Grab a periodic table

Purpose: How do we predict the subscripts in a formula like Al_2O_3?

WARMUP On your table circle the atoms that make +1, +2, -2, -1

#1 ALL IONIC SUBSTANCES MUST BE NEUTRAL

SUBSTANCE	PIECES	total charge
NaO	Na^+ O^{2-}	-1 impossible
Na_2O	Na^+ Na^+ O^{2-}	zero exists!
NaO_2	Na^+ O^{2-} O^{2-}	-3 impossible

#0

$(NH_4)_2(S_2O_3)$

Is a compound with

2 nitrogen
8 hydrogen
2 sulfur
3 oxygen

#1 ALL IONIC SUBSTANCES MUST BE NEUTRAL

substance	pieces	total charge
NaO	Na^{+} O^{-2}	-1 impossible
Na_2O	Na^{+} Na^{+} O^{-2}	0 exists!
NaO_2	Na^{+} O^{-2} O^{-2}	-3 impossible

#1

ALL IONIC SUBSTANCES MUST BE NEUTRAL

Substance	Pieces	Total CHARGE
NaO	$Na^{+}\ O^{-2}$	-1 IMPOSSIBLE
Na_2O	$Na^{+}\ Na^{+}\ O^{-2}$	zero (this exists)
NaO_2	$Na^{+}\ O^{2-}\ O^{2-}$	-3 IMPOSSIBLE

#2 CRISS CROSS RULE

Al_2O_3 is the correct formula

example

$Fe_1(MnO_4)_2$ OR $Fe(MnO_4)_2$

example

$(NH_4)_2(C_2O_4)_1$ OR $(NH_4)_2C_2O_4$

#2

THE CRISS CROSS RULE

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

forms

Al_2S_3

Check it: Al^{3+} Al^{3+} S^{2-} S^{2-} S^{2-}

It adds up to zero ☺ It's possible.

Al^{+3} SO_4^{-2}

$Al_2(SO_4)_3$

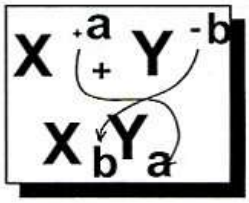
NH_4^{+1} PO_4^{-3}

$(NH_4)_3(PO_4)_1$ OR $(NH_4)_3PO_4$

Answers to Tuesday's classwork:

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
NH_4Cl	1. NH_4 and Cl	
$BaBr_2$	2. Ba and Br	
Al_4C_3	3. Al and C	
Na_2O	4. Na and O	
K_3PO_4	5. K and PO_4	
CaF_2	6. Ca and F	
Li_3N	7. Li and N	
$BaCO_3$	8. Ba and CO_3	
$Al_2(SO_4)_3$	9. Al and SO_4 $Al_2(SO_4)_3$	
$Mg(NO_3)_2$	10. Mg and NO_3	
Li_2S	11. Li and S	
Na_2SO_4	12. Na and SO_4	
$Ca(HCO_3)_2$	13. Ca and HCO_3 → $Ca(HCO_3)_2$	
$Ag(CH_3COO)$	14. Ag (+1) and CH_3COO (−1)	
$Zn(OH)_2$	15. Zn and OH	

EMOTIONS iPhone