic Formulas

5.5 Polyatomic Ions

Section 5.1 - Valence Electrons & Electron-Dot Symbols

A. Valence electrons - Valence (outermost) electrons are in the principle energy shell furthest from the nucleus (the highest energy shell). Record into your notes

a. Draw Bohr electron dot structures for the elements of period (row) 2.



b. Draw Lewis electron dot structures for the elements of period (row) 2.

Group 1 Group 2 Group 3 Group 4 Group 5 Group 6 Group 7 Group 8

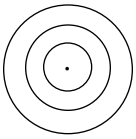
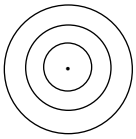
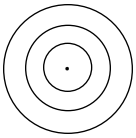
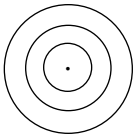
Lewis Dot Structure only show outermost electrons (valence electrons)

- the group number equals the number of valence electrons for representative elements
- only show the valence electrons as dots about the atom in a Lewis dot

Summary: Row number = number of shells in Bohr's Model
Group number = number of valence electrons in Lewis dot

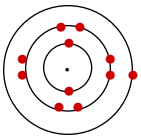
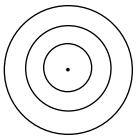
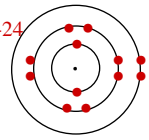
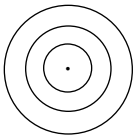
Print slide

Atomic Structure

Atomic Number: 11 **Name:** **Symbol:** **mass #** 23 # p _____ # n _____ # e _____ **Electronic Configuration:**	 **Physical Properties:** **Chemical Properties:** **Lewis Dot:**
Atomic Number: 17 **Name:** **Symbol:** **mass #** 35 # p _____ # n _____ # e _____ **Electronic Configuration:**	 **Physical Properties:** **Chemical Properties:** **Lewis Dot:**
Atomic Number: 12 **Name:** **Symbol:** **mass #** 24 # p _____ # n _____ # e _____ **Electronic Configuration:**	 **Physical Properties:** **Chemical Properties:** **Lewis Dot:**
Atomic Number: 8 **Name:** **Symbol:** **mass #** 16 # p _____ # n _____ # e _____ **Electronic Configuration:**	 **Physical Properties:** **Chemical Properties:** **Lewis Dot:**

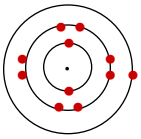
Record into your notes

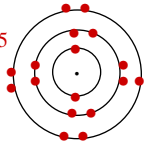
Atomic Structure

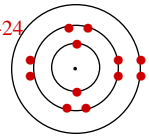
Atomic Number: 11 **Name:** sodium-23 **Symbol:** $^{23}_{11}Na$ **mass #** 23 # p 11 # n 12 # e 11 **Electronic Configuration:** $1s^2\ 2s^2\ 2p^6\ 3s^1$	 **Physical Properties:** soft metal, conducts e- **Chemical Properties:** reacts w/ H_2O **Lewis Dot:** **Na•**
Atomic Number: 17 **Name:** **Symbol:** **mass #** 35 # p _____ # n _____ # e _____ **Electronic Configuration:**	 **Physical Properties:** **Chemical Properties:** **Lewis Dot:**
Atomic Number: 12 **Name:** magnesium-24 **Symbol:** $^{24}_{12}Mg$ **mass #** 24 # p 12 # n 12 # e 12 **Electronic Configuration:** $1s^2\ 2s^2\ 2p^6\ 3s^2$	 **Physical Properties:** ductile metal, conducts e- **Chemical Properties:** burns in O_2 **Lewis Dot:** **•Mg•**
Atomic Number: 8 **Name:** **Symbol:** **mass #** 16 # p _____ # n _____ # e _____ **Electronic Configuration:**	 **Physical Properties:** **Chemical Properties:** **Lewis Dot:**

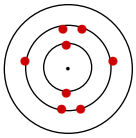
Record into your notes

Atomic Structure

Atomic Number: 11
Name: sodium-23
Symbol: $^{23}_{11}Na$

mass # 23
 # p 11
 # n 12
 # e 11
Electronic Configuration: $1s^2\ 2s^2\ 2p^6\ 3s^1$
Physical Properties: soft metal, conducts e-
Chemical Properties: reacts w/ H_2O
Lewis Dot: Na•

Atomic Number: 17
Name: chlorine-35
Symbol: $^{35}_{17}Cl$

mass # 35
 # p 17
 # n 18
 # e 17
Electronic Configuration: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5$
Physical Properties: yellow gas, nonconductor
Chemical Properties: reacts w/ Na(s)
Lewis Dot: •Cl•

Atomic Number: 12
Name: magnesium-24
Symbol: $^{24}_{12}Mg$

mass # 24
 # p 12
 # n 12
 # e 12
Electronic Configuration: $1s^2\ 2s^2\ 2p^6\ 3s^2$
Physical Properties: ductile metal, conducts e-
Chemical Properties: burns in O_2
Lewis Dot: • Mg •

Atomic Number: 8
Name: oxygen-16
Symbol: $^{16}_{8}O$

mass # 16
 # p 8
 # n 8
 # e 8
Electronic Configuration: $1s^2\ 2s^2\ 2p^4$
Physical Properties: colorless gas, nonconductor
Chemical Properties: supports combustion
Lewis Dot: •O•

Section 5.2 - Octet Rule & Ions

Achieving Noble Gas Electron Configuration

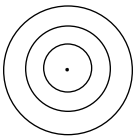
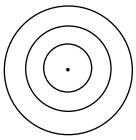
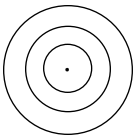
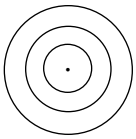
An ion will form when an atom

- loses electrons (OIL, oxidation) or gains electrons (RIG, reduction) to achieve noble gas electron configuration
- Recognize on following slides
  - a) the appearance of Bohr's Model after an atom loses or gains electrons to form ions
  - b) how two atoms share their electrons covalently to achieve noble gas electron configuration.

Section 5.2 - Octet Rule & Ions

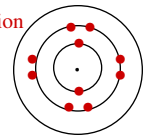
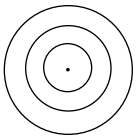
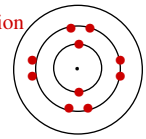
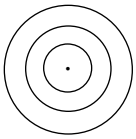
Print Slide

Ionic Structure

Atomic Number: 11 **Name:** **Symbol:** **mass #** 23 # p _____ # n _____ # e _____ **Electronic Configuration:**		**Physical Properties:** **Chemical Properties:** **Lewis Dot:**	**Atomic Number:** 17 **Name:** **Symbol:** **mass #** 35 # p _____ # n _____ # e _____ **Electronic Configuration:**		**Physical Properties:** **Chemical Properties:** **Lewis Dot:**
Atomic Number: 12 **Name:** **Symbol:** **mass #** 24 # p _____ # n _____ # e _____ **Electronic Configuration:**		**Physical Properties:** **Chemical Properties:** **Lewis Dot:**	**Atomic Number:** 8 **Name:** **Symbol:** **mass #** 16 # p _____ # n _____ # e _____ **Electronic Configuration:**		**Physical Properties:** **Chemical Properties:** **Lewis Dot:**

Record into your notes

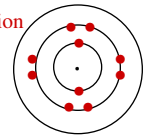
Ionic Structure

Atomic Number: 11 **Name:** sodium-23 ion **Symbol:** $^{23}_{11}Na^{1+}$ **mass #** 23 # p 11 # n 12 # e 10 **Electronic Configuration:** $1s^2\ 2s^2\ 2p^6\ 3s^0$	 More protons than electrons	**Physical Properties:** metal cation positive ion 1+ charge **Chemical Properties:** combines w/ anions **Lewis Dot:** $[Na]^{1+}$	**Atomic Number:** 17 **Name:** **Symbol:** **mass #** 35 # p _____ # n _____ # e _____ **Electronic Configuration:**		**Physical Properties:** **Chemical Properties:** **Lewis Dot:**
Atomic Number: 12 **Name:** magnesium-24 ion **Symbol:** $^{24}_{12}Mg^{2+}$ **mass #** 24 # p 12 # n 12 # e 10 **Electronic Configuration:** $1s^2\ 2s^2\ 2p^6\ 3s^0$	 More protons than electrons	**Physical Properties:** metal cation positive ion 2+ charge **Chemical Properties:** combines w/ anions **Lewis Dot:** $[Mg]^{2+}$	**Atomic Number:** 8 **Name:** **Symbol:** **mass #** 16 # p _____ # n _____ # e _____ **Electronic Configuration:**		**Physical Properties:** **Chemical Properties:** **Lewis Dot:**

Record into your notes

Ionic Structure

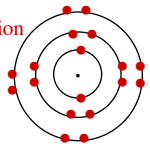
Atomic Number: 11
Name: sodium-23 ion
Symbol: $^{23}_{11}Na^{1+}$



mass # 23
 # p 11
 # n 12
 # e 10
More protons than electrons
Electronic Configuration: $1s^2\ 2s^2\ 2p^6\ 3s^0$

Physical Properties: metal cation positive ion 1+ charge
Chemical Properties: combines w/ anions
Lewis Dot: $[Na]^{1+}$

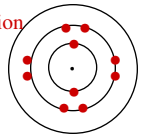
Atomic Number: 17
Name: chloride-35 ion
Symbol: $^{35}_{17}Cl^{1-}$



mass # 35
 # p 17
 # n 18
 # e 18
More electrons than protons
Electronic Configuration: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$

Physical Properties: nonmetal anion negative ion 1- charge
Chemical Properties: combines w/ cations
Lewis Dot: $[:\ddot{Cl}:]^{1-}$

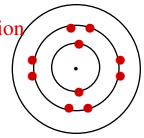
Atomic Number: 12
Name: magnesium-24 ion
Symbol: $^{24}_{12}Mg^{2+}$



mass # 24
 # p 12
 # n 12
 # e 10
More protons than electrons
Electronic Configuration: $1s^2\ 2s^2\ 2p^6\ 3s^2$

Physical Properties: metal cation positive ion 2+ charge
Chemical Properties: combines w/ anions
Lewis Dot: $[Mg]^{2+}$

Atomic Number: 8
Name: oxygen-16 ion
Symbol: $^{16}_{8}O^{2-}$



mass # 16
 # p 8
 # n 8
 # e 10
More electrons than protons
Electronic Configuration: $1s^2\ 2s^2\ 2p^6\ 3s^0$

Physical Properties: nonmetal anion negative ion 2- charge
Chemical Properties: combines w/ cations
Lewis Dot: $[:\ddot{O}:]^{2-}$

Section 5.2 - Octet Rule & Ions

Print slide

Ions isoelectronic ("same electronic configuration") with noble gases

[Ne] **[Ar]**

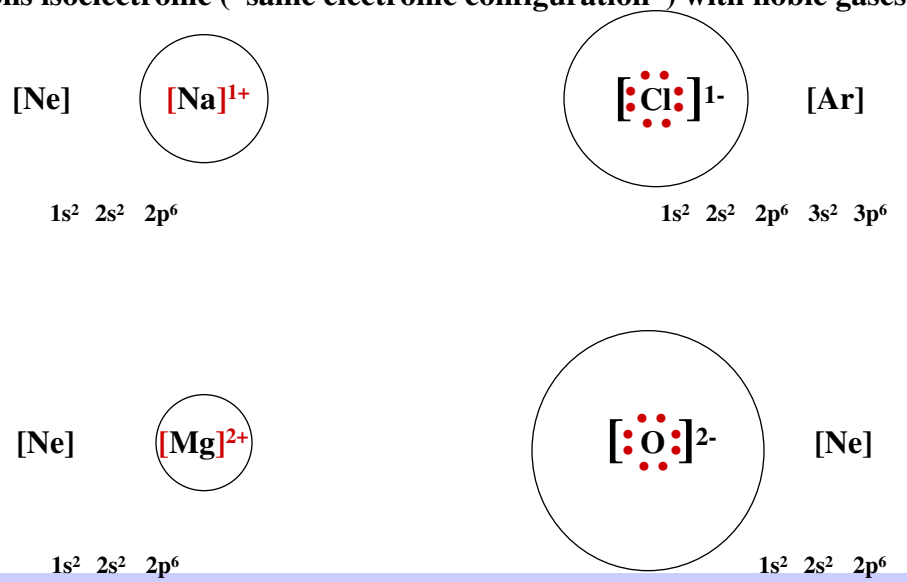
[Ne] **[Ne]**

Note: the stability of these ions is associated with 8 valence electrons (an octet) and an outmost electron configuration of ns^2np^6 (n=outmost shell)

Section 5.2 - Octet Rule & Ions

Record into your notes

Ions isoelectronic ("same electronic configuration") with noble gases

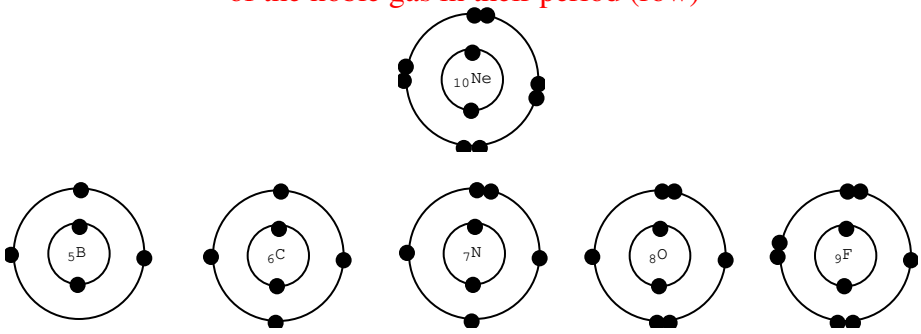


Note: the stability of these ions is associated with 8 valence electrons (an octet) and an outmost electron configuration of ns^2np^6 (n=outmost shell)

Section 5.2 - Octet Rule & Ions

Print Slide

nonmetals gain electrons to achieve noble gas e- configuration of the noble gas in their period (row)

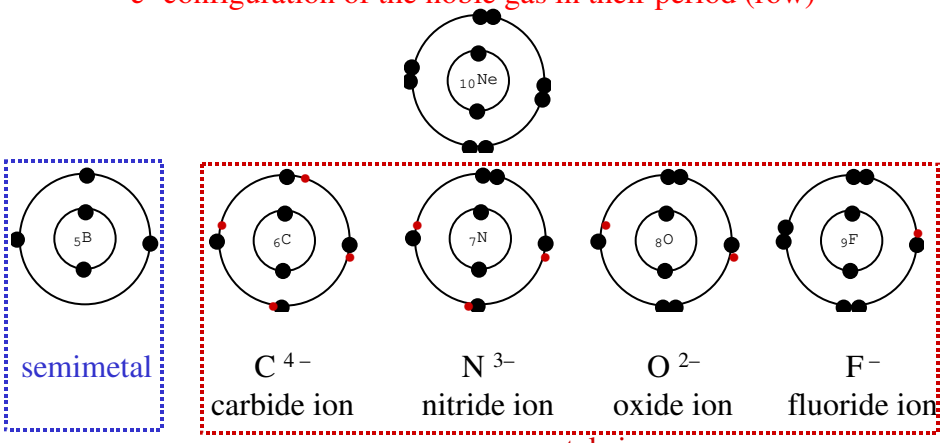


Please Note: the nonmetals like to gain electrons & the stability of these ions is associated with 8 valence electrons (an octet)

Please note the addition of the red colored valence (outermost) electrons to each atom listed. Recognize boron, B, is a semimetal, not a nonmetal.

Record into your notes

nonmetals gain just enough electrons to achieve noble gas e- configuration of the noble gas in their period (row)



semimetal

C^{4-} carbide ion

N^{3-} nitride ion

O^{2-} oxide ion

F^{-} fluoride ion

nonmetals ions

Please Note: the nonmetals like to gain electrons & the stability of these ions is associated with 8 valence electrons (an octet)

Section 5.2 - Octet Rule & Ions

An ion will form when an atom

1) loses electrons (oxidize, OIL, oxidation is loss of e^-) or
2) gains electrons (reduce, RIG, reduction is gain of e^-)

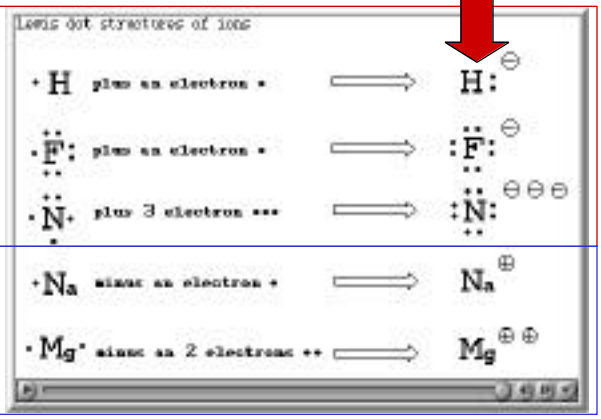
to achieve noble gas electron configuration

Lewis Dot Structures

(more practice with Lewis Dots at the hyperlink below)

nonmetals *RIG* to form anions

metals *OIL* to form cations

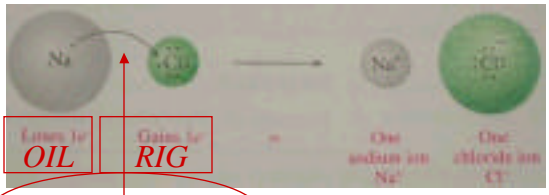


http://homework.sdmesa.edu/dgergens/chem100/lewis_dot/lewis_dot.html

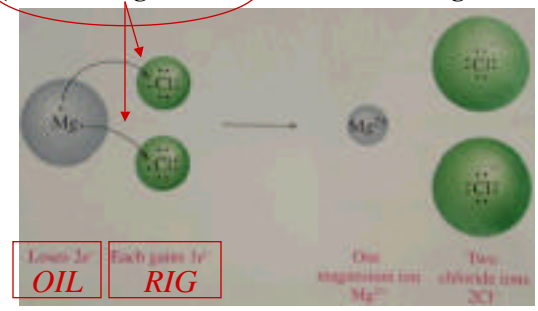
Please Note: a representative metal will lose electrons equal to its group # and as a cation its Lewis dot structure is just the ion with positive charge

Section 5.3 - Ionic Compounds

Chapter 5 - Introduction to Ionic Bonding (p149 &150)

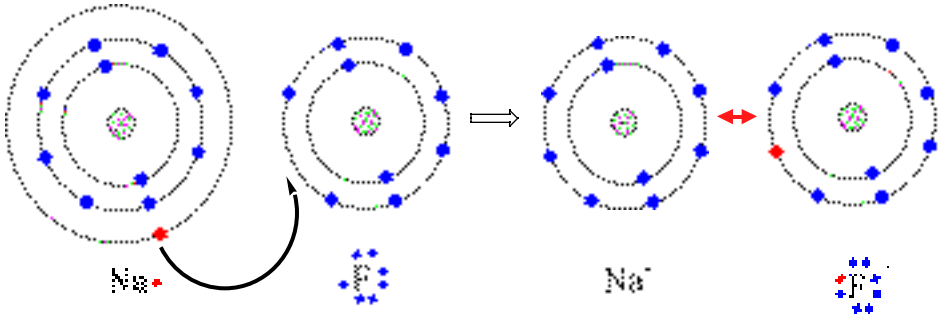


Ionic Bonding (transferring electrons to achieve noble gas electron configuration)

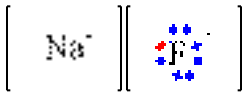


Please note the movement of the red colored valence (outermost) electron on sodium. It is transferred over to the fluorine atom.

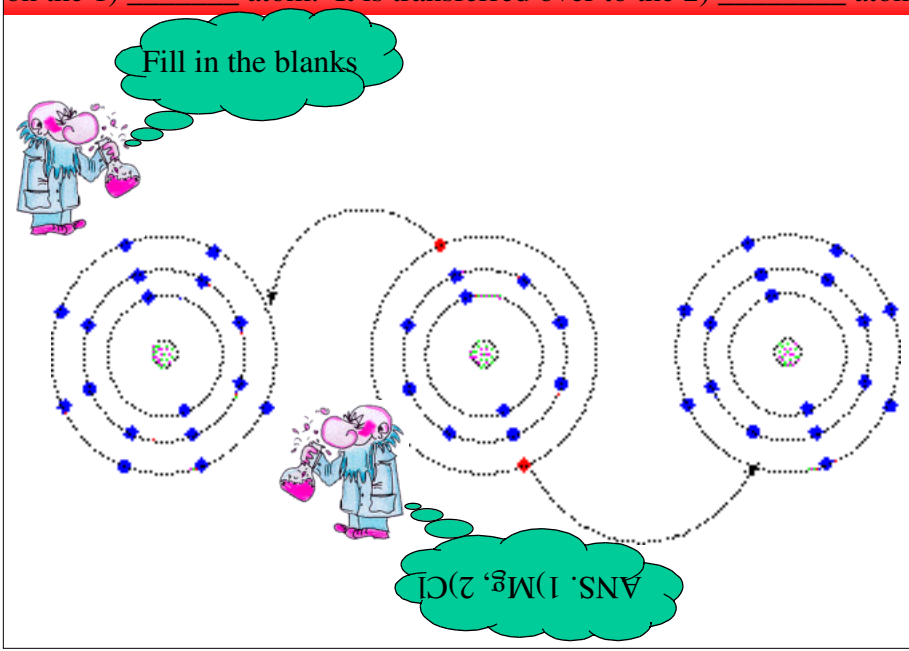
Bohr Models



Lewis dot structures

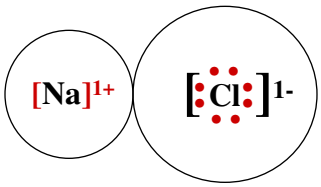


Please note the movement of the red colored valence (outermost) electrons on the 1) _____ atom. It is transferred over to the 2) _____ atom.



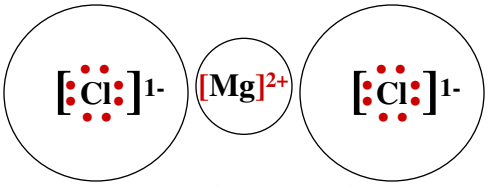
Section 5.3 - Ionic Compounds

Ionic Bonding (transferring electrons to achieve noble gas electron configuration)

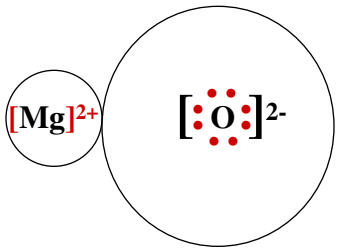


sodium chloride

1. **Opposites attract (cation attracts an anion)**
2. **Brought together by electrostatics**
3. **Ions coming together to balance charge**



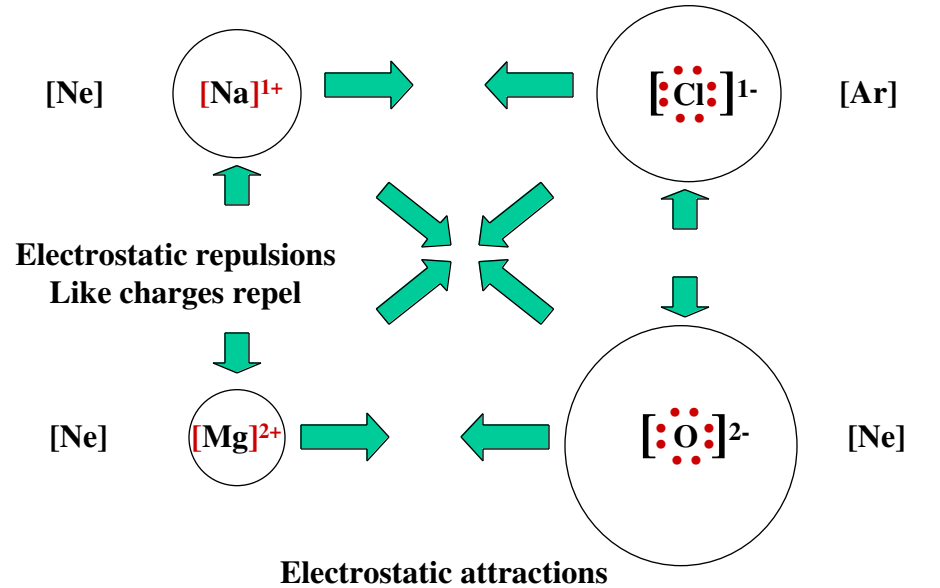
magnesium chloride



magnesium oxide

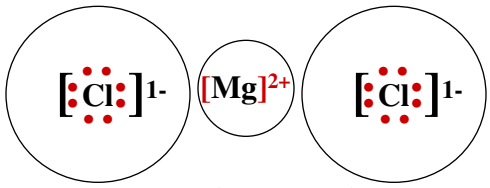
Section 5.3 - Ionic Compounds

Ions isoelectronic ("same electronic configuration") with noble gases



Section 5.4 - Naming & Writing Ionic Formulas

In naming ionic compounds, the positive cation, M^+, is named first followed by the name of the negative, X^-, anion.



magnesium chloride

Before we can continue naming ionic compounds, we must learn the special names for the anions, X^-

Where'd me m -ates

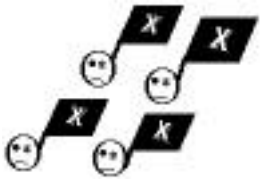
$[PO_4]^{3-}$, $[SO_4]^{2-}$, $[ClO_4]^{1-}$

rrR' - <u>ides</u>" "be one" (C^{4-} , N^{3-} , O^{2-} , F^{1-}).

Section 5.4 - Naming & Writing Ionic Formulas

Before we can even begin our discussion on naming, we must memorize our

X^- charges



MUST learn X^- charges!!!

monatomic ions
suffix –ides

$C^{4\pm}$ N^{-3} O^{2-} F^{1-}
P^{-3} S^{2-} Cl^{1-}

isoelectronic charges

oxy ions, XO^-
suffix –ates

BO_3^{3-} CO_3^{2-} NO_3^-
PO_4^{3-} SO_4^{2-} ClO_4^{1-}

carbide ion
nitride ion
oxide ion
fluoride ion

phosphide ion
sulfide ion
chloride ion

phosphate ion
sulfate ion
perchlorate ion

borate ion
carbonate ion
nitrate ion

Section 5.4 - Naming & Writing Ionic Formulas

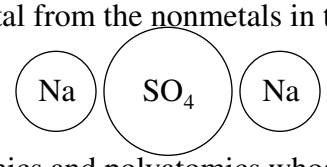
Ion charge calculation in ionic substances

1) Ion charge is called "oxidation state or number"
2) memorize the monatomic ions and their charge the "–ides" (C^{4-} , N^{3-} , O^{2-} , F^{1-}).
3) memorize the polyatomic ions and their charge "–ates"($[PO_4]^{3-}$, $[SO_4]^{2-}$, $[ClO_4]^{1-}$)
4) All anions (-ides and -ates) seek out positively charged cations (Na^{1+}, Ca^{2+}, Al^{3+}) to achieve a balance of zero in overall substance charge.

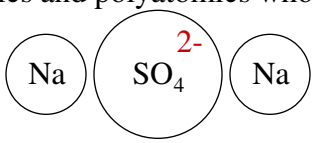
Section 5.4 - Naming & Writing Ionic Formulas

Perhaps the easiest way to calculate an oxidation number for a metal in an ionic compound is to draw a visual. For example, Na_2SO_4

1) Separate the metal from the nonmetals in the formula,

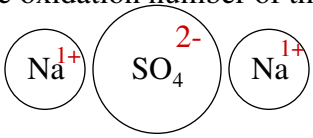


2) Assign monatomics and polyatomics whose oxidation number was memorized,



3) Knowing the sum of all oxidation numbers in a neutral species is zero (0), solve for the oxidation number of the remaining element.

sodium sulfate

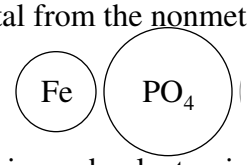


1 + (2-) + 1 = 0

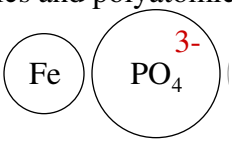
Section 5.4 - Naming & Writing Ionic Formulas

Calculate an oxidation number for a metal in an ionic compound of $FePO_4$

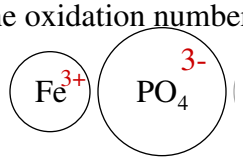
1) Separate the metal from the nonmetals in the formula,



2) Assign monatomics and polyatomics whose oxidation number was memorized,



3) Knowing the sum of all oxidation numbers in a neutral species is zero (0), solve for the oxidation number of the remaining element.

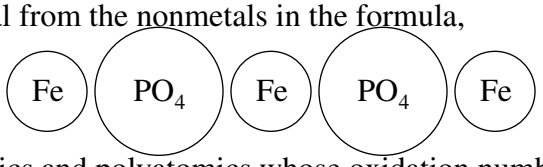
iron (III) phosphate 

3 + (3-) = 0

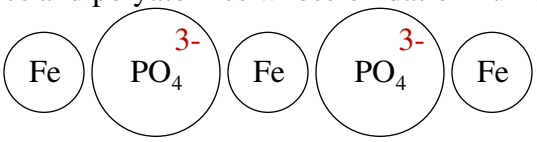
Section 5.4 - Naming & Writing Ionic Formulas

Calculate an oxidation number for a metal in an ionic compound of $Fe_3(PO_4)_2$

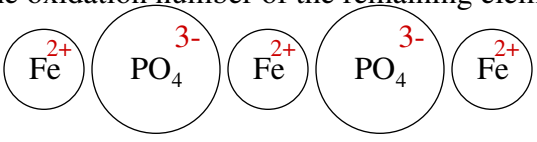
1) separate the metal from the nonmetals in the formula,



2) Assign monatomics and polyatomics whose oxidation number was memorized,

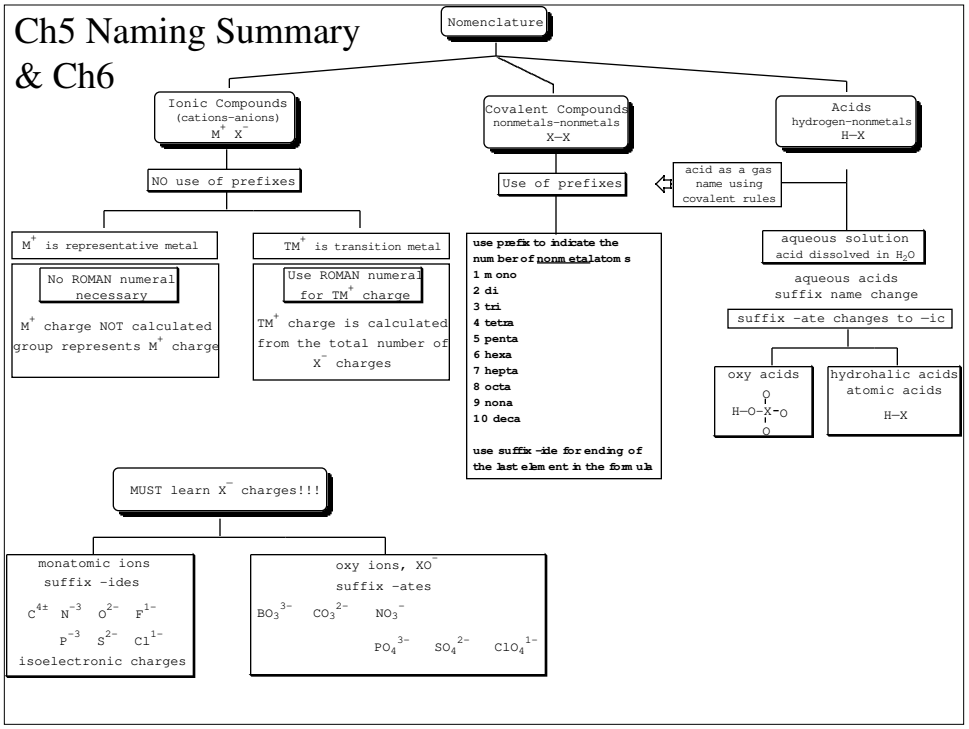


3) Knowing the sum of all oxidation numbers in a neutral species is zero (0), solve for the oxidation number of the remaining element.

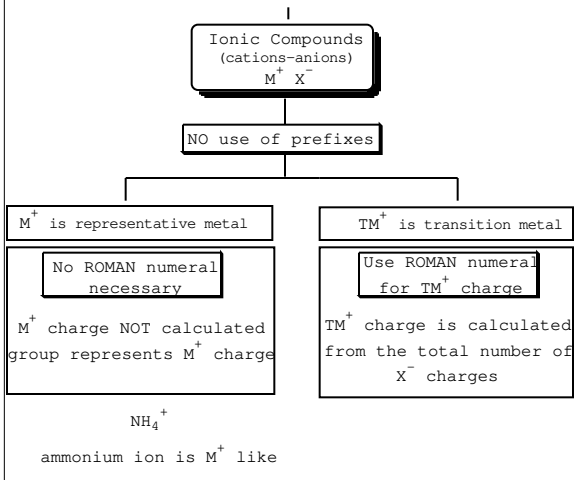
iron (II) phosphate 

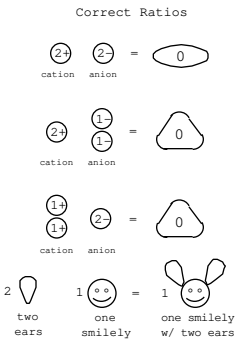
2 + (3-) + 2 + (3-) + 2 = 0

Ch5 Naming Summary & Ch6



Ionic Compounds





the sum of all oxidation numbers in a neutral species is zero, 0,

Ionic Compounds

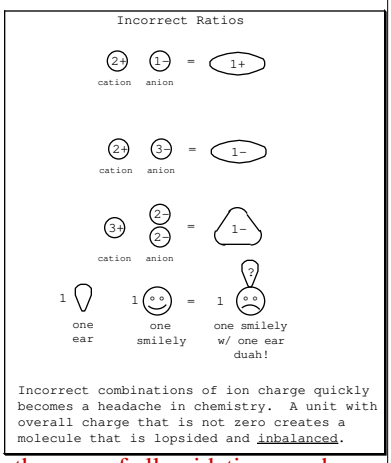
Ionic Compounds (cations–anions)
$M^+ X^-$

NO use of prefixes

M^+ is representative metal	TM^+ is transition metal
No ROMAN numeral necessary M^+ charge NOT calculated group represents M^+ charge	Use ROMAN numeral for TM^+ charge TM^+ charge is calculated from the total number of X^- charges

NH_4^+

ammonium ion is M^+ like



Incorrect combinations of ion charge quickly becomes a headache in chemistry. A unit with overall charge that is not zero creates a molecule that is lopsided and unbalanced.

the sum of all oxidation numbers in a neutral species is zero, 0,

Ionic Compounds

Ionic Compounds (cations–anions)
$M^+ X^-$

NO use of prefixes

M^+ is representative metal	TM^+ is transition metal
No ROMAN numeral necessary M^+ charge NOT calculated group represents M^+ charge	Use ROMAN numeral for TM^+ charge TM^+ charge is calculated from the total number of X^- charges

NH_4^+

ammonium ion is M^+ like

$1\ Fe^{2+}$	$1\ CO_3^{2-}$	=	$FeCO_3$	iron (II) carbonate
$1\ Fe^{2+}$	$2\ Br^-$	=	$FeBr_2$	iron (II) bromide
$2\ Li^+$	$1\ CO_3^{2-}$	=	Li_2CO_3	lithium carbonate
$1\ Sr^{2+}$	$2\ OH^-$	=	$Sr(OH)_2$	strontium hydroxide

TM^+ roman numeral

A Roman numeral represents oxidation state:
The larger the positive number,
The higher the oxidation state of the ion.

Only transition metals and heavier post-transition metals (e.g. Sn,Pb) use a Roman numeral in its name

the sum of all oxidation numbers in a neutral species is zero, 0,

Section 5.5 - Polyatomic Ions (learn your primary —ates)

A polyatomic ion is a group of atoms that has an electrical charge.
Some of the most important polyatomic ions contain a nonmetal and one or more oxygen atoms. X charges

MUST learn X^{-} charges!!!

monatomic ions
suffix –ides

$C^{4\pm}$ N^{-3} O^{2-} F^{1-}

P^{-3} S^{2-} Cl^{1-}

isoelectronic charges

oxy ions, XO^{-}
suffix –ates

BO_3^{3-} CO_3^{2-} NO_3^{-}

PO_4^{3-} SO_4^{2-} ClO_4^{1-}

The common polyatomic ions have charges 3-,2-,1- . Please note this for each ion
1) its location on the perioidic table,
2) number of oxygen atoms attached to it and
3) its charge.

Mister Pirate and his m "-ates" will take issue with you if you don't

Section 5.5 - Polyatomic Ions (must know these too)

Once you have learned your "—ates," we can learn some additional ions.

1. hydroxide ion, OH^{1-}
2. hydrogen carbonate ion, HCO_3^{1-}
3. dihydrogen carbonate ion, $H_2PO_3^{1-}$
4. ammonium ion, NH_4^{1+}

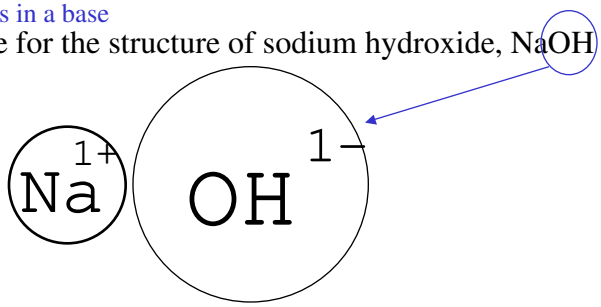
These highlighted are primary —ates Just additional proton(s) H^{1+} were Added to them

5. peroxide ion, O_2^{2-}
6. mercury (I) ion, Hg_2^{2+}
7. cyaninde ion, CN^{1-}

Section 5.5 - Polyatomic Ions

Balancing oxidation numbers in a base

Draw a visual picture for the structure of sodium hydroxide, NaOH

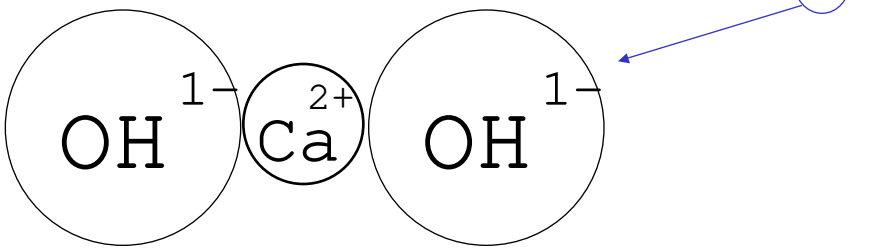


Note, use of the word hydroxide is derived from hydro oxide
"proton ion" + "oxide ion" combinded equals hydroxide ion
(H^{1+} and O^{2-} together equals OH^{1-})

Section 5.5 - Polyatomic Ions

Balancing oxidation numbers in a base

Draw a visual picture for the structure of calcium hydroxide, $Ca(OH)_2$

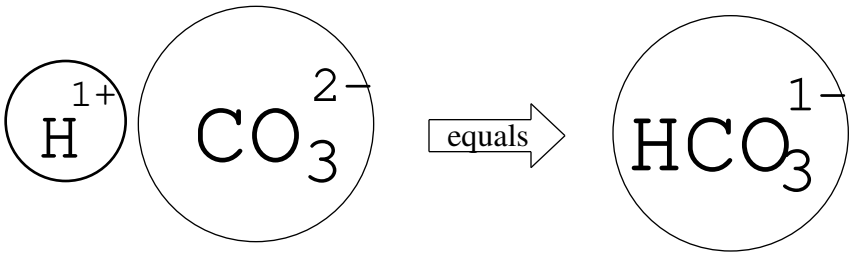


Note, use of the word hydroxide is derived from hydro oxide
"proton ion" + "oxide ion" combinded equals hydroxide ion
(H^{1+} and O^{2-} together equals OH^{1-})

Section 5.5 - Polyatomic Ions

Balancing oxidation numbers in a hydro - ate ions

Draw a visual picture for the structure of hydrogen carbonate ion, HCO_3^{1-}



proton combined with carbonate ion → hydrogen carbonate ion, HCO_3^{1-}

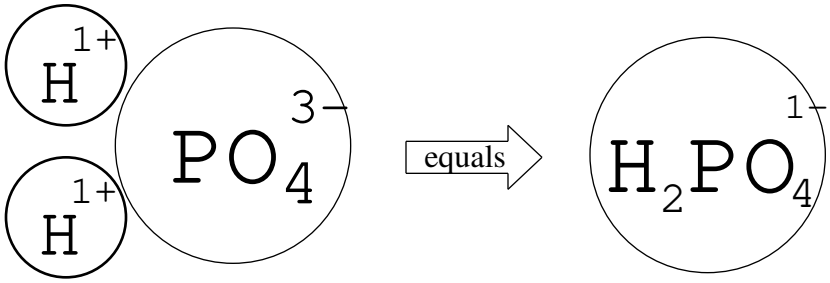
$H^+ + CO_3^{2-}$ —combination reaction→ HCO_3^{1-}

reactant ions — product ion

Section 5.5 - Polyatomic Ions

Balancing oxidation numbers in a hydro - ate ions

Draw a visual picture for the of dihydrogen phosphate ion, $H_2PO_4^{1-}$



proton combined with phosphate ion → dihydrogen phosphate ion, $H_2PO_4^{1-}$

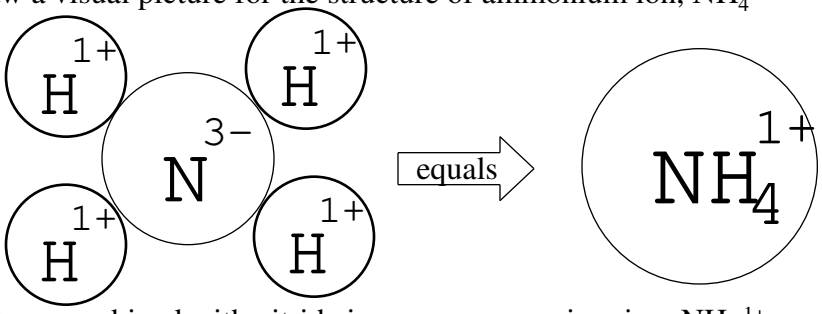
$2H^+ + PO_4^{3-}$ —combination reaction→ $H_2PO_4^{1-}$

reactant ions — product ion

Section 5.5 - Polyatomic Ions

Balancing oxidation numbers in a hydro - ate ions

Draw a visual picture for the structure of ammonium ion, NH_4^{1+}



protons combined with nitride ion → ammonium ion, NH_4^{1+}

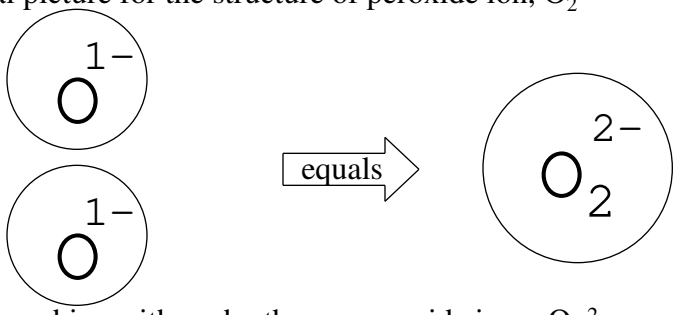
$4H^{+}$ + N^{3-} —combination reaction→ NH_4^{1+}

reactant ions — product ion

Section 5.5 - Polyatomic Ions

Special ion names

Draw a visual picture for the structure of peroxide ion, O_2^{2-}



superoxides combine with each other → peroxide ion, O_2^{2-}

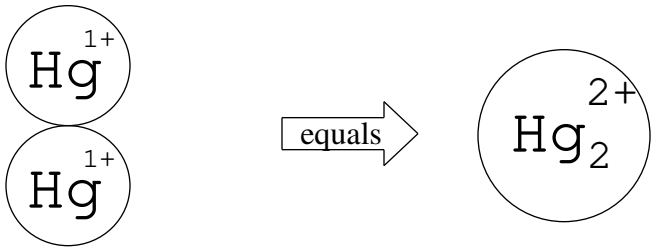
O^{1-} + O^{1-} —combination reaction→ O_2^{2-}

reactant ions — product ion

Section 5.5 - Polyatomic Ions

Special ion names

Draw a visual picture for the structure of mercury (I) ion, Hg_2^{2+}



mercury(I) ions combine → diatomic ion, Hg_2^{2+}

$Hg^{1+} + Hg^{1+}$ — combination reaction → Hg_2^{2+}

reactant ions

product ion

Supplemental packet page 75

Sparklettes Water

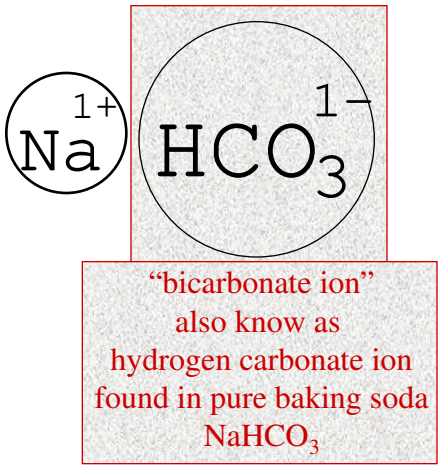
Dr. Gergens - SD Mesa College

The Crystal-Fresh® Drinking Water ingredient label says the following:

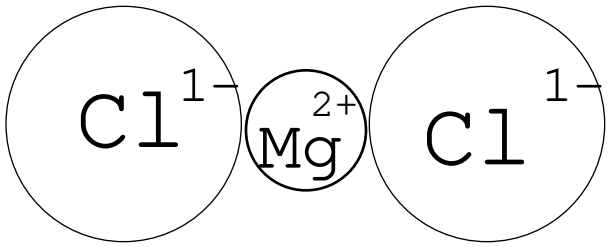
"Drawn from our deep protected wells in Santa Ana, CA. Purified using our Crystal-Fresh process, including filtration, ozonation, reverse osmosis, and/or dionization. Contains purified water and specially selected minerals in nutritionally insignificant amounts for great taste (sodium bicarbonate, magnesium chloride, calcium chloride and sodium sulfate).

Lets learn to write the correct formulas for these substances (sodium bicarbonate, magnesium chloride, calcium chloride and sodium sulfate) that Sparkletts ® adds to it's purified water In "nutritionally insignificant amounts for great taste."

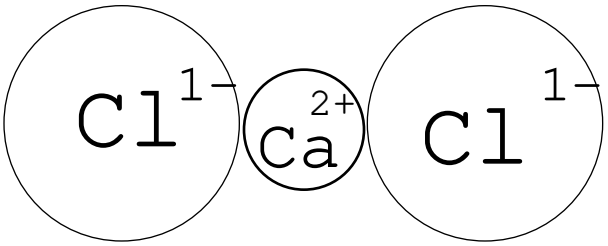
Lets learn to write the correct formulas for these substances (sodium bicarbonate, magnesium chloride, calcium chloride and sodium sulfate) that Sparkletts ® adds to it's purified water In "nutritionally insignificant amounts for great taste."



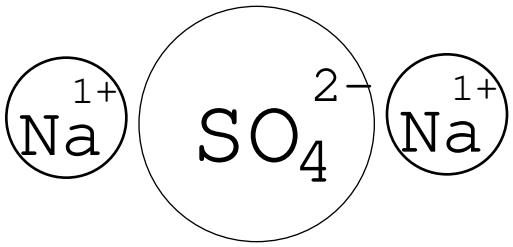
Lets learn to write the correct formulas for these substances (sodium bicarbonate, magnesium chloride, calcium chloride and sodium sulfate) that Sparkletts ® adds to it's purified water In "nutritionally insignificant amounts for great taste."



Lets learn to write the correct formulas for these substances (sodium bicarbonate, magnesium chloride, calcium chloride and sodium sulfate) that Sparkletts ® adds to it's purified water In "nutritionally insignificant amounts for great taste."



Lets learn to write the correct formulas for these substances (sodium bicarbonate, magnesium chloride, calcium chloride and sodium sulfate) that Sparkletts ® adds to it's purified water In "nutritionally insignificant amounts for great taste."



Sparklettes Water Nomenclature Exercise: "Nutritionally insignificant amounts of these compounds added for good taste."
Dr. Gerjens – SD Mesa College

Supplemental packet page 76

1. Write the name each cation and each anion (*e.g.*, Na^+ is sodium ion; Cl^- is chloride ion)
2. Say and write the name of the ionic salt compound by combining each cation with each anion in the table (*e.g.*, sodium chloride)
3. Complete the table by writing in the ionic salt compound formula in each cell of the table (*e.g.*, NaCl).
4. When writing a formula a cation and anion must combine in an appropriate ration to balance charge; see examples on back.

cations (name these ions)	anions (name these ions)		
	Cl^- chloride ion	**SO_4^{2-}** sulfate ion	**HCO_3^-** hydrogen carbonate ion
Na^+ sodium ion	**NaCl** sodium chloride	Na_2SO_4 sodium sulfate	$NaHCO_3$ sodium hydrogen carbonate
Mg^{2+} magnesium ion	$MgCl_2$ magnesium chloride	$MgSO_4$ magnesium sulfate	$Mg(HCO_3)_2$ magnesium hydrogen carbonate
Ca^{2+} calcium ion	$CaCl_2$ calcium chloride	$CaSO_4$ calcium sulfate	$Ca(HCO_3)_2$ calcium hydrogen carbonate

5. Predict the transition metal cation charge for iron, Fe, in the ionic salt $Fe_2(SO_4)_3$, and place it in the cation box below.
6. Give a name for $Fe_2(SO_4)_3$. Since transition metals can variable charge, you must somehow indicate metal cation charge in its name.
7. Write additional formulas for the cation Fe^{3+} combined with the anions Cl^- and HCO_3^- and give their compound names.

cation iron (III) ion	$FeCl_3$ iron (III) chloride	**$Fe_2(SO_4)_3$** iron (III) sulfate	$Fe(HCO_3)_3$ iron (III) hydrogen carbonate

Acids. In general, a substance that has an 'H' listed first in its formula is referred to as an **acid**. Name the acid but place a prefix in its name di= 2, tri= 3, tetra = 4, penta = 5, hexa = 6, hepta = 7, octa = 8, nona = 9, deca = 10 to indicate the number of hydrogens in the formula.

cations	anions		
	Cl^-	**SO_4^{2-}**	**HCO_3^-**
H^+ hydrogen ion	HCl hydrogen chloride	H_2SO_4 hydrogen chloride	H_2CO_3 dihydrogen carbonate
give a common name and use for each acid	hydrochloric acid stomach acid	sulfuric acid car battery acid	carbonic acid carbonated water

Section 6.2 - Covalent Compounds

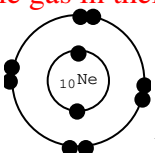
Chapter 6 - Introduction to Covalent Bonding

Please note the addition of the red colored valence (outermost) electron by the incoming hydrogen atom which will be shared by both atoms.

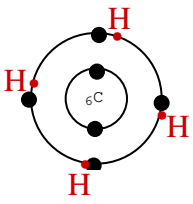
Covalent Bonding (**sharing electrons to achieve noble gas electron configuration**

nonmetals bond to hydrogen to achieve noble gas e- configuration of the noble gas in their period (row)

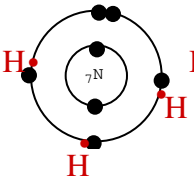
Addition of hydrogen



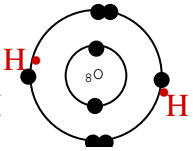
Achieving an OCTET valence



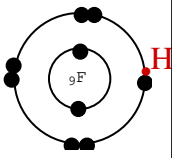
CH_4
methane gas



NH_3
ammonia gas



H_2O
water



HF
hydrogen fluoride

molecules of nonmetals hydrides