SCH4U Answers September 2017

Naming and Writing Formulas for Compounds with Polyatomic Ions

1. Metals lose electrons and become positive ions. If a metal loses 2 electrons its charge becomes +2.

2. Polyatomic ions have charges just like metals and non-metals. The charge on the polyatomic ion SO_4^{2-} is −2.

3. When making formulas for compounds with polyatomic ions, the charge on the metal must equal the charge on the polyatomic ion ion. This means that you would need two sodium ions (+1 charge each) if they were in a compound with SO_4^{2-}. This would give a total of 2+ and 2-.
   The formula would then be Na_2SO_4.

4. Sometimes more than one polyatomic ion is needed. In this case it must be written in brackets in the formula.
   For example, the Ca ion has a charge of +2. Hydroxide (OH^-) has a charge of −1. This means that you would need 2 hydroxides (total charge of −2) to combine with one calcium ion (total charge of +2).
   The formula for calcium hydroxide would therefore be $Ca(OH)_2$.

5. Complete the following chart:

Polyatomic Ion	Charge on the polyatomic ion	Name of polyatomic ion
CO_3^{2-}	-2	Carbonate
SO_4^{2-}	−2	Sulfate
OH^-	−1	hydroxide
NO_3^-	−1	nitrate
PO_4^{3-}	−3	phosphate
HCO_3^-	−1	hydrogen carbonate

6. Complete the following chart.

Charge of the metal ion		Charge of the polyatomic ion		Formula of compound formed between the metal and polyatomic ions	Name of compound
Na	+1	OH^-	-1	NaOH	Sodium hydroxide
K	+1	NO_3^-	-1	KNO_3	potassium nitrate
Li	+1	PO_4^{3-}	-3	Li_3PO_4	lithium phosphate
Mg	+2	SO_4^{2-}	-2	$MgSO_4$	magnesium sulfate
Al	+3	NO_3^-	-1	$Al(NO_3)_3$	aluminum nitrate
Cu	+2	CO_3^{2-}	-2	$CuCO_3$	Copper (II) carbonate
Cu	+1	CO_3^{2-}	-2	Cu_2CO_3	copper (I) carbonate
Fe	+3	PO_4^{3-}	-3	$FePO_4$	iron (III) phosphate
Fe	+2	OH^-	-1	$Fe(OH)_2$	iron (II) hydroxide
Na	+1	NO_3^-	-1	$NaNO_3$	Sodium nitrate
Ca	+2	SO_4^{2-}	-2	$CaSO_4$	Calcium sulfate
Al	+3	OH^-	-1	$Al(OH)_3$	Aluminum hydroxide
Li	+1	HCO_3^-	-1	$LiHCO_3$	Lithium hydrogen carbonate
Cu	+2	SO_4^{2-}	-2	$CuSO_4$	Copper (II) sulfate
Fe	+3	NO_3^-	-1	$Fe(NO_3)_3$	Iron (III) nitrate
Pb	+2	CO_3^{2-}	-2	$PbCO_3$	Lead (II) carbonate
Na	+1	SO_4	-2	Na_2SO_4	Sodium sulfate
K	+1	PO_4	-3	K_3PO_4	potassium phosphate
Li	+1	HCO_3	-1	$LiHCO_3$	lithium hydrogencarbonate
Ca	+2	OH	-1	$Ca(OH)_2$	calcium hydroxide
Sn	+2	NO_3	-1	$Sn(NO_3)_2$	tin (II) nitrate
Cu	+2	NO_3	-1	$Cu(NO_3)_2$	Copper (II) nitrate
Zn	+2	NO_3	-1	$Zn(NO_3)_2$	zinc nitrate