

## Polyatomic Ions and Their Charges – Honors Chem

### +1 Charge

<b>* ammonium</b>	$\text{NH}_4^{+1}$		
hydronium	$\text{H}_3\text{O}^{+1}$	mercury (I)	$\text{Hg}_2^{+2}$

### -1 Charge

<b>* acetate</b>	$\text{C}_2\text{H}_3\text{O}_2^{-1}$		
aluminate	$\text{AlO}_2^{-1}$	hydrogen sulfide	$\text{HS}^{-1}$
amide	$\text{NH}_2^{-1}$	hydrogen sulfite	$\text{HSO}_3^{-1}$
azide	$\text{N}_3^{-1}$	<b>* hydroxide</b>	$\text{OH}^{-1}$
benzoate	$\text{C}_6\text{H}_5\text{COO}^{-1}$	hypobromite	$\text{BrO}^{-1}$
<b>* bicarbonate</b>	$\text{HCO}_3^{-1}$	hypochlorite	$\text{ClO}^{-1}$
bisulfite	$\text{HSO}_3^{-1}$	hypoiodite	$\text{IO}^{-1}$
bromate	$\text{BrO}_3^{-1}$	iodate	$\text{IO}_3^{-1}$
borohydride	$\text{BH}_4^{-1}$	iodite	$\text{IO}_2^{-1}$
<b>* chlorate</b>	$\text{ClO}_3^{-1}$	lactate	$\text{C}_3\text{H}_5\text{O}_3^{-1}$
chlorite	$\text{ClO}_2^{-1}$	<b>* nitrate</b>	$\text{NO}_3^{-1}$
chromite	$\text{CrO}_2^{-1}$	<b>* nitrite</b>	$\text{NO}_2^{-1}$
cyanate	$\text{OCN}^{-1}$	perbromate	$\text{BrO}_4^{-1}$
<b>* cyanide</b>	$\text{CN}^{-1}$	<b>* perchlorate</b>	$\text{ClO}_4^{-1}$
dihydrogen phosphate	$\text{H}_2\text{PO}_4^{-1}$	periodate	$\text{IO}_4^{-1}$
dihydrogen phosphite	$\text{H}_2\text{PO}_3^{-1}$	<b>* permanganate</b>	$\text{MnO}_4^{-1}$
formate	$\text{HCOO}^{-1}$	sorbate	$\text{C}_6\text{H}_7\text{O}_2^{-1}$
glutamate	$\text{C}_5\text{H}_8\text{NO}_4^{-1}$	superoxide	$\text{O}_2^{-1}$
<b>* hydrogen carbonate</b>	$\text{HCO}_3^{-1}$	thiocyanate	$\text{SCN}^{-1}$
hydrogen sulfate	$\text{HSO}_4^{-1}$	triiodide	$\text{I}_3^{-1}$
		vanadate	$\text{VO}_3^{-1}$

### -2 Charge

<b>* carbonate</b>	$\text{CO}_3^{-2}$	<b>* peroxide</b>	$\text{O}_2^{-2}$
carbide	$\text{C}_2^{-2}$	peroxydisulfate	$\text{S}_2\text{O}_8^{-2}$
<b>* chromate</b>	$\text{CrO}_4^{-2}$	phthalate	$\text{C}_8\text{H}_4\text{O}_4^{-2}$
dichromate	$\text{Cr}_2\text{O}_7^{-2}$	selenate	$\text{SeO}_4^{-2}$
disulfate	$\text{S}_2^{-2}$	silicate	$\text{SiO}_3^{-2}$
hexafluorosilicate	$\text{SiF}_6^{-2}$	<b>* sulfate</b>	$\text{SO}_4^{-2}$
hydrogen phosphate	$\text{HPO}_4^{-2}$	<b>* sulfite</b>	$\text{SO}_3^{-2}$
hydrogen phosphite	$\text{HPO}_3^{-2}$	tartrate	$\text{C}_4\text{H}_4\text{O}_6^{-2}$
imide	$\text{NH}^{-1}$	tellurate	$\text{TeO}_4^{-2}$
manganate	$\text{MnO}_4^{-2}$	tetraborate	$\text{B}_4\text{O}_7^{-2}$
metasilicate	$\text{SiO}_3^{-2}$	thiosulfate	$\text{S}_2\text{O}_3^{-2}$
molybdate	$\text{MoO}_4^{-2}$	tungstate	$\text{WO}_4^{-2}$
monohydrogen phosphate	$\text{HPO}_4^{-2}$	zincate	$\text{ZnO}_2^{-2}$
oxalate	$\text{C}_2\text{O}_4^{-2}$		

### -3 Charge

arsenate	$\text{AsO}_4^{-3}$	hypophosphite	$\text{PO}_2^{-3}$
arsenite	$\text{AsO}_3^{-3}$	<b>* phosphate</b>	$\text{PO}_4^{-3}$
borate	$\text{BO}_3^{-3}$	phosphite	$\text{PO}_3^{-3}$
citrate	$\text{C}_6\text{H}_5\text{O}_7^{-3}$		

### -4 Charge

orthosilicate	$\text{SiO}_4^{-4}$	pyrophosphate	$\text{P}_2\text{O}_7^{-4}$
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### -5 Charge

tripolyphosphate	$\text{P}_3\text{O}_{10}^{-5}$
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\* means that they're pretty common / important ones... You'll be expected to know these

## A rule or two about polyatomic ions

From –ate...adding an oxygen makes per- -ate...taking away an oxygen (from the original –ate) makes –ite...taking away another oxygen makes hypo- -ite...

An example:	hypochlorite	$\text{ClO}^{-1}$
	chlorite	$\text{ClO}_2^{-1}$
Base ion →	chlorate	$\text{ClO}_3^{-1}$
	perchlorate	$\text{ClO}_4^{-1}$

Taking an –ate and adding hydrogen to it makes “hydrogen –ate” and adds +1 to the charge...adding another hydrogen makes “dihydrogen –ate” and adds another +1 to the charge...(also works for –ite’s becoming “hydrogen –ite” or “bi- -ite” by adding one hydrogen or “dihydrogen –ite” by adding two hydrogens)...

An example:	phosphate	$\text{PO}_4^{-3}$	
	hydrogen phosphate	$\text{HPO}_4^{-2}$	(sometimes called “biphosphate”)
	dihydrogen phosphate	$\text{H}_2\text{PO}_4^{-1}$	

### Common Multivalent Metals

(more complete chart at <http://www.phs.princeton.k12.oh.us/Departments/science/ldusch/multivalent.html>)

<i>Stock System</i>	<i>Old Name</i>	<i>Symbol</i>
cobalt (II)	cobaltous	$\text{Co}^{+2}$
cobalt (III)	cobaltic	$\text{Co}^{+3}$
chromium (II)	chromous	$\text{Cr}^{+2}$
chromium (III)	chromic	$\text{Cr}^{+3}$
copper (I)	cuprous	$\text{Cu}^{+1}$
copper (II)	cupric	$\text{Cu}^{+2}$
iron (II)	ferrous	$\text{Fe}^{+2}$
iron (III)	ferric	$\text{Fe}^{+3}$
lead (II)	plumbous	$\text{Pb}^{+2}$

<i>Stock System</i>	<i>Old Name</i>	<i>Symbol</i>
lead (IV)	plumbic	$\text{Pb}^{+4}$
manganese (II)	manganous	$\text{Mn}^{+2}$
manganese (IV)	manganic	$\text{Mn}^{+4}$
mercury (I)	mercurous	$\text{Hg}_2^{+2}$
mercury (II)	mercuric	$\text{Hg}^{+2}$
nickel (I)	nickelous	$\text{Ni}^{+1}$
nickel (II)	nickelic	$\text{Ni}^{+2}$
tin (II)	stannous	$\text{Sn}^{+2}$
tin (IV)	stannic	$\text{Sn}^{+4}$

by charges

### The polyatomic ions you need to know

alphabetically

ammonium	$\text{NH}_4^{+1}$
acetate	$\text{C}_2\text{H}_3\text{O}_2^{-1}$
bicarbonate	$\text{HCO}_3^{-1}$
chlorate	$\text{ClO}_3^{-1}$
cyanide	$\text{CN}^{-1}$
hydrogen carbonate	$\text{HCO}_3^{-1}$
hydroxide	$\text{OH}^{-1}$
nitrate	$\text{NO}_3^{-1}$
nitrite	$\text{NO}_2^{-1}$
perchlorate	$\text{ClO}_4^{-1}$
permanganate	$\text{MnO}_4^{-1}$
carbonate	$\text{CO}_3^{-2}$
chromate	$\text{CrO}_4^{-2}$
peroxide	$\text{O}_2^{-2}$
sulfate	$\text{SO}_4^{-2}$
sulfite	$\text{SO}_3^{-2}$
phosphate	$\text{PO}_4^{-3}$

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hydroxide	$\text{OH}^{-1}$
nitrate	$\text{NO}_3^{-1}$
nitrite	$\text{NO}_2^{-1}$
perchlorate	$\text{ClO}_4^{-1}$
permanganate	$\text{MnO}_4^{-1}$
peroxide	$\text{O}_2^{-2}$
phosphate	$\text{PO}_4^{-3}$
sulfate	$\text{SO}_4^{-2}$
sulfite	$\text{SO}_3^{-2}$