

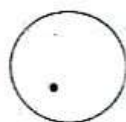
Partial hints for solving tonight's El Sol Sheet

Naming Ions.

CAEMIS+ry: <http://genest.weebly.com>
 Stop in for help every day at lunch and Tues & Thurs after school!!



Name _____
 Period _____



1. This is a pretty good drawing of what Thomson thought a Plum Pudding NEUTRAL hydrogen atom looked like. It shows a positive circle with one electron in it.

		SO_4^{2-}	NH_4^+	He
This is (choose one) a) an anion b) neutral c) a cation	This is (choose one) a) an anion b) neutral c) a cation	This is (choose one) a) an anion b) neutral c) a cation	This is (choose one) a) an anion b) neutral c) a cation	This is (choose one) a) an anion b) neutral c) a cation

2. Go through the boxes below and do the following:

- circle any metal that has a variable charge
- cross out any polyatomic ion

CO_3^{2-}	Al^{3+}	Fe^{2+}	PO_4^{3-}	Au^+
_____	Aluminum	IRON (II)	_____	_____

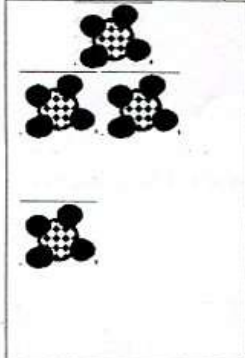
3. Go back through the boxes above and write the name. Remember the rules for naming:

- metal ions that do have a variable charge are the name of the element, followed by a roman numeral that tells the charge. For example Fe^{3+} is named *Iron(III)*
- Polyatomic ions just get whatever name is on your photocopied ion sheet given on Tuesday.
- metal ions that don't have a variable charge are called by their element name. For example, Sr^{2+} is just named *strontium*.

4. Do steps #2 and #3 on the boxes below

NO_3^-	Pb^+	V^{2+}	Au^{3+}	NH_4^+
_____	LEAD (I)	VANADIUM (II)	_____	_____

Key to understanding the cartoons on this sheet:				
1 chlorine atom	1 hydrogen atom	1 oxygen atom	1 nitrogen atom	1 carbon atom



- How many atoms, total, are in this box? _____
- How molecules are in this box? _____
- What is the formula of this compound? _____
- Which would be an acceptable way to say what's in this box
a) C_8H_{10} b) C_4H_{16} c) other _____
- What is the molecular weight of this substance? (the units of your answer should be in g/mole. Your first step should be to look up the g/mole in the periodic table)

Name the following compounds by combining the names you wrote earlier in this sheet:

NO_3^-	Pb^+	V^{2+}	Au^{3+}	NH_4^+
CO_3^{2-}	Na^+	Fe^{2+}	Au^{3+}	Au^+

10. Na_2CO_3 _____

11. $PbNO_3$ _____

12. $Al_3(CO_3)_2$ _____

13. VCO_3 _____

14. $Fe(NO_3)_2$ _____

15. $(NH_4)_2CO_3$ _____

16. $Au(NO_3)_3$ _____

17. $Fe_3(PO_4)_2$ _____

IRON (II) NITRATE

AMMONIUM CARBONATE

GOLD (III) NITRATE

IRON (I) PHOSPHATE

18. In the table below, fill in the formula of the ionic compound below its name:

Zinc sulfate	Cobalt (II) carbide SKIP	Silver selenide SKIP	Ammonium sulfide SKIP
Lead (II) nitrate	Silver oxalate	Lead (IV) oxide SKIP	Magnesium oxide SKIP
Copper (I) sulfate	Copper (II) sulfite $CuSO_3$	Sodium bicarbonate $NaHCO_3$	Strontium hypochlorite
Iron (III) oxide SKIP	Copper (I) chromate	Tin (II) sulfate $SnSO_4$	Potassium bisulfate

class notes for Wednesday

February 4, 2015

PURPOSE WHAT ARE THE NAMES
OF IONIC COMPOUNDS?

WARMUP

USE YESTERDAY'S RULES TO
FILL IN THE CORRECT FORMULA

	Co^{2+}	Co^{3+}
NO_3^-	$\text{Co}(\text{NO}_3)_2$	$\text{Co}(\text{NO}_3)_3$
SO_4^{2-}	CoSO_4	$\text{Co}_2(\text{SO}_4)_3$

#1 SOME METALS ARE
MYSTERIOUS. THEY
HAVE VARIABLE
CHARGE

V^{+1} is Vanadium(I)
 V^{+2} is Vanadium(II)
 V^{+5} is Vanadium(V)
 V^{+6} is Vanadium(VI)

The roman numeral indicates
the positive charge
ON ONE atom

#2 POLYATOMIC IONS
are named from the
table

PO_4^{3-} is phosphate

NO_3^- is nitrate

#3

If the metal has a known charge just name it for its element

Mg^{2+} is magnesium

Ag^+ is silver

12/14/11/ 8:09 PM

+1																						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18					
1 H hydrogen 1.01																	2 He helium 4.00					
+2																						
3 Li lithium 6.94	4 Be beryllium 9.01																					
11 Na sodium 22.99	12 Mg magnesium 24.31																					
													+3		+1/2		-3		-2		-1	
5 B boron 10.81	6 C carbon 12.01	7 N nitrogen 14.01	8 O oxygen 16.00	9 F fluorine 19.00	10 Ne neon 20.18																	
13 Al aluminum 26.98	14 Si silicon 28.09	15 P phosphorus 30.97	16 S sulfur 32.06	17 Cl chlorine 35.45	18 Ar argon 39.95																	
19 K potassium 39.10	20 Ca calcium 40.08	21 Sc scandium 44.96	22 Ti titanium 47.88	23 V vanadium 50.94	24 Cr chromium 52.00	25 Mn manganese 54.94	26 Fe iron 55.85	27 Co cobalt 58.93	28 Ni nickel 58.71	29 Cu copper 63.55	30 Zn zinc 65.38	31 Ga gallium 69.72	32 Ge germanium 72.64	33 As arsenic 74.92	34 Se selenium 78.96	35 Br bromine 79.90	36 Kr krypton 83.80					
37 Rb rubidium 85.47	38 Sr strontium 87.62	39 Y yttrium 88.91	40 Zr zirconium 91.22	41 Nb niobium 92.91	42 Mo molybdenum 95.94	43 Tc technetium (99)	44 Ru ruthenium 101.07	45 Rh rhodium 101.91	46 Pd palladium 106.4	47 Ag silver 107.87	48 Cd cadmium 112.40	49 In indium 114.82	50 Sn tin 118.71	51 Sb antimony 121.76	52 Te tellurium 127.60	53 I iodine 126.90	54 Xe xenon 131.30					
55 Cs cesium 132.91	56 Ba barium 137.34	57 La lanthanum 138.91	58 Pr praseodymium 140.91	59 Nd neodymium 144.24	60 Pm promethium (145)	61 Sm samarium 150.4	62 Eu europium 151.96	63 Gd gadolinium 157.25	64 Tb terbium 158.93	65 Dy dysprosium 162.50	66 Ho holmium 164.93	67 Er erbium 167.26	68 Tm thulium 168.93	69 Yb ytterbium 173.04	70 Lu lutetium 175.97							
87 Fr francium (223)	88 Ra radium 226.03	89 Ac actinium (227)	90 Th thorium 232.04	91 Pa protactinium 231.04	92 U uranium 238.03	93 Np neptunium 237.05	94 Pu plutonium (242)	95 Am americium (243)	96 Cm curium (247)	97 Bk berkelium (247)	98 Cf californium (251)	99 Es einsteinium (252)	100 Fm fermium (257)	101 Md mendelevium (258)	102 No nobelium (255)	103 Lr lawrencium (257)						

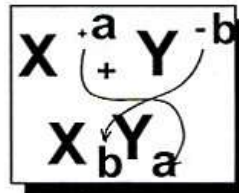
Atomic Masses to .01

The elements marked with a dot have variable charge. Their charge is unpredictable, so when you describe ions from these squares on the periodic table you must include a roman numeral in their name to tell what the charge is (in contrast, elements like Al^{3+} , Na^+ , Ca^{2+} DON'T need a roman numeral in their name -- every good chemist knows what the charge is of those elements)

Answers to Tuesday's classwork and the La Mano Sheet:

Writing Formulas by Crossing Over

The quickest way to determine the formula of a compound of two elements or polyatomic ions is to use the *Cross-Over Rule*. Look up the oxidation state of each element or ion and reduce to lowest terms. Then cross over the oxidation states without the sign to find the subscripts as shown in the diagram to the right.



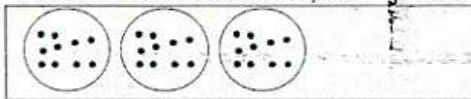
Using the Cross-Over Rule, determine the formula for compounds of the elements and polyatomic ions below, and write your answer in the answer space.

FORMULA		NAME
<u>NH₄Cl</u>	1. NH ₄ and Cl	
<u>BaBr₂</u>	2. Ba and Br	
<u>Al₄C₃</u>	3. Al and C	
<u>Na₂O</u>	4. Na and O	
<u>K₃PO₄</u>	5. K and PO ₄	
<u>CaF₂</u>	6. Ca and F	
<u>Li₃N</u>	7. Li and N	
<u>BaCO₃</u>	8. Ba and CO ₃	
<u>Al₂(SO₄)₃</u>	9. Al and SO ₄	<u>Al₂(SO₄)₃</u>
<u>Mg(NO₃)₂</u>	10. Mg and NO ₃	
<u>Li₂S</u>	11. Li and S	
<u>Na₂SO₄</u>	12. Na and SO ₄	
<u>Ca(HCO₃)₂</u>	13. Ca and HCO ₃	<u>Ca(HCO₃)₂</u>
<u>Ag₃(CH₃COO)₃</u>	14. Ag and CH ₃ COO	
<u>Zn(OH)₂</u>	15. Zn and OH	

The
 name
 is
 more



Use the drawing below to answer #1 through #4 below.
 Each circle here is an atom, each dot is an electron




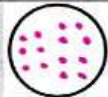
← atoms in sticky tape.
 (they are neutral)


- Warm up questions:
 - How many atoms are shown in the box above? three
 - What is the correct term for each circle? (cation / neutral atom / anion)
 - What is the charge of a single • ? (-1 / zero / +1)
 - If electrons are added to these atoms the charge of the tape will become more (negative / positive)

2. Using the neutral sticky tape atoms above as a reference point, draw appropriate numbers of electrons into each circle below.


an atom with two less electrons than a neutral tape atom  eight electrons


a cation with a charge of +1  nine electrons


an anion with a charge of -4  fourteen electrons


a cation with a charge of +3  seven electrons because 10-3=7

3. Using the neutral sticky tape atoms above as a reference point, estimate the charge on each atom below.


The charge of this atom is -2 (-2 / -1 / neutral / +1 / +2)  two extra compared to neutral

The charge of this atom is 0 (-2 / -1 / neutral / +1 / +2) 

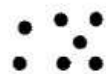

The charge of this atom is 0 (-2 / -1 / neutral / +1 / +2) 

The charge of this atom is +10 

4. A neutral nitrogen atom looks like this according to JJ Thomson's Plum Pudding Model:



The charge is zero (-)

Thomson would say this is a picture of a) the plum? b) the pudding?	 The charge is (+ / zero / -)	Thomson would say this is a picture of of a) the plum? b) the pudding?	 The charge is (+ / zero / -)
---------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------

5. Pulling the 'Top Tape' in our lab removed electrons from the Top Tape and added electrons to the Bottom Tape.

- a) This would cause the number of electrons in the Top Tape to (increase / decrease).
- b) This would cause the number of electrons in the Bottom Tape to (increase / decrease).
- c) Draw dots in each tape atom below to show your guess for how many electrons in the Top-Tape and Bottom Tape (exact answers for each student will vary).



← atoms in Top Tape.
(cations)



← atoms in Bottom Tape.
(anions)

Use the following pictures of NEUTRAL atoms to answer the next four questions				
neutral Hydrogen	neutral lithium	neutral nitrogen	neutral oxygen	neutral fluorine

6. Draw enough dots (electrons) on each atom to create the object described

a fluorine anion with a charge of -1 TEN ELECTRONS

a Li⁺ cation TWO ELECTRONS

a nitrogen anion with a charge of -3 TEN ELECTRONS

a cation of hydrogen with a charge of +1 NO ELECTRONS