

### Naming/Formula Writing For Ternary Ionic Compounds:

- First, identify that a polyatomic ion is present by noticing that 3 or more upper case letters are in the formula or noticing that the name ends with "-ate" or "-ite". (or "-ide" in rare cases)
- The naming is similar to other ionic compounds with cation named first, followed by the anion name.
- Knowing ion names/ formulas well is the key.

## Common Polyatomic Ions: The 8 common "-ates"

- A useful way to generate some common polyatomic ion formulas. (all ending with "-ate")

Steps:

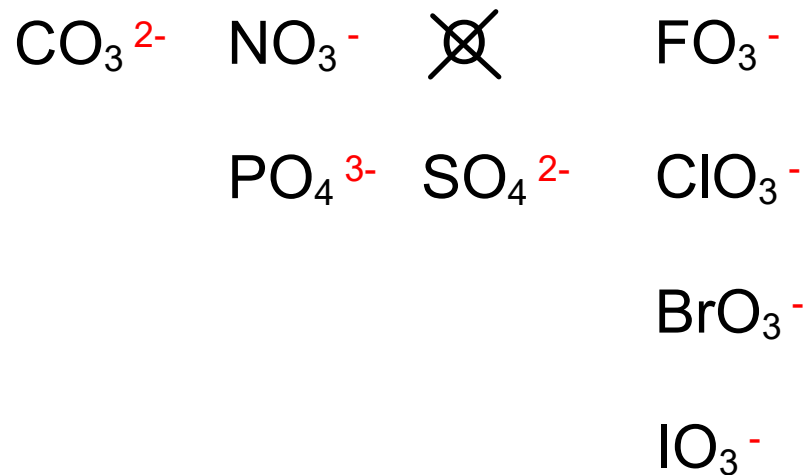
1. Look at the upper right corner of the periodic table. (Ignore noble gases) Write down the elements from carbon to iodine, and add phosphorous and sulfur.

C	N	O	F
	P	S	Cl
			Br
			I

2. Add oxygen to each element. Each element on the outside has 3 oxygen atoms, the center two have 4 each. Since oxygen alone cannot form a common "ate", cross it out.



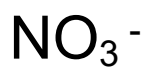
3. Place charges on the ions. All ions have similar charges as the first element in the formula. Exceptions:  $\text{NO}_3$ ,  $\text{CO}_3$



4. Give a name to each ion, beginning with the name of the first element and the ending "-ate"



carbonate



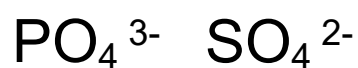
nitrate



fluorate



phosphate



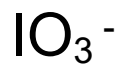
sulfate



chlorate



bromate



iodate

## Oxygen Variation of the 8 Common "ates"

If you take a polyatomic ion that ends with "-ate", new ions can be created by adding or removing oxygen atoms. Note: no change in charge results. The (root) ate is a common "ate".

Relationship	General name	Example name	Example formula
one more oxygen atom than (root)ate	per(root) ate	perchlorate	$\text{ClO}_4^-$
	(root)ate	chlorate	$\text{ClO}_3^-$
one less oxygen atom than (root)ate	(root)ite	chlorite	$\text{ClO}_2^-$
two less oxygen atoms than (root)ate	hypo(root)ite	hypochlorite	$\text{ClO}^-$

## Hydrogen Variation of Polyatomic Ions

-Polyatomic ions with a charge of 2- or greater are capable of having hydrogen atoms as part of the ion.

-Unlike varying the number of oxygen, adding hydrogen does change the charge. For every H that is added, the charge increases by +1.

Ion Formula	Ion Name	Change in H
$\text{PO}_4^{3-}$	phosphate	none
$\text{HPO}_4^{2-}$	hydrogen phosphate	1 added
$\text{H}_2\text{PO}_4^-$	dihydrogen phosphate	2 added

## Other Important Polyatomic Ions

$\text{NH}_4^+$       ammonium

$\text{OH}^-$       hydroxide