Unit 5 NAME

Class Work 12/17/13

5.4 Polyatomic Ions and Covalent Bonds

SPARK (Take out your 5.3 WS)

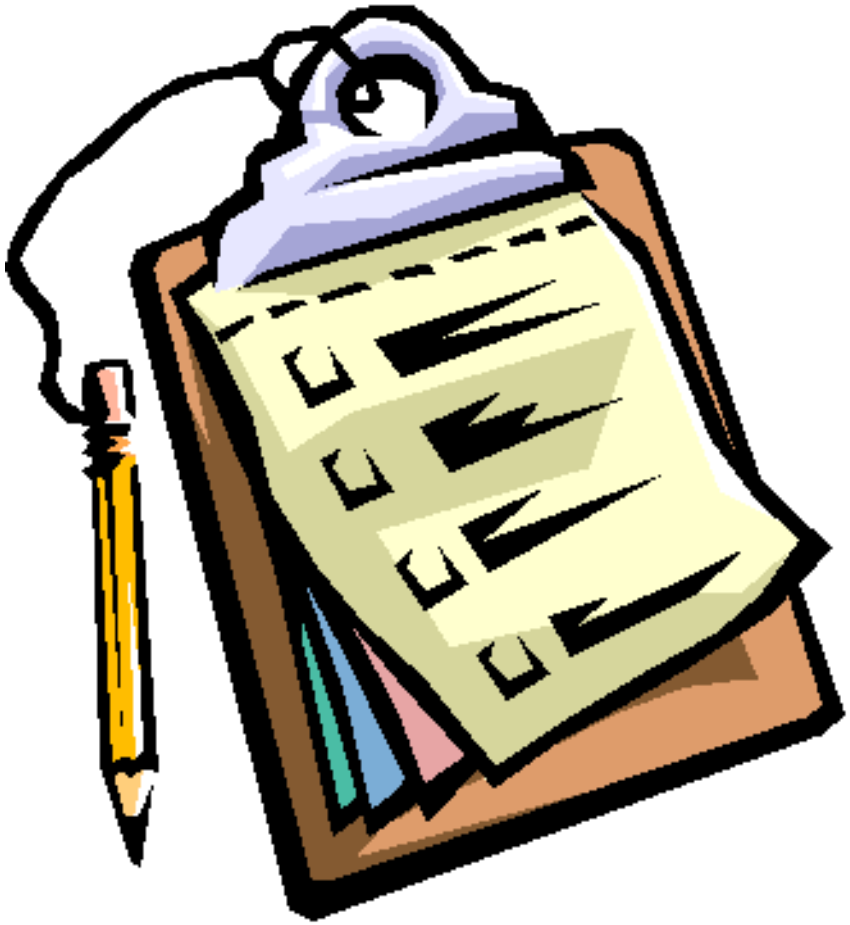
1. What is an ionic bond?
2. What is the chemical formula of nickel (II) bromide?
3. Write the name of: platinum (II) selenide

Objective

SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Agenda:

- SPARK/Objective
- Lesson
- Practice
- Exit Ticket
- Homework



Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Answers!

Name	Formula
Aluminum Oxide	Al_2O_3
Iron (III) Chloride	$FeCl_3$
Sodium Iodide	NaI
Copper (II) Oxide	FeO
Beryllium Sulfide	BeS
Manganese (III) Bromide	$MnBr_3$

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Winter Break Homework!

You will complete:

- 200 Things to know for the chemistry Regents which will count for 3 homework grades
- The 93 regents questions (on the answer sheet) which will count as a "take home" quiz!

Objective: SWBAT draw Lewis Dot Structure for covalent bonding

Review of Homework!

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Polyatomic Ions

- Find Table E in your reference sheets!

Table E
Selected Polyatomic Ions

H_3O^+	hydronium	CrO_4^{2-}	chromate
Hg_2^{2+}	dimercury (I)	$Cr_2O_7^{2-}$	dichromate
NH_4^+	ammonium	MnO_4^-	permanganate
$C_2H_3O_2^-$ / CH_3COO^-	acetate	NO_2^-	nitrite
CN^-	cyanide	NO_3^-	nitrate
CO_3^{2-}	carbonate	O_2^{2-}	peroxide
HCO_3^-	hydrogen carbonate	OH^-	hydroxide
$C_2O_4^{2-}$	oxalate	PO_4^{3-}	phosphate
ClO^-	hypochlorite	SCN^-	thiocyanate
ClO_2^-	chlorite	SO_3^{2-}	sulfite
ClO_3^-	chlorate	SO_4^{2-}	sulfate
ClO_4^-	perchlorate	HSO_4^-	hydrogen sulfate
		$S_2O_3^{2-}$	thiosulfate

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Polyatomic Ions

- **Polyatomic ions** – ions composed of groups of atoms covalently bonded together
- Their charges do not add up to zero – therefore, the overall molecule has a charge.
- Some are cations some are anions.

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Polyatomic Ions

- Polyatomic ions form ionic compounds
- Balance charges the same way you do with monatomic ions
- Always remember: the ENTIRE ion holds the charge!

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Polyatomic ions

- **Polyatomic ion** – treat these like any other ion!
  - Always remember: the ENTIRE ion holds the charge! Keep it in parentheses!

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Polyatomic Ions

- You can still use the criss-cross method
- Remember to put the polyatomic ion in parentheses and the subscript outside

EXAMPLE: Mg ClO_3

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Check for Understanding

- What is the formula for Copper (II) sulfate?

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Naming Polyatomic Ions

1. If the compound is NOT binary, find the appropriate polyatomic ion on Table E.
2. The polyatomic ion will substitute for the anion name.
3. **Keep their name in the compound!!!!**
   - Example: $NaNO_3$
   - Sodium Nitrate
4. **Follow rules for anions and cations**
   - Example: NH_4Cl
   - Ammonium Chloride

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Practice!!! Complete Chart

Name	Formula
Sodium Carbonate	
Magnesium Sulfite	
Hydronium Chloride	
	$NaClO_3$
	$Mg(NO_2)_2$
	$(NH_4)_2O$

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Answers!!!

Name	Formula
Sodium Carbonate	Na_2CO_3
Magnesium Sulfite	$MgSO_3$
Hydronium Chloride	H_3OCl
Sodium Chlorate	$NaClO_3$
Magnesium Nitrite	$Mg(NO_2)_2$
Ammonium Oxide	$(NH_4)_2O$

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

What about the other type of bonding?

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Covalent Bond

- Covalent bonds are formed by the *sharing* of electrons (Electronegativity difference <2)
- Molecular compound - a neutral group of atoms held together by covalent bonds.
- Example: H_2O

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Example of a Covalent Bond

Each of Hydrogen's electrons are shared to make H_2

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Key Characteristics!

- Electrons are shared
- Bonds between non-metals and other non-metals
- Formulas are in true ratio of atoms ($C_6H_{12}O_6$)

http://betterlesson.com/document/616184/covalent_bond-mov?from=search

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Bond Formation

- How could silicon and hydrogen bond to both achieve a stable octet **if they both want electrons**?

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

They can share electrons!!

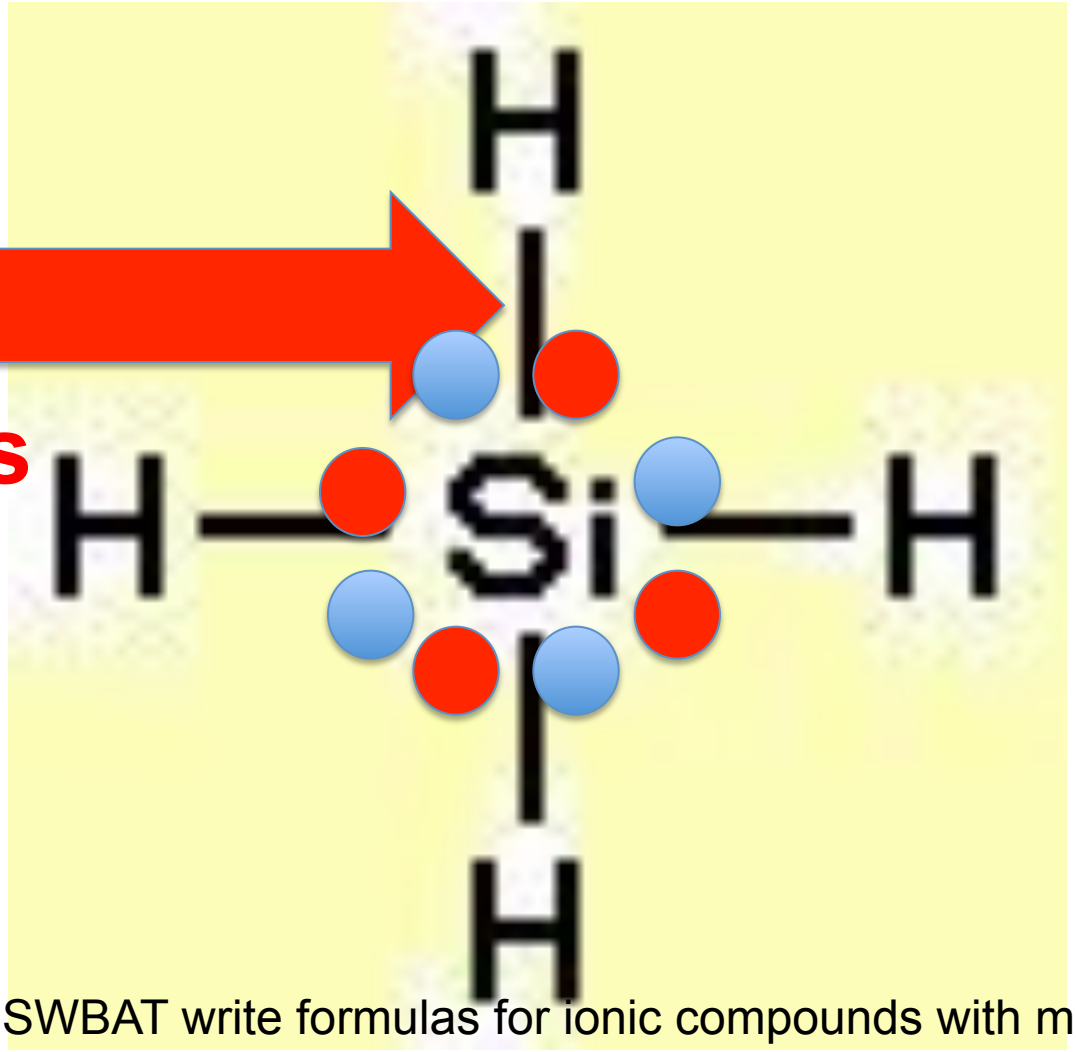
Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Bond Formation

- How could silicon and hydrogen bond to both achieve a stable octet **if they both want electrons**?

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Silicon Tetrahydride



Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Naming Covalent Compounds

Binary Covalent Compounds:

Step 1: Determine the least electronegative element and name that first

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Naming Covalent Compounds

Binary Covalent Compounds:

Step 2: Add a prefix to the first element. Do not use "mono" if there is only one atom!

Ex. CO_2 is carbon dioxide not monocarbon dioxide

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Naming Covalent Compounds

Binary Covalent Compounds:

Step 3: Add a prefix to the second element (including mono if there is only one atom)

Ex. Water is really dihydrogen monoxide (H_2O)

Naming Covalent Compounds

Binary Covalent Compounds:

Step 4: Change the ending of the second, more electronegative element to end in -ide

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Prefixes

½ - hemi

1 – mono

2 – di

3 – tri

4 – tetra

5 – penta

6 – hexa

7 – hepta

8 – octa

9 – nona

10 - deca

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Important!

- If the non-metals begins with a vowel (example oxygen), **drop the last vowel of the prefix**
- Example: N_2O_5 is dinitrogen pentoxide NOT dinitrogen pentaoxide.

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Example #1

- Write the name of this molecular compound:

PCl_5

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Example #2

- Write the name of this molecular compound:

N_2O_4

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Example #3

- Write the chemical formula for:

Dihydrogen monoxide

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

Exit Ticket

- For the following ionic compounds:
  - Write the name of the compound:
    - **$Fe_2(SO_4)_3$**
  - Write the formula of the compound:
    - **Chromium (VI) Oxide**

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds

HOMEWORK

Finish 5.4 independent practice sheet!

Objective: SWBAT write formulas for ionic compounds with more than two elements and name covalent compounds