Formula Writing

Aim

- determine the ratio of elements in a compound from their oxidation states

Notes

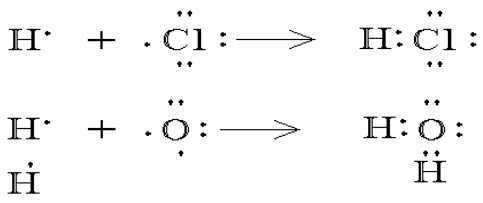
★ Determining formulas for ionic compounds using atomic diagrams

Na	+	Cl	→	Na^+	+	Cl^- → NaCl
-1-		-7-				-8-
-8-		-8-		-8-		-8-
-2-		-2-		-2-		-2-
11P		17P		11P		17P
12N		18N		12N		18N

Mg	+	2F	→	Mg^{+2}	+	$2F^-$ → MgF_2
-2-						
-8-		-7-		-8-		-8-
-2-		-2-		-2-		-2-
12P		9P		12P		9P
12N		10N		12N		10N

-7-	-8-
-2-	-2-
9P	9P
10N	10N

★ Determining formulas for covalent compounds by pairing up unpaired electrons to complete the outer shell



★ Determining formulas using oxidation states

☆ the sum of the oxidation states is zero

★ $Na^{+1} + Cl^{-1} \rightarrow NaCl$

$+1 + -1 + 0$

★ $Mg^{+2} + 2F^{-1} \rightarrow MgF_2$

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

★ $Al^{+3} + O^{-2}$

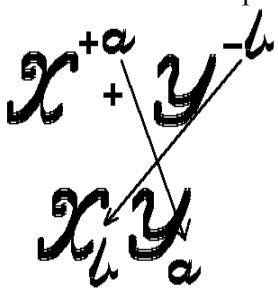
$Al^{+3} + O^{-2} \rightarrow Al_2O_3$

$\underline{\quad} \quad \underline{O^{-2}}$

$+6 + -6 = 0$

or find lowest common multiple

☆ find the lowest common multiple by crossing over



★ exceptions

★ equal and opposite add up to zero so the ratio is 1 to 1

☆ $Mg^{+2} + O^{-2} \rightarrow MgO$

☆ $Al^{+3} + P^{-3} \rightarrow AlP$

★ oxidation states that are multiples of each other must be reduced to lowest terms:

$C^{+4} + O^{-2} \rightarrow CO_2$ <u>NOT</u> C_2O_4

★ polyatomic ions

★ see *Table E* for oxidation state

★ enclose in parentheses if there is more than one

$NH_4^{+1} + CO_3^{-2} \rightarrow (NH_4)_2CO_3$

Answer the questions below by circling the number of the correct response

1. What is the correct formula for a compound of Li and F? (1) LiF (2) Li_2F (3) LiF_2 (4) Li_2F_3

2. What is the correct formula for a compound of Mg and Cl? (1) MgCl (2) Mg_2Cl (3) $MgCl_2$ (4) Mg_2Cl_3

3. What is the correct formula for a compound of Al and O? (1) AlO (2) Al_2O (3) Al_3O_2 (4) Al_2O_3

4. What is the correct formula for a compound of Ca and Br? (1) CaBr (2) Ca_2Br (3) $CaBr_2$ (4) Ca_2Br_3

5. What is the correct formula for a compound of Al and P? (1) AlP (2) Al_2P (3) AlP_2 (4) Al_2P_3

6. Which is the formula for the compound that forms when magnesium bonds with phosphorus?
   (1) Mg_2P (3) Mg_2P_3
   (2) MgP_2 (4) Mg_3P_2