Wednesday October 15, 2014

Picture re-takes Oct 16

If you missed the test last Wednesday, plan to write it ASAP

" What happens when electrons lose their energy?"

"They Get Bohr'ed"

-

Test

If you missed it please see Ms Casey ASAP to write it during IS or at lunch on Wednesday.....If you do not write it by Oct 16th you will receive a mark of zero which will appear on your progress report Oct 18th!

CHEMISTRY

Chemistry tends to focus on the properties of substances and the interactions between different types of matter, particularly reactions that involve electrons.

Review of what you learned about MATTER in Grade 9

1. types of properties: physical and chemical

2. physical properties -> **observed with senses**

3. examples of physical properties:
   - color
   - texture
   - odor
   - lustre
   - clarity
   - taste
   - state of matter (solid, liquid, gas)
   - melting point
   - freezing point
   - boiling point
   - malleability
   - ductility
   - brittleness
   - solubility

4. **chemical properties** -> ability/inability to undergo a change that alters its composition

5. examples of chemical properties include the tendency to:

- corrode
- tarnish
- explode
- combust
- react with acid
- rust

6. types of changes:

physical - substance remains the same

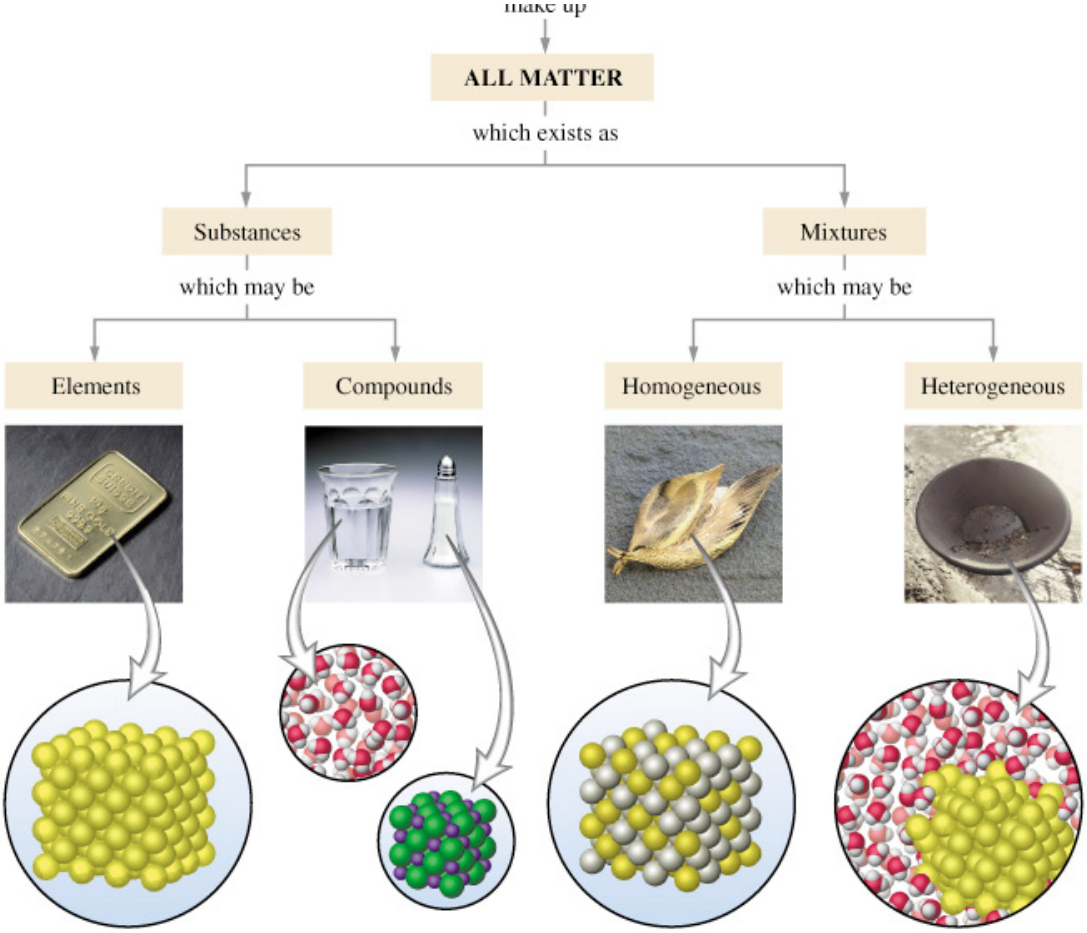
- melting, boiling, freezing, condensing, dissolving, cutting, breaking

chemical - substance changes into something new with new properties

- corroding, tarnishing, rusting, combusting, cooking

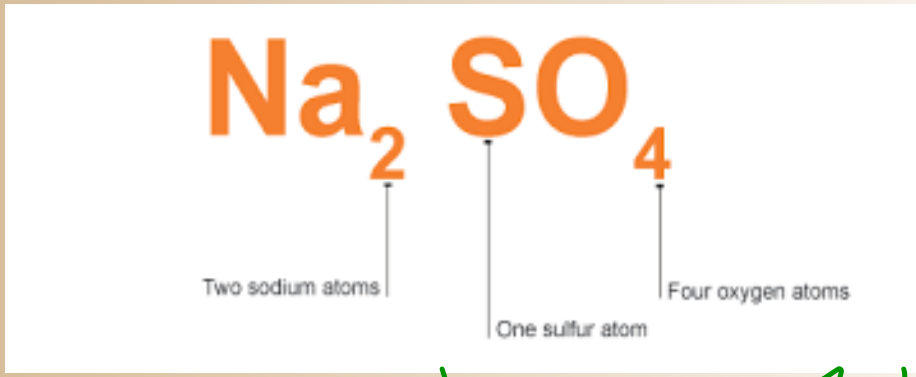
7. evidence that a chemical reaction has occurred
   - color change
   - formation of a precipitate (solid)
   - heat or light given off
   - odor produced
   - production of bubbles
   - change in temperature

8. classification of matter:
   - pure substances (elements and compounds)
   - mixtures (solutions and heterogeneous mixtures)


make up
ALL MATTER
which exists as
Substances
Mixtures
which may be
which may be
Elements
Compounds
Homogeneous
Heterogeneous

9. chemical symbols and formulas:

- state the number of different elements present in a chemical formula, the number of atoms of each element, and the total number of atoms in each molecule



2 + 1 + 4 = 7 atoms

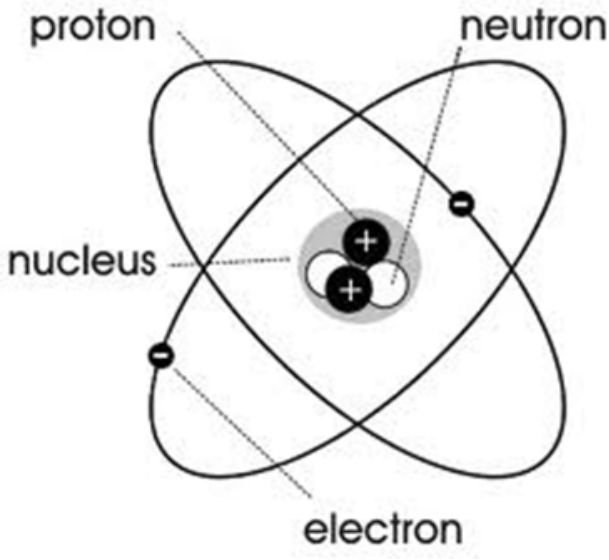
1. matter is made up of atoms
2. subatomic particles: protons (+), neutrons (neutral), electrons (-)

3. atomic number = number of protons

4. mass number = #p + #n

5. standard atomic notation

$$^{35}_{17}Cl$$



Science 10 - The Periodic Table.notebook

6. periodic table

7. period and group

8. metals/metalloids/nonmetals

9. families of the periodic table: alkali metals, alkaline earth metals, halogens, noble gases
periods of the periodic table: lanthanides, actinides

Atom - are neutral because the # Protons = #electrons

Li atomic # 3 +++ --- atom

Ions - a charged atom - because

the # protons ≠ # electrons

Li^{+1} lose 1 electron +++ --

Ions occur because elements lose or gain ELECTRONS

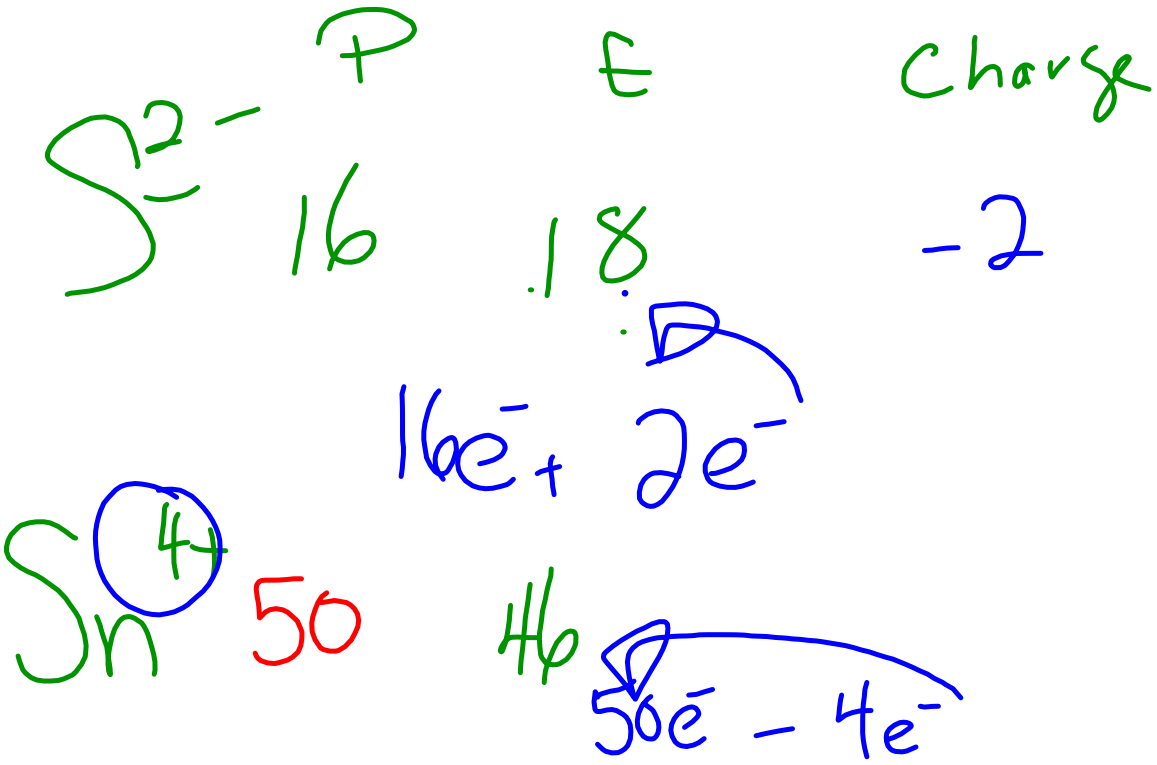
	atom	ion
Mg	12p 12e	12p 10e Mg^{2+}
O	8p 8e	2+6 8p 10e
K	19p 19e	18e K^{+1}
Cl		Cl^{1-}

worksheet chemistry ions and subatomic

particles

Nomenclature worksheet 1

monatomic ions



Monatomic ions

Sodium Na sodium ion Na^{1+}

Bromine Br bromide ion Br^{1-}

NON Metals need to end in IDE

Fe^{3+} 26 23 3+

Fe^{2+} 26 24

F^{-1} 9 10

N^{-3} 7 10

Mn^{5+} 25 20

3. Mg magnesium ion Mg^{2+}

Cl chloride ion Cl^{1-}

O oxide ion O^{2-}

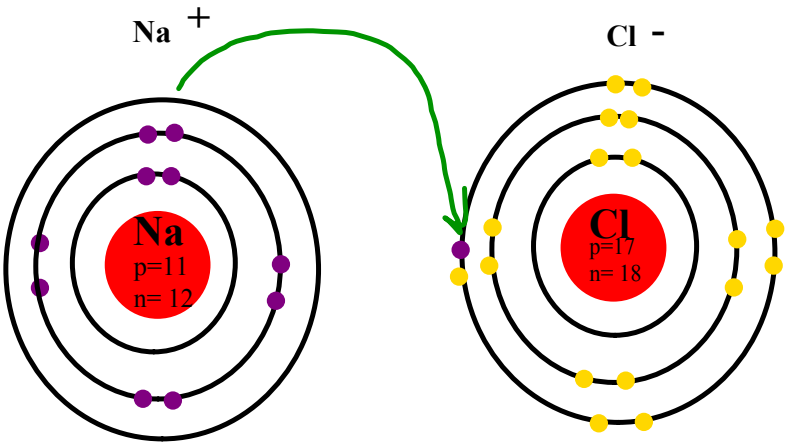
Al aluminum ion Al^{3+}

- **Ionic compounds** are made up of **positive (Metal)** and **negative (nonmetal) ions.**
  - *Positively charged ions are called ***cations***
  - *Negatively charged ions are called ***anions***

The ions are present because the ***metal gives its valence electrons to the nonmetal making both of them stable now.***

- They conduct electricity pg 189 Q 2 & 3
  - **THEY TRANSFER ELECTRONS**
  - Table salt is NaCl

$$NaCl_{(s)} \rightarrow Na^{+}_{(aq)} + Cl^{-}_{(aq)}$$



sodium chloride

Electrons per orbit first orbit 2, second orbit 8, third orbit 8

- **NAMING IONS**

- The ***cations*** are always named first

  - Metal ions keep their full name with "ion" added to the end of the word

I.e. Li^{+} is named Lithium Ion
Ca^{+2} is named Calcium Ion

- **If the metal is a Transition metal you must check to see if it can have more than one charge. You can do this by looking at you perodic table and seeing if there is more than one charge under the atomic number.**

i.e. iron can have a charge of either +2 or +3. As a result, you need to specify whether the cation has a +2 or a +3 charge. When you've done this, just put the number after the name of the element in Roman numerals. For example, the Fe^{+3} ion just has the name "iron (III)".

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  - Nonmetal ions the ending of the nonmetal changes to "ide" and the word "ion" is added

I.e. F^{-} is named fluoride ion
Cl^{-} is named chloride ion
O^{-2} is named Oxide ion
N^{-3} is named Nitride ion
P^{-3} is named Phosphide ion

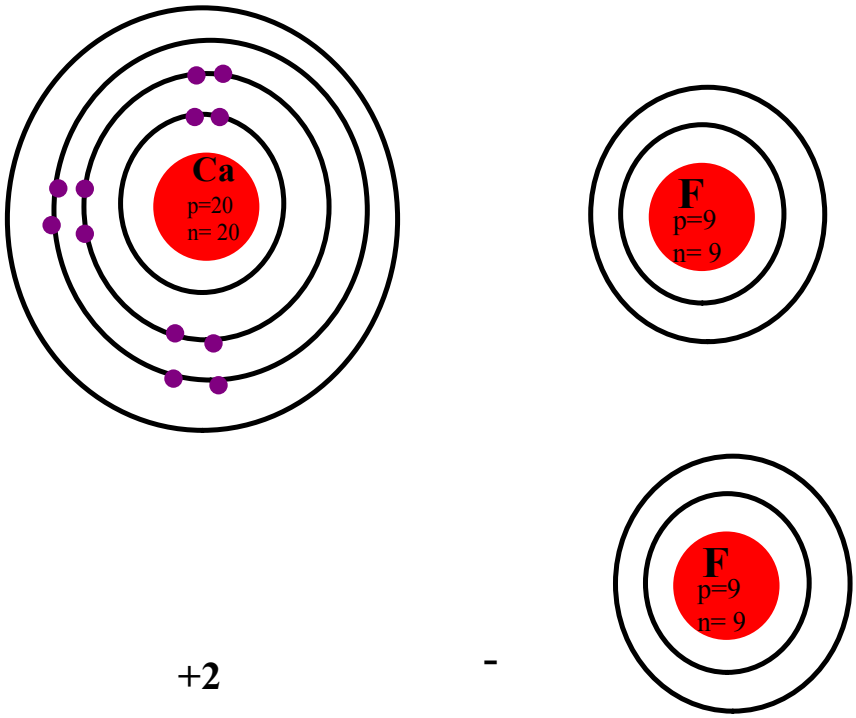
If the anion has more than one atom, then we'd say that it's a "polyatomic ion", meaning (not surprisingly) that the anion has more than one atom.

i.e) OH^{-} is "hydroxide",

SO_4^{2-} is sulfate

Example: Calcium Fluoride

$$CaF_2\,(s) \rightarrow Ca^{+2}\,(aq) + F^{-}\,(aq)$$



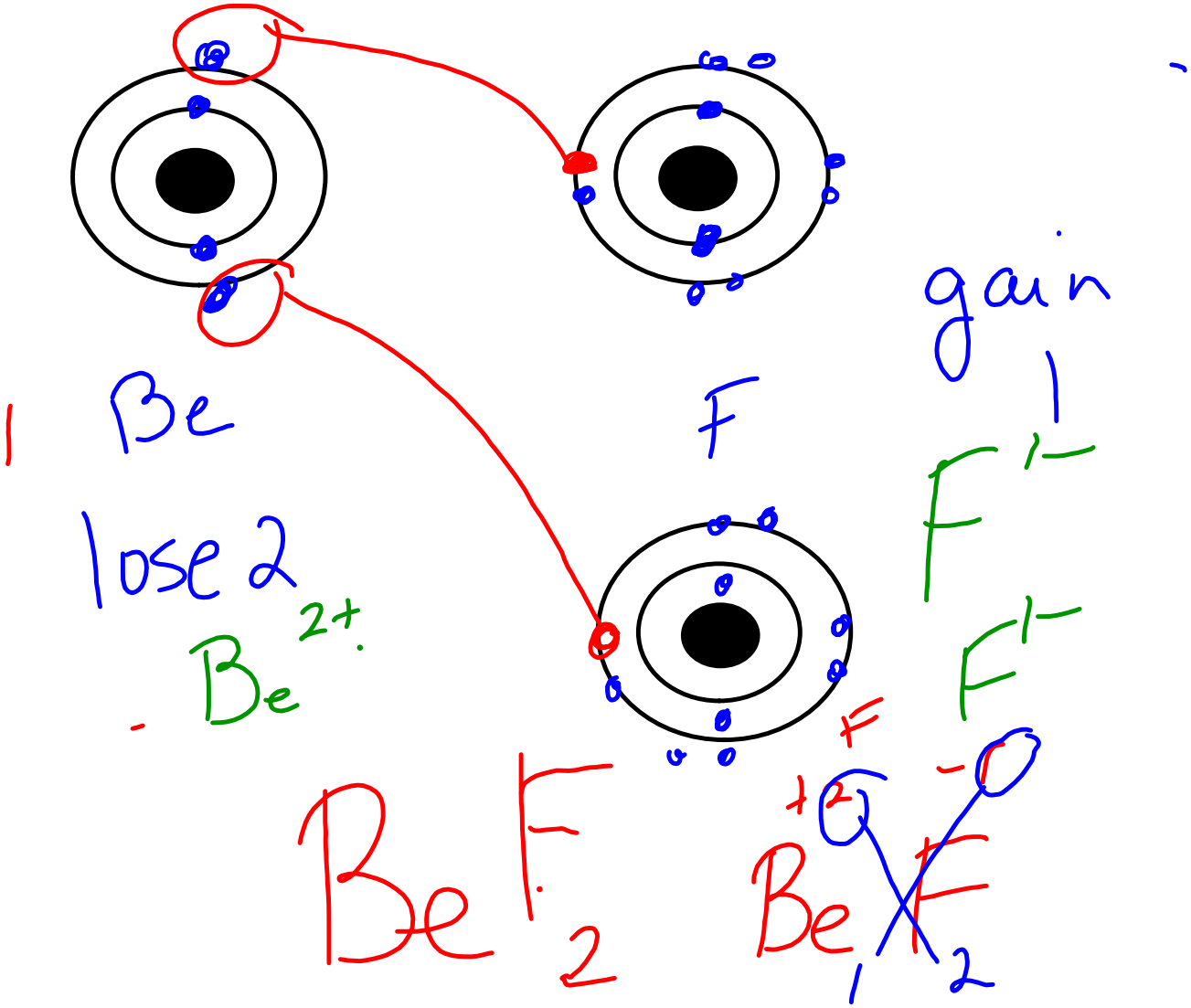
Read pages 188-189
Complete questions 1, 2 , 3 & 4

1. a) Metals form ionic compounds with nonmetals by tranferring electrons to the to nonmetals
b) Na & Cl

2) Beryllium and fluorine react to form an ionic compound.
a) Which element is the metal and which is the nonmetal?

Be metal F non metal

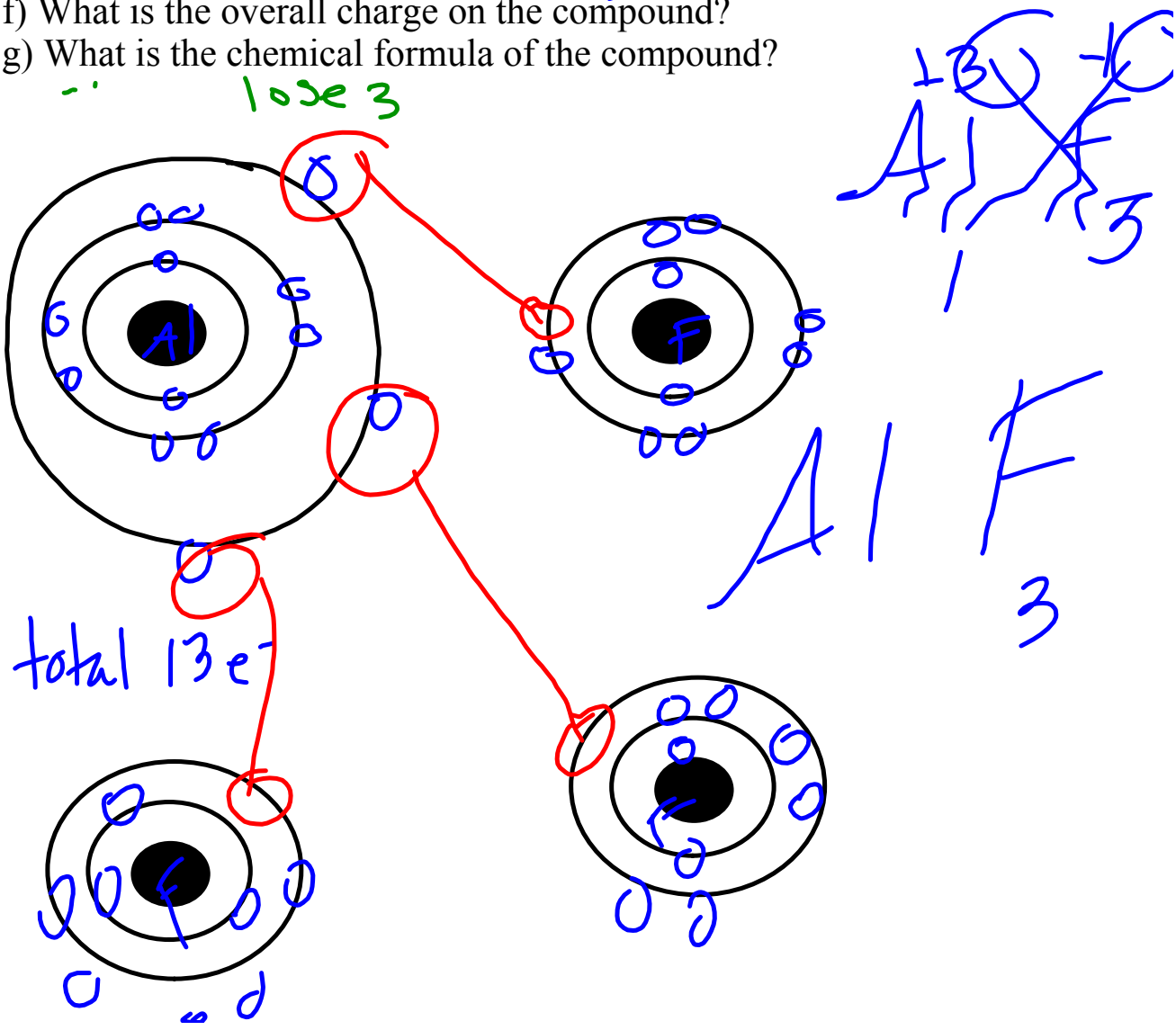
b) Draw bohr diagrams of beryllium and fluorine.
c) How many electrons must each element gain or lose to form stable ions?
d) Draw sketch to show how this compound forms by transfer of electrons.
e) Indicate the ionic charge on the ions
f) What is the overall charge on the compound?
g) What is the chemical formula of the compound?



3) aluminum and fluorine react to form an ionic compound.
a) Which element is the metal and which is the nonmetal?

Al - metal F - nonmetal

b) Draw bohr diagrams of aluminum and fluorine.
c) How many electrons must each element gain or lose to form stable ions? Al - lose 3 F - gain 1
d) Draw sketch to show how this compound forms by transfer of electrons.
e) Indicate the ionic charge on the ions Al^{3+} F^{1-}
f) What is the overall charge on the compound?
g) What is the chemical formula of the compound?



4) What part of an atom is involved in making chemical bonds?

ELECTRONS

Ionic Compounds

How to write chemical formulas For Ionic Compounds

-A chemical formula is a combination of symbols that represent a particular compound

- Ionic Compounds

Step 1) Write the symbol for the metal first and the non-metal

ie) Metal Non-metal
Al Cl

Step 2) Write the ionic charge(combining capacity) above each symbol

ie.) Metal Non-metal
3^+ 1^-
Al Cl

Step 3) Determine how many ions, of each you need to have a net ionic charge of zero.

ie.) Total ionic charge is (3+) + (1-) = (2+)
Therefore to balance the ionic charge
(3+) + 3(1-) = 0

Step 4) The number that appear infront of the brackets indicate how many ions of a specific element is needed to form the ionic compound.

ie.) $AlCl_3$

Step 1)Crisscross Rule: Write the ionic charge above the symbol. Then crisscross the numbers using them as subscripts.

How to write chemical formulas For Ionic Compounds

- **If you find it difficult to determine how many ions are needed to balance the ionic charges there is a simplier method called the Crisscross Rule.**

ie.) **Metal** **Non-metal**

p 195
3-9

The formula is $AlCl_3$

The Total ionic charge is (3+) + 3(1-) = 0

Write the name of the compound, remember the ending of the non-metal changes to *ide*.

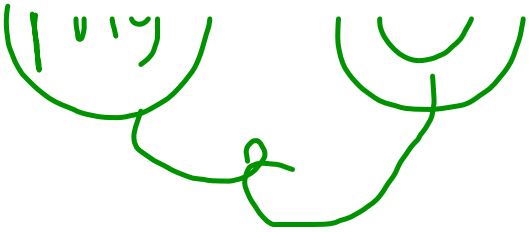
Aluminum + chlorine becomes Alumimun chloride

Page 195 Q 3-9

Ca Cl

+1

K Br



Al O

Ca I

Some metals are able to form more than one kind of ion

Name of Element	Symbol	Ionic Charge	Roman Numeral
Copper	Cu	1+, 2+	I, II
Iron	Fe	2+, 3+	II, III
Lead	Pb	2+, 4+	II, IV
Tin	Sn	2+, 4+	II, IV

CuCl is named Copper(I) Chloride

$Cu^{+}_{(s)} + Cl^{-}_{(s)} \longrightarrow CuCl_{(s)}$

$CuCl_2$ is named Copper(II) Chloride

$Cu^{2+}_{(s)} + 2Cl^{-}_{(s)} \longrightarrow CuCl_{2\,(s)}$

Cu Cl

Cu^{+2} Cl^{-}

+2 +2(-1) = +1

+2 + (-2) = 0

Write the ionic compounds formed by nickel and oxygen two possibilities.

Ni O

Ni O

Homework:
Page 195
Question:
1,3,4,5,6,7,8,9

1) How does the sum of the charges on the positive ions compare to the sum of the charges on the negative ions in ionic compounds?

Ans: The sum on the positive charge ion must be equal to the negative charge ion in order for the overall net charge to be 0.

b) Calculate the sum of the ionic charges in the compound Al_2O_3. Show your calculations.

Ans: metal nonmetal

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

(3+) + (2-) = +1

2(3+) + 3(2-)
(6+) + (6-)= 0

Homework:
Page 195
Question: 1,3,4,5,7,9,

3 & 4) Write the formulas for the compounds formed by the following combinations of elements.

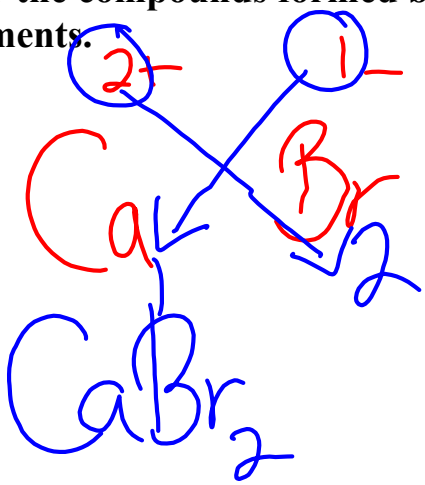
(a) lithium and fluorine

Li^+ F^-

(1+) + (1-) = 0

LiF

Lithium fluoride



(b) Calcium and bromine

Ca^{2+} Br^-

(2+) + (1-) = +1

(2+) + 2(1-) = 0

$CaBr_2$

Calcium Bromide

(c) Sodium and Nitrogen

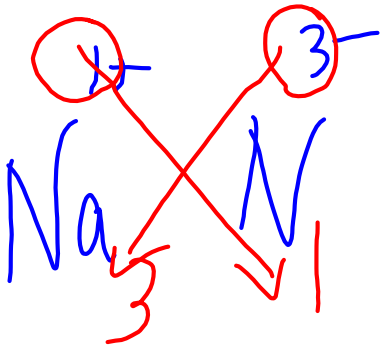
Na^+ N^{3-}

(+1) + (3-) = -2

3(+1) + (3-) = 0

Na_3N

Sodium Nitride



(d) aluminum and nitrogen

Al^{3+} N^{3-}

(3+) + (3-) = 0

AlN

Aluminum Nitride

Homework:
Page 195
Question: 1,3,4,5,7,9,

5)Write the formula for the following compounds

a) sodium iodide

Na^+ I^-

(1+) + (1-) = 0

NaI

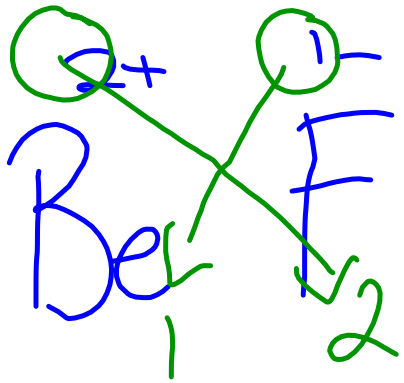
b) beryllium fluoride

Be^{2+} F^-

(2+) + (1-) = 1+

(2+) + 2(1-) = 0

BeF_2



c) magnesium oxide

Mg^{2+} O^{2-}

(2+) + (2-)= 0

MgO

d) aluminum sulfide

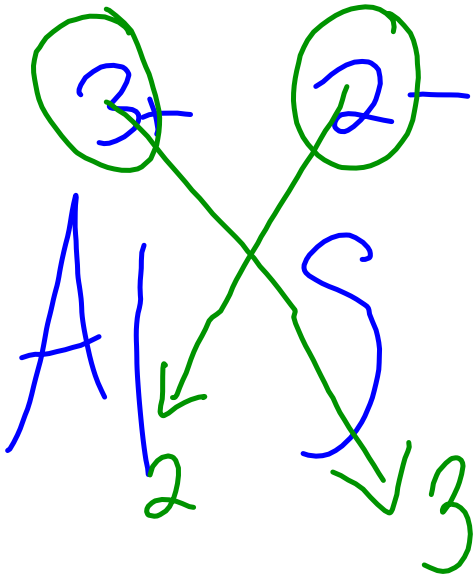
Al^{+3} S^{-2}

(3+) + (2-) = +1

2(3+) + 3(2-)

(6+) + (6-) = 0

Al_2S_3



6. a)KCl

potassium chloride

B) Na_3P

Sodium phosphide

c) CaF_2

Calcium fluoride

Homework:
Page 195
Question:
1,3,4,5,6,7,8,9,

7) Write the formula for the following compounds.

a) Copper(I) bromide

Cu^{+1} Br^{-}

(1+) + (1-) = 0

CuBr

1+ 1-
Cu Br

b) copper(II) bromide

Cu^{2+} Br^{-}

(2+) + (1-) = 1+
(2+) + 2(1-) = 0

$CuBr_2$

2+ 1-
Cu Br

c) iron(II) sulfide

Fe^{2+} S^{2-}

(2+) + (2-) = 0

FeS

iron (III) sulfide

3+ 2-
Fe S
2 3

8. a) $SnCl_2$

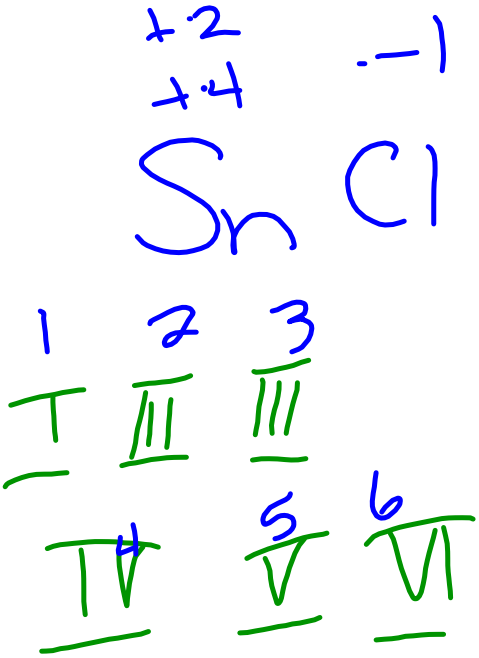
tin (II) chloride

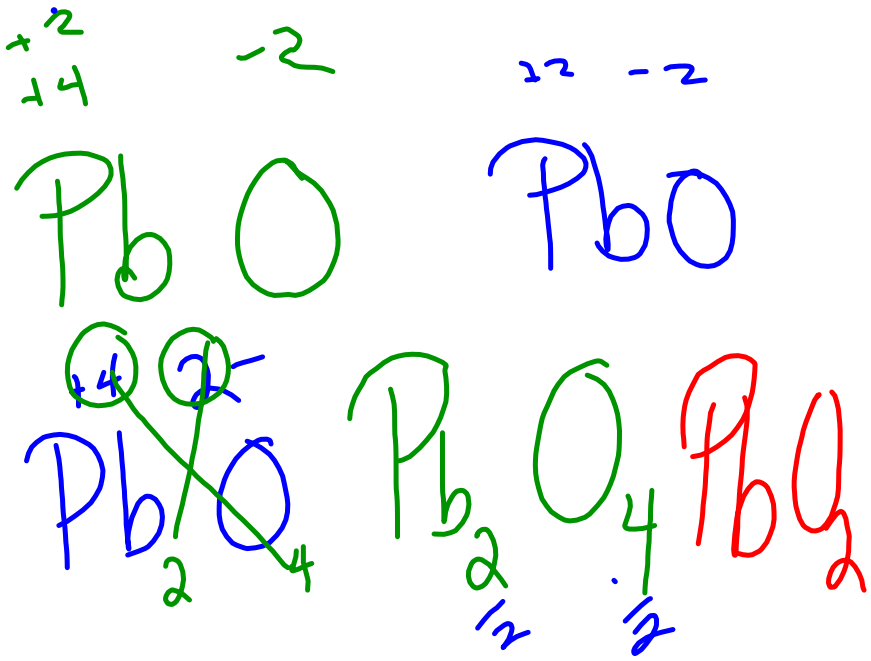
b) $SnCl_4$

tin (IV) chloride

c) $PbBr_2$

Lead (II) bromide




+2
+4
-2
PbO
+2 -2
PbO
+4 -2
PbO2
Pb2O4
2
4
1/2
1/2

1. a) $Mg^{2+}\ O^{2-}$ MgO

k) $Cu^{1+}\ Br^{1-}$ $CuBr$

2. a) lithium oxide

$Li^{1+}\ O^{2-}$

k) $Pb\ S$

lead (II) sulfide

Homework:
Page 195
Question:
1,3,4,5,6,7,8,9,

9) Write the formula and of the name of the compound formed by each of the following combinations of ions.(Note that some of these ions will require the use of Roman numerals in the name.)

Look in the perodic table to see if your metal has more than one charge

a) Fe^{3+} and O^{2-}

Iron(III) oxide

b) Ca^{2+} and F^{-}

Calcium Fluoride

c) Cu^{+} and S^{2-}

Copper(I) Sulfide

ASSIGNMENT

- Worksheet 5.8
- ASSIGNMENT

MARKS (progress reports this week)

If you failed the Chap 3 & 4 test you can attend IS Thursday for help and Friday to be re-evaluated to potentially bring your mark up to a 60%. See Ms. Casey if you are interested!!! **room 4231**

1. $\overset{+2}{Mg}\ \overset{-2}{O}$ MgO

b) $\overset{+1}{Na}\ \overset{-1}{F}$ NaF

i) Mg_3N_2 Mg_3N_2

m) $FeCl_3$ $FeCl_3$

2. d) Calcium oxide

+2 +3 -1

j) $FeBr_3$

iron (III) bromide

n) magnesium phosphide

+2 +5 -2

o) Ni_2O

nickel (II) oxide

5.8 answers

1 a) MgO
b) NaF
c)AlN
d)K_2S
e)LiI
f)$CaBr_2$
g)BeO
h) $NiCl_2$
i) Mg_3N_2
j)Al_2S_3

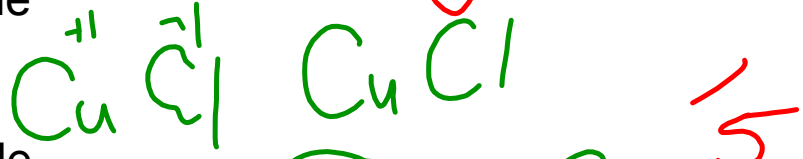
Pop Quiz

1. Write the formula for the following compounds

A) Sodium fluoride

b) Magnesium nitride

c) Copper (I) chloride



d) calcium phosphide

e) tin (IV) bromide

2. Write the name for the following compounds

a) MgS magnesium sulphide

b) Na_3N sodium nitride

c) $CuCl_2$ copper(II)chloride

d) K_3P potassium phosphide

e) $FeBr_3$ Iron(III) bromide

5

Remember:
IONIC COMPOUNDS INVOLVE THE TRANSFER OF ELECTRONS FROM METALS

- Hand in 58

POSITIVE IONS

X^+ Ba^{2+}

Na^+ NH_4^+ 1

NEGATIVE IONS

NO_3^- 1

Y^- CrO_4^{2-} ate

Cl^- SO_4^{2-} ite

Na

5.9

POLYATOMIC COMPOUNDS

- Polyatomic ions are groups of atoms that tends to stay together & carry an overall ionic charge.

ASSIGNMENT last chance to hand it in!!!

- Worksheet 5.8 ASSIGNMENT MARK

(progress reports this week)

If you failed the Chap 3 & 4 test you can attend IS **TODAY** for help and Friday to be re-evaluated to potentially bring your mark up to a 60%. See Ms. Casey if you are interested!!! **room 4231**

http://www.youtube.com/watch?v=MJZeZvDxcx8

Table 2: Common Polyatomic Ions and their Ionic charge (page196)

Name of polyatomic ions	Ion Formula	Ionic Charge
nitrate	NO_3^-	1-
hydroxide	OH^-	1-
bicarbonate (hydrogen carbonate)	HCO_3^-	1-
chlorate	ClO_3^-	1-
hydrogen sulfide	HS^-	1-
carbonate	CO_3^{2-}	2-
sulfate	SO_4^{2-}	2-
phosphate	PO_4^{3-}	3-
Some more Polyatomic ions are found on the back of the perodic table I had given you. (Polyatomic Ions - Theoretical Summary)		

- Polyatomic ions are groups of atoms that tends to stay together & carry an overall ionic charge.
- Polyatomic ions do not separate. For example, when Sodium Nitrate dissolves in water the metal ion will separate from the polyatomic ion to form sodium ions and nitrate ions, but the nitrate ion itself stays together.

Find the following polyatomic ions and write the chemical symbol along with the charge.

Nitrate

Sulfite

Hydroxide

phosphate

Find the following polyatomic ions and write name.

MnO_4^-

CO_3^{2-}

NH_4^+

$C_4H_4O_6^{2-}$

Ionic Compounds involving polyatomic ions are referred to as:

↓

Polyatomic compounds

(they are just another form of ionic compound)

Polyatomic ions interactive.notebook

Polyatomic Compounds

Since polyatomic compounds are just ionic compounds, we use the same method to write them as we did for regular ionic compounds.

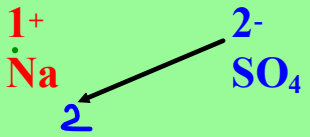
Polyatomic Compounds

Step 1) Write the symbol for the metal first and the polyatomic group

ie) Metal Polyatomic group
Na SO_4

Step 2) Write the ionic charge above each symbol

ie.) Metal Non-metal



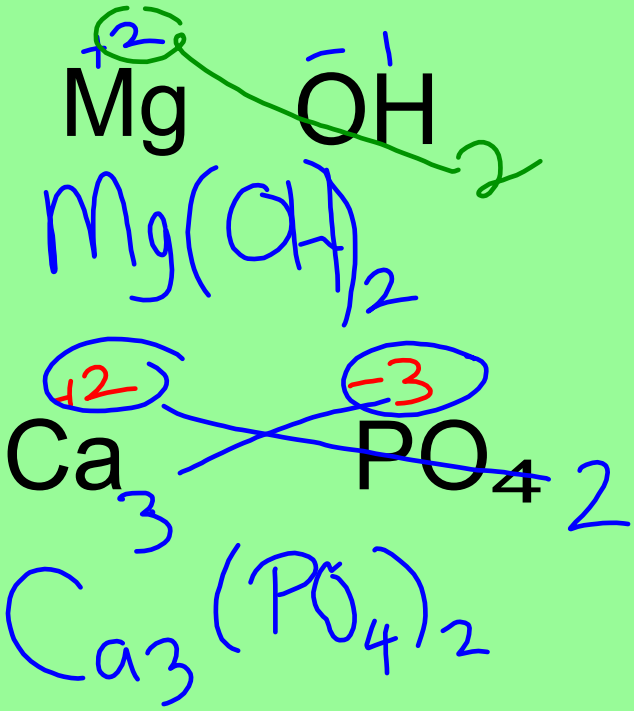
Page 198 Questions 1,2,3,4,6 & 7

Criss Cross if necessary (if the numbers are different)

Step 3) The number that appear infront of the brackets indicate how many ions of a specific element is needed to form the ionic compound.

ie.) Na_2SO_4

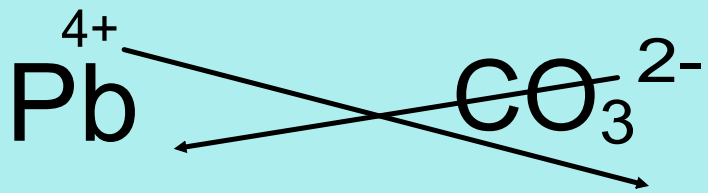
BECAREFUL - if the polyatomic already has a subscript & you have to criss cross you must use a ***bracket***.



Test today 12 - NOON

Be here!!! - if you weren't you are running out of time to write your test or get ZERO!!

Turn in 5.8 if you have not done so yet.



$Pb \quad CO_3$

Calcium nitrate

:

hydrogen carbonate (bicarbonate)

TWO NAMES USED FOR THE SAME POLYATOMIC ION

Page 198
Questions
1,2,3,4,6 & 7

Homework:
Page 198
Questions 1-7

1) In your own words, explain what is meant by the term "polyatomic ion". Give two examples.

A group of charged atoms that act like a single ion. OH^- SO_4^{-2} NO_3

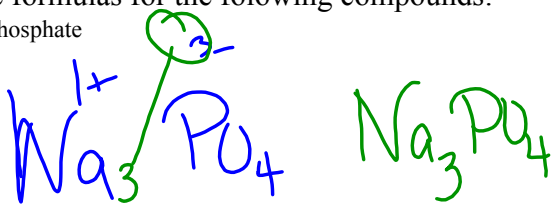
2) What happens to the ions in the compound sodium nitrate when dissolved in water?

The metal Na^+ will separate from NO_3 but the NO_3 doesn't split up.

$)_3^3$

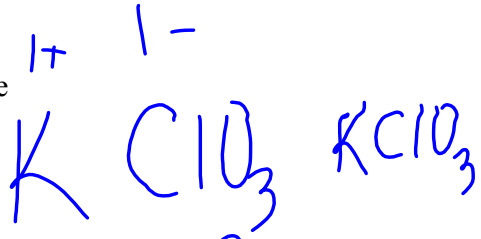
3) Write the formulas for the folowing compounds:

a) Sodium Phosphate



b) calcium sulfate

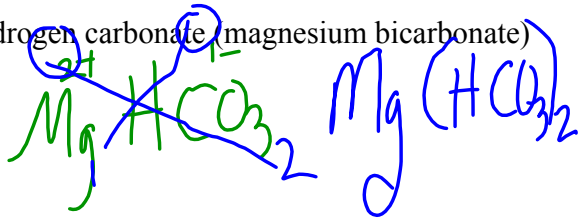
c) potassium chlorate



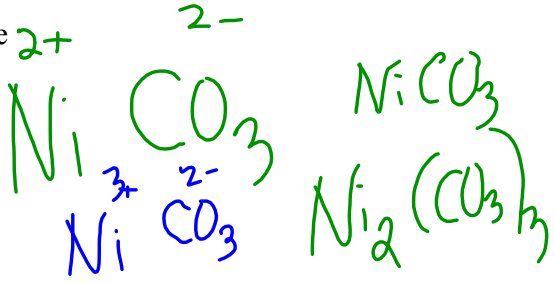
d) aluminum hydroxide

e) Berylium nitrate

f) magnesium hydrogen carbonate (magnesium bicarbonate)



g) nickel carbonate



g) nickel carbonate

4) Write the name for the following compounds:

a) K_2CO_3 potassium carbonate

b) Na_2SO_4 sodium sulfate

c) $Al(HCO_3)_3$ aluminum bicarbonate

d) $AgNO_3$ Silver nitrate

5) What pattern do you see in the formula of oxyacids and the original ionic charge of the polyatomic ions? Explain, with two examples.

b) Why does this pattern make sense?

$H(SO_4^{-})$

$(+1) + (-2) = -1$

$2(+1) + (-2) = 0$

6) Why is ammonia nitrate (NH_4NO_3) not written $N_2H_4O_3$?

$(NH_4)^+ (NO_3)^-$

NH_4NO_3

Polyatomics have very strong bonds & stay together - the formula shows how they join

7) Some polyatomic ions have a positive charge. The ammonium ion (NH_4^+) is an example. Give the names and formulas of the compounds formed by this ion with :

a) chloride ion

$NH_4^+ \quad Cl^-$

NH_4Cl

b) a sulfate ion

$NH_4^+ \quad SO_4^{2-}$

$(NH_4)_2SO_4$

Oxyacids are compounds formed when hydrogen combines with polyatomic ions that contain oxygen (Refer to page 198 table 3)

Table 3: Common Oxyacid (page198)

Ion Names	Ion Formula	Ionic Charge	Oxyacid Formula	Oxyacid Name
nitrate	NO_3^-	1-	HNO_3	Nitric acid
nitrite	NO_2^-	1-	HNO_2	Nitrous acid
Chlorate	ClO_3^{1-}	1-	$HClO_3$	Chloric acid
carbonate	CO_3^{2-}	2-	H_2CO_3	Carbonic acid
Sulfate	SO_4^{2-}	2-	H_2SO_4	Sulfuric acid
Sulfite	SO_3^{2-}	2-	H_2SO_3	Sulfurous acid
Phosphate	PO_4^{3-}	3-	H_3PO_4	Phosphoric acid

Nitric acid

1+ 1−

$H\ NO_3$

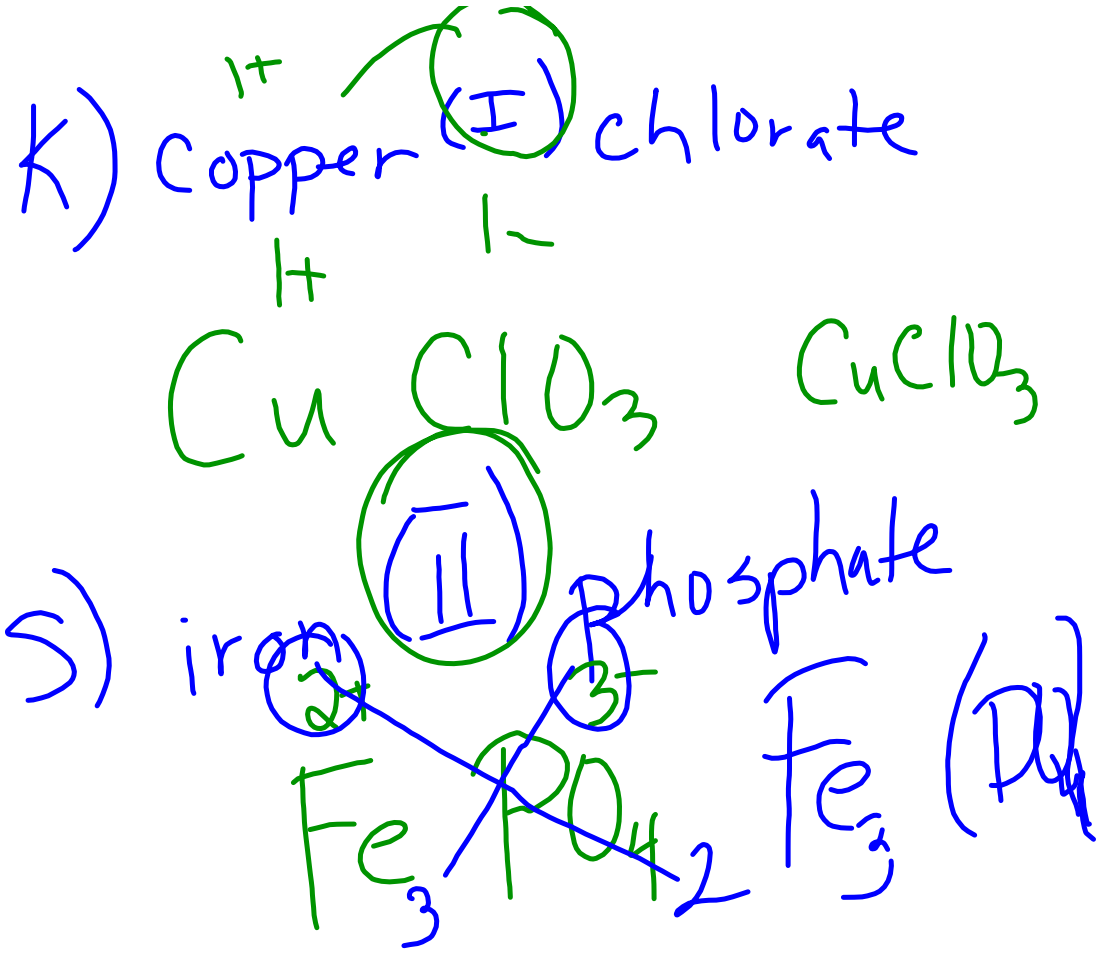
HNO_3

phosphoric acid

1+ 3−

$H\ PO_4$

3 1


k) Copper (I) chlorate
1+
1−
Cu ClO3
CuClO3
5) iron (II) phosphate
2+
3−
Fe3 PO4 2
Fe3 (PO4)2

1.a) magnesium sulfate

+2 -2

$Mg\ SO_4$ $MgSO_4$

2.a) Li_2CO_3 lithium carbonate

aq - acid sp 198

acids p 198

$H + CO_3$

2) (aq) - acid p 198
6 with roman numerals

i) $CuSO_4$

2+ 2−
1+

Copper (II) sulfate

Wednesday, Oct 22, 2014

Complete worksheet 5.9 polyatomic compounds & hand in for marks

Complete ionic compounds sheet (both regular ionic compounds and ionic compounds with polyatomics - TAKE YOUR TIME, PAY ATTENTION TO ELEMENTS VS POLYATOMICS

Complete ions and atoms worksheet

ATOMIC THEORY: ATOMS AND IONS

Complete the following table.

Atomic #

	English Name	International Symbol	Number of Protons	Number of Electrons	Number of Electrons Lost or Gained	Net Charge
1.	neon atom	Ne	10	10	∅	∅
2.	lithium ion	Li^+	3	2	lost 1	1+
3.	silver ion	Ag^+	47	46	lost 1	1+
4.	sulfide ion	S^{2-}	16	18	gain 2	2–
5.	atom	Si				
6.			33	36		
7.				54	lost 1	
8.			30	28		
9.				1	0	
10.		P				
11.	ion	Ca^{2+}				
12.	selenide ion					
13.			13			3+
14.		Rb^+				
15.			18	18		
16.			8	10		
17.	iodine atom					
18.		Pu				
19.				54	gained 2	
20.	unnilseptium atom					

Monday,

- Hand in worksheet 5.9 Polyatomic compounds
  (assignment marks)
- review properties of ionic compounds
- introduce molecular compounds

Properties of Ionic Compounds

- Ionic compounds form when metals transfer electrons to nonmetals and form an ionic bond
  - **All ionic compounds form crystals**
  - **Ionic compounds tend to have high melting and boiling points.**
  - **Ionic compounds are very hard and very brittle**
  - **Ionic compounds conduct electricity when they dissolve in water.**
- Polyatomic compounds form when metals transfer electrons to polyatomic ions to form a bond

Summary of ionic compounds

- metals (+) TRANSFER electrons to non metal(-) or polyatomics(-)
- IONIC BOND
- NAMING:
  - > metal name nonmetal name ends in **IDE** - calcium bromide
  - > metal name polyatomic name magnesium PHOSPHATE
  - > (+) polyatomic (-) polyatomic ammonium nitrate
  - > use roman numerals for multi ion charge metals iron (II) oxide
- Formula
  - > write the chemical symbol for each along with ion charge and criss cross if the numbers are DIFFERENT

> $Ca^{2+}F^{1-}$ → CaF_2

$Be^{2+}PO_4^{3-}$ → $Be_3(PO_4)_2$

$Mg^{2+}OH^{1-}$ → $Mg(OH)_2$

Ionic Compounds

element + element

metal + non metal

+ charge − charge

ending to ide

* may have to use roman numerals if the metal has more than 1 charge *

Polyatomic Compounds

element + polyatomic ions

metal + " "

+ −

use periodic table

use polyatomic ion list

Molecular Compounds

element + 1 or more elements

non metal + non metal(s)

use prefixes in the name(s) & use ide for second element

Molecular Compounds

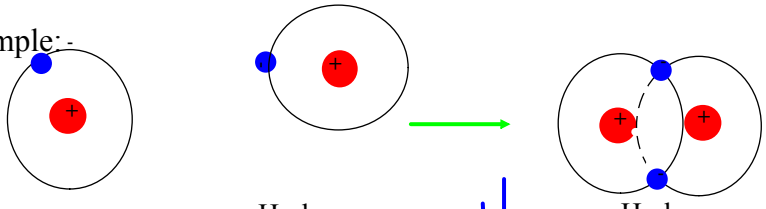
-Most compounds you encounter today do not contain ions. Rather, they contain neutral groups of atoms called molecules. Molecular compounds are all around us.

-Molecular Compounds are formed when :
nonmetals combine with other *nonmetals.*

- They **share** electrons rather than transferring them

- This sharing results in a "**Covalent Bond**" , which is a sharing of electrons held between two nonmetal atoms that hold the atoms together in a molecule

Example: -



Hydrogen atom

Hydrogen atom

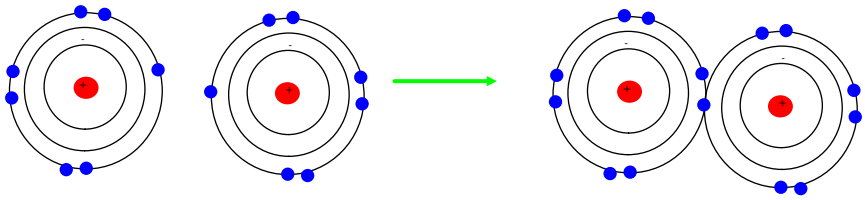
H_2

Hydrogen gas

Each hydrogen atoms has one valance electron. For the hydrogen atom to become stable it must have 2 electrons in it's first orbital, so both must gain an electron. they do this by sharing electrons, one from each atom.

Example 2:
Chlorine Gas Cl_2

O_2



Cl

Chlorine atom

Cl

Chlorine atom

Cl_2

Chlorine gas

Example of Molecular Compounds

Glucose	$C_6H_{12}O_6$
Carbon dioxide	CO_2 ,
Water	H_2O

Look at Figure 5, page 202 to see more visual representation of molecular compounds.

activity molecular models

9. sulfur 6 use silver

Quiz - take out Periodic table and polyatomic list

Writing formulas for molecular compounds

- Similiar to writing ionic compound.

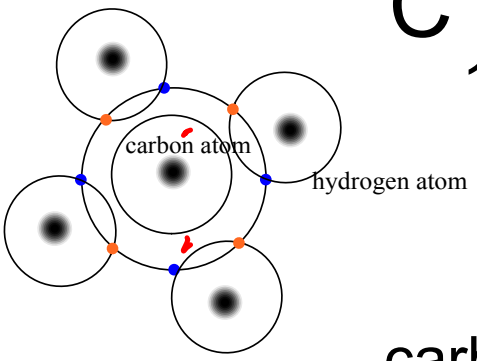
- The number of electrons that a nonmetal needs to share to become stable is a clue to the number of covalent bonds it can form.

- Combining capacity is the measure of covalent bonds that will be needed to form a stable molecule.

Example:

Carbon has 4 valence electrons. It does not gain or lose electrons. It shares electrons with other atoms such as hydrogen.

Carbon + Hydrogen



C^4 H^1

1 4

CH_4

methane

carbon tetrahydride

204

How to write the formula for molecular compounds

- the same method as ionic compounds use the combining capacity

Binary Molecular Compounds

Contain only two nonmetals

Use prefixes to name binary molecular compounds

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

- Example) PBr_5 phosphorus penta bromide

- They sometimes have common names

CH_4	methane (carbon tetrahydride)
NH_3	ammonia
H_2O_2	Hydrogen Peroxide (dihydrogen dioxide)
H_2O	water (dihydrogen oxide)
$C_6H_{12}O_6$	Glucose
CO_2	carbon dioxide
CO	carbon monoxide

nitrogen + oxygen

N_2O_4

Pg 204 Q 5 + 6

hydrogen + oxygen

CO_3

CS_2

P_2O_5

SO_3

CF_4

Homework:
page 204
questions: 1-6

CO_3 carbon trioxide

CS_2 carbon disulfide

P_2O_5 diphosphorus pentoxide

SO_3 sulfur trioxide

CF_4 carbon tetrafluoride

Homework:
page 204
questions: 1-6

Homework:

yellow sheet page 204

questions: 1-6

Worksheet 5.11

Diatomic elements - molecules made of two identical atoms

H_2, N_2, O_2, F_2, Cl_2, Br_2, I_2

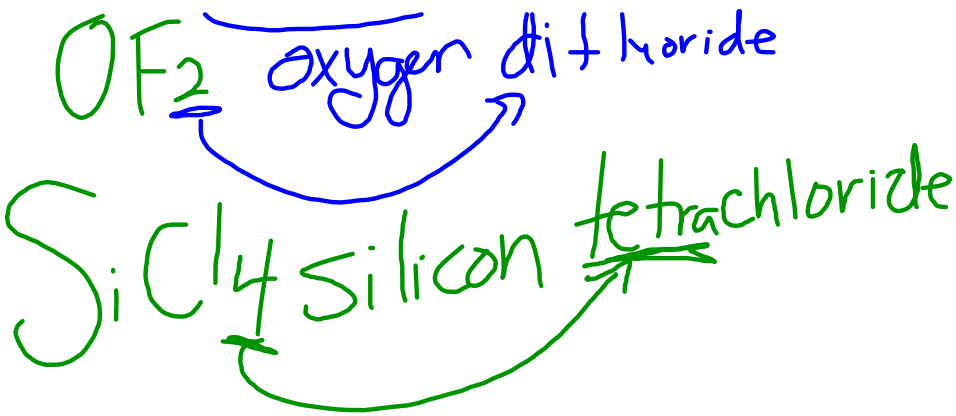
Many nonmetallic elements exist as covalently bonded molecules.

The following molecules are made up of IDENTICAL atoms:

Diatomic Elements: $H_{2(g)}$, $O_{2(g)}$, $N_{2(g)}$, $F_{2(g)}$, $Cl_{2(g)}$, $Br_{2(l)}$, $I_{2(g)}$ (Table 1, page 202)

It is important to remember these 7 diatomic elements for future use in writing chemical equation and balancing equations.

Homework:
page 204
questions: 1-6



Homework Jan 6, 2009
Page 204
1,2,3,4,5,6

1) How can you tell the difference between an ionic compound and a molecular compound?

An ionic compound is composed of a metal and a nonmetal.
(So basically a cation and an anion) . Electrons are transfered from the non-metal to the metal & form ionic bonds.

A molecular compound is composed of two nonmetals. (So elements from the left side of the periodic table). Each atom is neutrual meaning they do not have a charge. Electrons are shared by each atom- Covalent Bond

2) a. What kind of atoms form molecular compounds?

Nonmetal atoms form molecular compounds

b. How do the atoms in molecular compounds form stable electron arrangements?

Atoms in molecular compounds share electrons to form stable electron arrangements.

c. What type of bond holds atoms together in molecules?

Covalent bonds hold atoms together in molecular compounds.

Homework Jan 6, 2009

Page 204

1,2,4,5,6

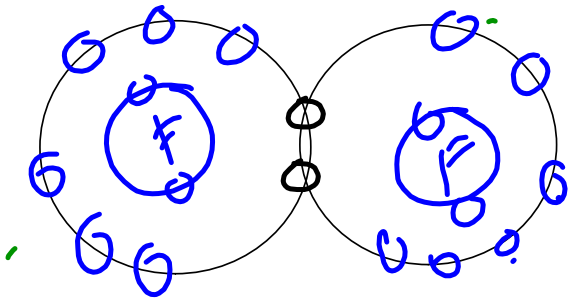
3) a. How many valence electrons are there in a fluorine atom?

A fluorine atom has 7 valence electrons

b. How many electrons does a fluorine atom need to share to become stable?

Fluorine needs to share 1 electron to become stable.

c. Draw a sketch to show how two fluorine atoms could form a stable molecule.



4) Some elements exist in the form of diatomic molecules. Where are these elements generally located in the periodic table?

Elements that form diatomic molecules are the halogen group, hydrogen, nitrogen and oxygen.

Oct 11-11:34 AM

Homework Jan 6, 2009
Page 204
1,2,4,5,6

5) Name the following compounds (use prefixes).

a. CBr_4

Carbon tetrabromide

b. NI_3

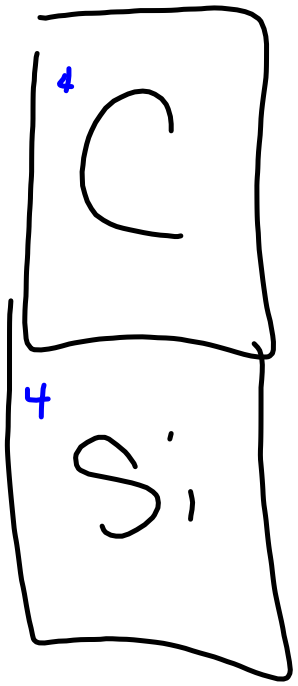
nitrogen triiodide

c. OF_2

oxygen difluoride

d. $SiCl_4$

Silicon tetrachloride

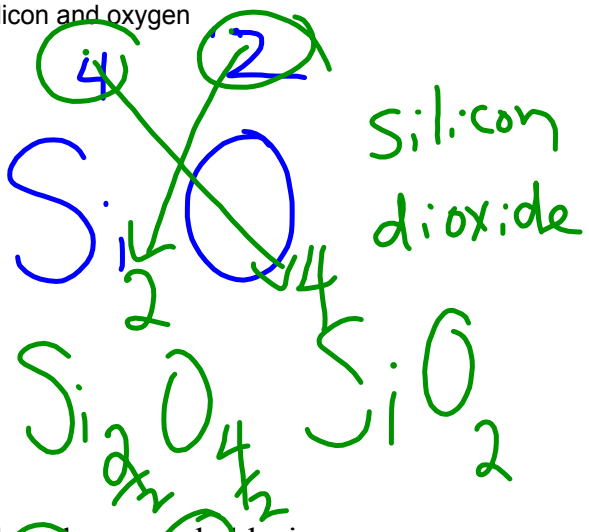

4
C
4
Si

Homework Jan 6, 2009
Page 204
1,2,4,5,6

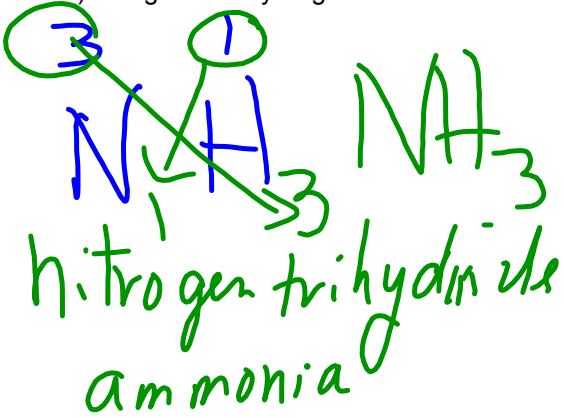
a. Silicon and oxygen

b. nitrogen and hydrogen

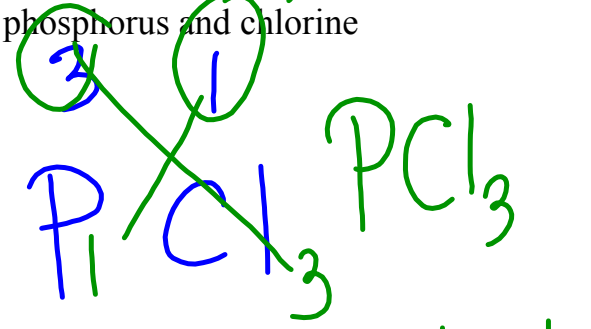
a)silicon and oxygen



b) nitrogen and hydrogen



c. phosphorus and chlorine

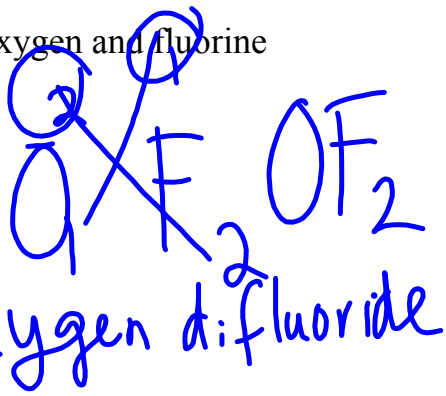


phosphorus trichloride

d. sulfur and bromine

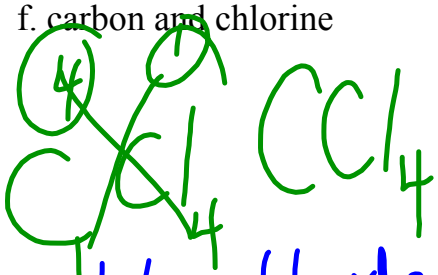
. Sulfur dibromide

e) oxygen and fluorine



oxygen difluoride

f. carbon and chlorine



Carbon tetrachloride

1. k) P_2O_3

2. g) N_2O_4

dinitrogen tetraoxide

http://www.youtube.com/watch?v=PKA4CZwbZWU

Video comparing Ionic & molecular compounds

Complete Ionic + Molecular Compounds worksheet

1. a) iron (II) sulfate Ionic

Fe^{2+} SO_4^{2-}

$FeSO_4$

2. $NaNO_3$ Ionic

Sodium nitrate

Complete 5.11 - turn in for marks today!!!!

Complete Ionic and Molecular compounds sheet - all questions

Review p 214
Q 6, 7, 9, 10,11

Read pages pages 205-207 - complete Hydrocarbon wordsearc
& Q 5 p 207 - BONUS assignment 1

Test Tomorrow (Thurs)

Science Help- Independant study today if you want to come in

Complete 5.11 - turn in for marks today!!!!
If you have not handed in 5.8 or 5.9 - today is the last day to get it done and handed in for marks!

Complete Ionic and Molecular compounds sheet - all questions

Review p 214
Q 6, 7, 9, 10,11

Read pages pages 205-207 - complete Hydrocarbon wordsearch & Q 5 p 207 - BONUS assignment

1

Test Monday

Science Help- Thursday Independant study let me know if you are interested in signing up or today at 12:10(if requested)

Ionic

Metals + nonmetals or polyatomics

Name

metal non-metal
Sodium chlor IDE

Na NO_3
Sodium nitrate

roman numeral
Fe Cu Pb Sn Ni

$Ni^{+2}O^{-2}$ NiO
nickel (II) oxide Ni_2O_3
$Ni^{+3}O^{-2}$
nickel (III) oxide

magnesium chloride
$Mg^{+2}Cl^{-1}_2$
$MgCl_2$

Molecular

ONLY NON-METALS

Name

CO_2 "IDE"
carbon dioxide

Use Prefixes

Formula

diphosphorus pentaoxide
P_2O_5

Ionic compounds

Metals & Nonmetals

Ionic bond

transfer electrons

Formula

Write the symbol

and criss cross if numbers are different CaF_2 PbO_2 $Ca(NO_3)_2$

Naming

metal - non metal ends in IDE

magnesium chlor**ide**

USE roman numerals only for multivalent elements ie Fe, Sn,

iron (II) oxide

With polyatomics

sodium nitrate

Molecular compounds

ONLY NON-metals

covalent bond

share electrons

Forumla

Criss cross if just given two elements

Carbon and oxygen

C_2O_4 CO_2

If given the name use the prefixes to write the subscripts

nitrogen dioxide NO_2

Naming

use prefixes (memorize)

based on the subscripts in the formula

N_2O_4

dinitrogen tetroxide

Test review

- Elements
- noble gases, alkali metals, halogens
- protons, electrons and neutrons
- maximum number of electrons per orbit
- how gaining and losing electrons forms ions & charges - why does this happen
- ionic compounds- ionic bond, name, formula, transfer of electrons metal
- ionic compounds with polyatomics
- what are polyatomics
- molecular compounds - covalent bond, name (use prefixes), formula, sharing of electrons
- oxyacids - what are they, how do they form?
- Know the common names & formulas for given molecular compounds

+ be careful with metals with 2 charges

roman numerals

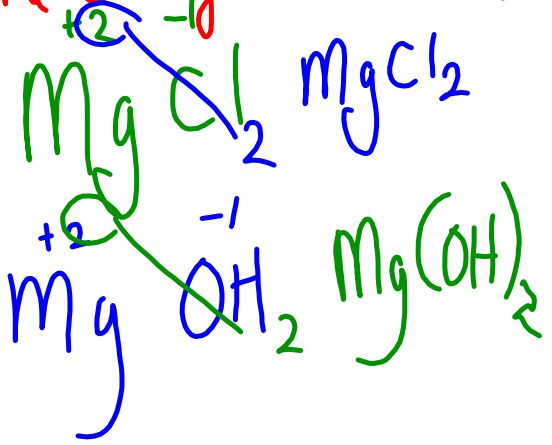
H + Sulfate H_2SO_4 (+1, −2)

Ionic

metals + nonmetal or polyatomic

name
metal first nonmetal "IDE"
metal + polyatomic
Roman numerals
Fe Cu Ni Sn Pb
metals w/ more than 1 charge

Formula
Write symbols + write the charge or comb. cap



Molecular

all non-metals
NO metals

name
use prefixes
2nd element "IDE"

Formula

Carbon dioxide

CO_2

P_2O_5

Ionic and Molecular Compounds Worksheet

1. Use these compounds to answer the questions.

NaCl NaOH

$CaCO_3$ N_2O_5

CO_2 $NaHCO_3$

a) Name each of the compounds given in the list.
b) Classify each of the compounds given in the list as either ionic or molecular.

iron(II) sulfate
manganese (II) nitrate
chromium (III) nitrate
copper (I) chloride
e)silicon tribromide
f)dinitrogen trihydride
g)cerium (III) phosphate
h)tricarbon trifluoride
i)chromium (III) nitride
j)silver nitrate
k) ammonium sulfide
l)cobalt (II) nitrate
barium nitrate
n)cadmium nitrate
o) nickel (II) nitrate

p)cesium carbonate
magnesium carbonate
calcium oxide
s)aluminum selenide
nickel (II) phosphate
magnesium hydroxide
calcium hydroxide
silver sulfate
tin (IV) chloride
carbon pentaoxide
diphosphorous hydride

3. Write the name for the following compounds.

a) $NaNO_3$
b) $(NH_4)_2SO4$
c) $Fe(NO_3)_3$
d) BaSe
e) $CUSO_4$
f) AgBr
g) Cd_3P_2
h) $CO_3(PO_4)_2$
i) LiH
j) Ga_2Te_3
k) $HgC1_2$
l) CuSe
m) $MgC1_2$
n) MnO
o) HC1
p) $Sr(NO_3)_2$
q) HgF_2
r) Li_2Se
s) SrI_2
t) NH_4F
u) Ag_2S
v) PO_2
w) N_2H_3
x) CBr_4
y) $SiCl_3$
z) CH2

Science 10

Ionic and Molecular Compounds Worksheet

1. Use these compounds to answer the questions.

a) Name each of the compounds given in the list.
b) Classify each of the compounds given in the list as either ionic or molecular.

NaCl I

Sodium Chloride

NaOH I

Sodium Hydroxide

$CaCO_3$ I

Calcium Carbonate

N_2O_5 M

dinitrogen pentaoxide

CO_2 M

Carbon Dioxide

$NaHCO_3$ I

Sodium Bicarbonate
or
Sodium hydrogen carbonate

2. Write the formula for each of the following compounds.

a) iron(II) sulfate

$Fe^{+2}\ SO_4^{-2}$ $Fe(SO_4)$

I

b) manganese (II) nitrate

$Mn\ NO_3$ $Mn(NO_3)_2$

c) chromium (III) nitrate I

$Cr^{+3}\ NO_3^{-1}$

$Cr(NO_3)_3$

d) copper (I) chloride

$Cu^{+1}\ Cl^{-1}$ I

$CuCl$

e) cerium (III) phosphate

f) chromium (III) nitride I

$Cr^{+3}\ N^{-3}$ CrN

g) silver nitrate

$Ag^{+}\ NO_3^{-}$

$AgNO_3$

h) magnesium hydroxide

$Mg^{2+}\ (OH^{-})$

$Mg(OH)_2$

i) calcium hydroxide

$Ca^{2+}\ (OH^{-})$

$Ca(OH)_2$

j) silver sulfate

$Ag^{+}\ SO_4^{2-}$

Ag_2SO_4

k) tin (IV) chloride I

$Sn^{4+}\ Cl^{-}$

$SnCl_4$

l) ammonium sulfide

$NH_4^{+}\ S^{2-}$

$(NH_4)_2S$

m) cobalt (II) nitrate

$Co^{2+}\ NO_3^{-}$

$Co(NO_3)_2$

n) barium nitrate

$Ba^{2+}\ NO_3^{-}$

$Ba(NO_3)_2$

e) silicon tribromide M

$SiBr_3$

dinitrogen trihydride M

N_2H_3

4) magnesium hydroxide I

+2 -1

$Mg(OH)_2$

$MgOH_2$

$Mg(OH)_2$ ✓

5) carbon pentaoxide m

CO_5

2. Write the formula for each of the following compounds.

o) cadmium nitrate

Cd^{+2} NO_3^-

$Cd(NO_3)_2$

p) nickel (II) nitrate

q) cesium carbonate

Cs^{+1} CO_3^{-2}

Cs_2CO_3

r) magnesium carbonate

Mg^{2+} CO_3^{2-}

$MgCO_3$

s) calcium oxide

Ca^{2+} O^{-2}

CaO

t) aluminum selenide

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

Al_2Se_3

u) nickel (II) phosphate

Ni^{2+} PO_4^{3-}

$Ni_3(PO_4)_2$

v) dinitrogen trihydride

N_2H_3

w) carbon petaoxide

CO_5

x) silicon tribromide

$SiBr_3$

y) tricarbon trifluoride

C_3F_3

z) diphosphorous hydride

P_2H

3. Write the name for the following compounds.

a) $NaNO_3$

sodium nitrate

b) $(NH_4)_2SO_4$

ammonium sulfate

c) $Fe(NO_3)_3$

Iron(III) nitrate

d) BaSe

barium selenide

e) $CuSO_4$

copper(II) sulfate

f) AgBr

silver bromide

g) Cd_3P_2

cadmium phosphate

h) $Co_3(PO_4)_2$

cobalt(II) phosphate

i) LiH

sodium nitrate

k) $HgCl_2$

mercury(II) chloride

l) CuSe

m) $MgCl_2$

3) Write the name for the following compounds.

p) $Sr(NO_3)_2$

strontium nitrate

q) HgF_2

mercury(II) flouride

r) Li_2Se

lithium selenide

s) SrI_2

strontium iodide

t) NH_4F

ammonium flouride

u) Ag_2S

silver sulfide

v) PO_2

phosphorus dioxide

w) N_2H_3

dinitrogen trihydride

x) CBr_4

carbon tetrabromide

y) $SiCl_3$

silicon trichloride

z) CH_2

carbon dihydride

n) MnO

manganese(II) oxide

5.12 Hydrocarbons

Organic compounds are molecular substances that contain carbon atoms as the basic building blocks

In fact carbon is contained in more compounds than all of the other elements put together because of carbons remarkable combining capacity.

Hydrocarbons are compounds of hydrogen and carbon found in various combinations, also called fossil fuels because of their origin in living matter.

Ex petroleum (crude oil), natural gas, coal

Common properties of hydrocarbons are the facts that they produce steam, carbon dioxide and heat during combustion and that oxygen is required for combustion to take place. The simplest hydrocarbon, **methane(CH_4)**, burns as follows:

$CH_4 + 2\ O_2 \rightarrow 2\ H_2O + CO_2 + Energy$

Another example of this property is propane(C_3H_8):

$C_3H_8 + 5\ O_2 \rightarrow 4\ H_2O + 3\ CO_2 + Energy$

Burning of hydrocarbons is an example of exothermic chemical reaction.

We know these hydrocarbons are used as a source of fuel but the different types of molecules or petrochemicals, present in these mixtures can be used to make industrial chemicals and consumer products, including plastics, synthetic fibres and pharmaceuticals.

Complete the word search and questions 5. P207

Word Search answers

1. Food
2. Plastics
3. Combining
4. Methane
5. Natural gas
6. Organic
7. Water
8. Four
9. hydrocarbon
10. sugars
11. fossil fuels
12. Octane
13. LNG
14. Sweetening
15. distillation
16. environmental

Complete both sides of the ionic & molecular worksheet

TEST THURSDAY

REVIEW SECTIONS
5.1, 5.5, 5.6, 5.8, 5.9, 5.11 & 5.12

REVIEW QUESTIONS
P 214-215
#1,2,4,5-11

1. a) physical property can be sensed, decribed or measured
Chemical property - tendency of a substance to interact with other substances - combustibility or reaction with acid

b) element - pure substance that cannot be broken down
compound - pure substance made of two or more elements chemically bonded together

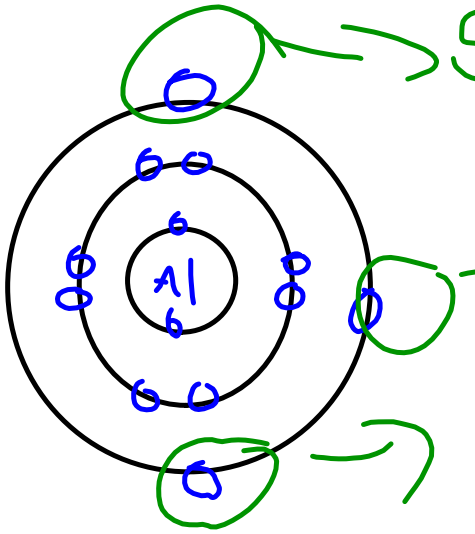
c) metals have positive charges & on the left and middle of periodic table & good conductors
nonmetals have negative charges only a few on the right (except H) not good conductors

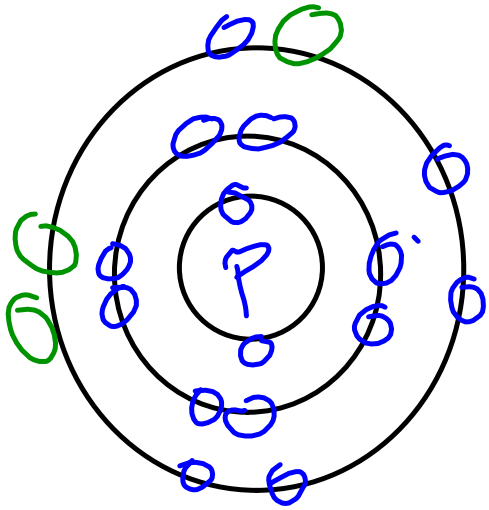
d) Ionic compound - metal combined with a non metal
ionic bond, transfer of electrons

Molecular - 2 or more nonmetals, covalent bond, share electrons

2. a) element
b) chemical change
c) reactants
d) Alkali metals
e) protons
f) ion
g) synthetic

4.





5

6. & 7.

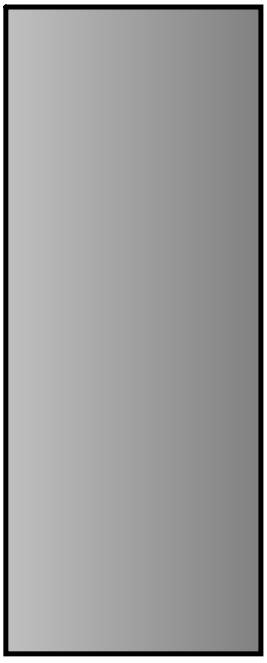
a. magnesium chloride $MgCl_2$

b. sodium bromide NaBr

c. magnesium oxide MgO

d. aluminum phosphide Al P

e. aluminum sulfide Al S

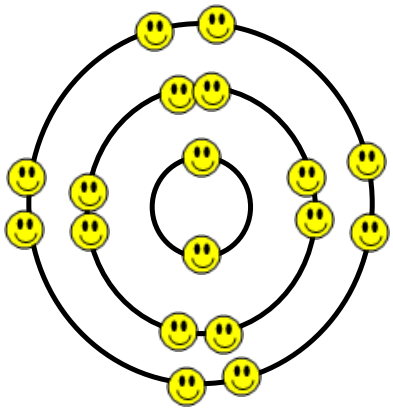


8.

a) 16 protons S

b) 18 protons Ar

c) 19 protons K



9.

a. CuCl - copper (I) chloride

b) FeI_2 - iron (II) iodide

c) tin (IV) oxide SnO_2

d) lead (II) bromide $PbBr_2$

10.

a. $CuCO_3$ Copper (I) carbonate

b. $FeSO_4$ Iron (II) Sulfate

c. tin (IV) phosphate $Sn^{+4}PO_4^{-3}$ $Sn_3(PO_4)_4$

d. lead (II) nitrate

11.

a) carbon monoxide

CO

1- mono

2- di.

3 tri

4- tetra

5- penta

b) nitrogen triiodide

NI_3

c) SCl_2

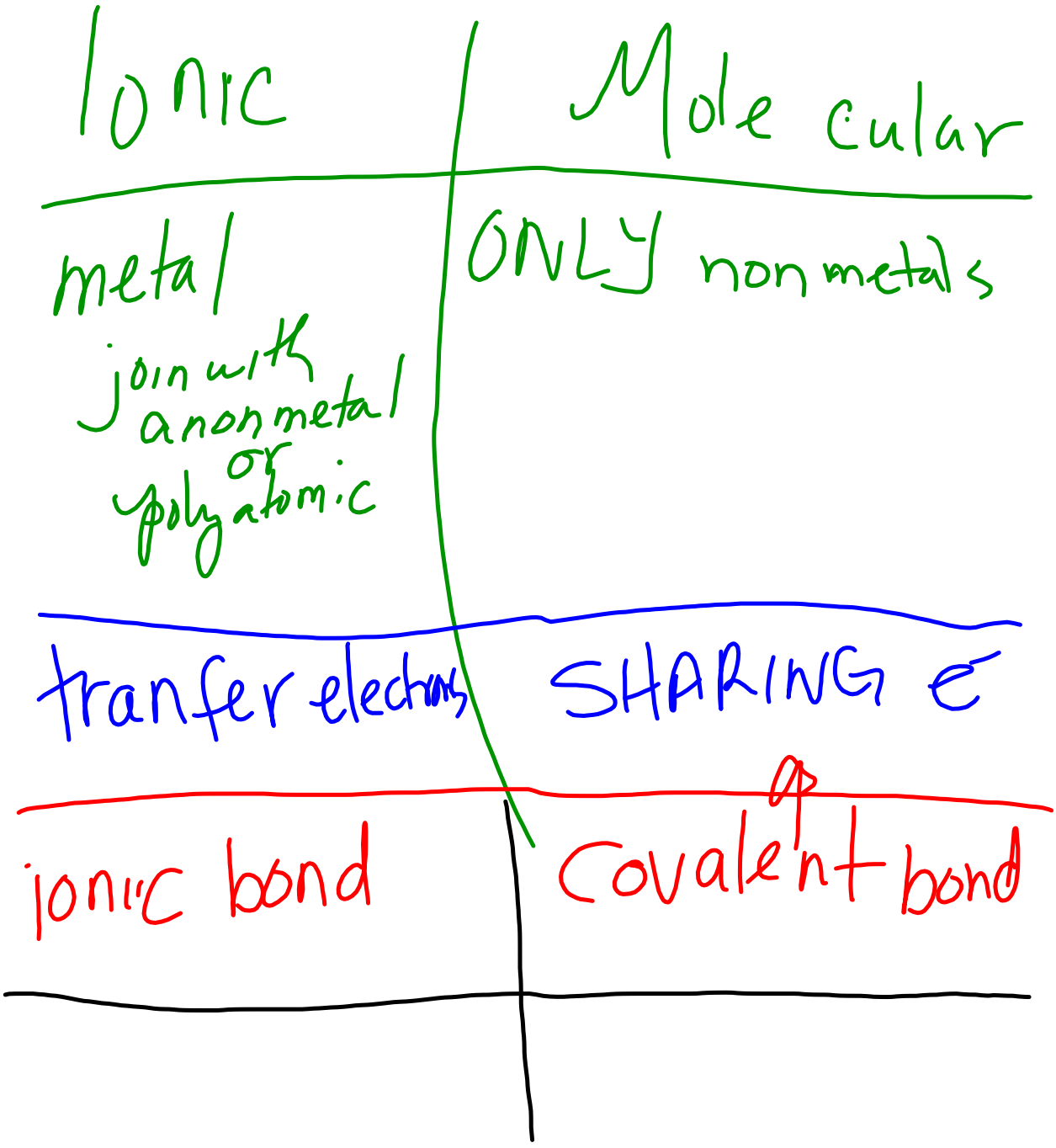
Sulfur dichloride

d) CCl_4

Carbon tetrachloride

S_2P_3

trisulfur diphosphide


Ionic
Molecular
metal
join with a nonmetal or polyatomic
ONLY nonmetals
tranfer electrons
SHARING e
ionic bond
covalent bond

Attachments

Polyatomic ions interactive.notebook

Science 10 - The Periodic Table.notebook