

Major Formal Oxidation States

Anions					
-1 ions		-2 ions		-3 ions	
acetate C ₂ H ₃ O ₂ ⁻¹ or CH ₃ COO ⁻¹	hypoiodite IO ⁻¹	carbide(dicarbide) C ₂ ⁻²	selenide Se ⁻²	arsenate AsO ₄ ⁻³	
amide NH ₂ ⁻¹	hydroxide OH ⁻¹	carbonate CO ₃ ⁻²	silicate SiO ₃ ⁻²	arsenite AsO ₃ ⁻³	
azide N ₃ ⁻¹	hypoiodite IO ⁻¹	chromate CrO ₄ ⁻²	silicide Si ⁻²	arsenide As ⁻³	
benzoate C ₇ H ₆ O ₂ ⁻¹	hydrogen carbonate HCO ₃ ⁻¹	dichromate Cr ₂ O ₇ ⁻²	sulfate SO ₄ ⁻²	borate BO ₃ ⁻³	
bromate BrO ₃ ⁻¹	bicarbonate HCO ₃ ⁻¹	disulfate S ₂ O ₇ ⁻²	sulfide S ⁻²	boride B ⁻³	
bromide Br ⁻¹	hydrogen sulfate HSO ₄ ⁻¹	hexafluorosilicate SiF ₆ ⁻²	sulfite SO ₃ ⁻²	nitride N ⁻³	
bromite BrO ₂ ⁻¹	iodate IO ₃ ⁻¹	hydrogen arsenate HAsO ₄ ⁻²	tartrate C ₄ H ₄ O ₆ ⁻²	phosphate PO ₄ ⁻³	
chloride Cl ⁻¹	iodide I ⁻¹	hydrogen phosphate HPO ₄ ⁻²	telluride Te ⁻²	phosphide P ⁻³	
chlorite ClO ₂ ⁻¹	nitrate NO ₃ ⁻¹	manganate MnO ₄ ⁻²	thiosulfate S ₂ O ₃ ⁻²	phosphite PO ₃ ⁻³	
chlorate ClO ₃ ⁻¹	nitrite NO ₂ ⁻¹	oxalate C ₂ O ₄ ⁻²		hypophosphite PO ₂ ⁻³	
cyanide CN ⁻¹	perbromate BrO ₄ ⁻¹	oxide O ⁻²			
cyanate OCN ⁻¹	perchlorate ClO ₄ ⁻¹	peroxide O ₂ ⁻²	-4 ions		
fluoride F ⁻¹	periodate IO ₄ ⁻¹	persilicate SiO ₄ ⁻²			
hypobromite BrO ⁻¹	permanganate MnO ₄ ⁻¹	selenate SeO ₄ ⁻²	monocarbide C ⁻⁴		
hypochlorite ClO ⁻¹	thiocyanate SCN ⁻¹	selenite SeO ₃ ⁻²			

Special Elemental Forms

hydrogen gas	H ₂ (g)
oxygen gas	O ₂ (g)
nitrogen gas	N ₂ (g)
sulfur solid	S ₈ (s)
phosphorus solid	P ₄ (s)
fluorine gas	F ₂ (g)
chlorine gas	Cl ₂ (g)
bromine liquid	Br ₂ (l)
iodine solid	I ₂ (s)

Look on the periodic table for the symbol of all other elements.

Cations							
+1 ions		+2 ions		+3 ions		+4 ions	
ammonium NH ₄ ⁺¹	barium Ba ⁺²	aluminum Al ⁺³	carbon C ⁺⁴				
cesium Cs ⁺¹	beryllium Be ⁺²	antimony(III) Sb ⁺³	cerium(IV) Ce ⁺⁴				
copper(I) Cu ⁺¹	cadmium Cd ⁺²	arsenic(III) As ⁺³	lead(IV) Pb ⁺⁴				
francium Fr ⁺¹	calcium Ca ⁺²	bismuth Bi ⁺³	manganese(IV) Mn ⁺⁴				
gold(I) Au ⁺¹	cerium(II) Ce ⁺²	boron B ⁺³	thorium(IV) Th ⁺⁴				
hydrogen H ⁺¹	chromium(II) Cr ⁺²	cerium(III) Ce ⁺³	tin(IV) Sn ⁺⁴				
lithium Li ⁺¹	cobalt(II) Co ⁺²	chromium(III) Cr ⁺³	titanium(IV) Ti ⁺⁴				
mercury(I) Hg ₂ ⁺²	copper(II) Cu ⁺²	cobalt(III) Co ⁺³	germanium(IV) Ge ⁺⁴				
potassium K ⁺¹	gold(II) Au ⁺²	gallium(III) Ga ⁺³	platinum(IV) Pt ⁺⁴				
rubidium Rb ⁺¹	iron(II) Fe ⁺²	gold(III) Au ⁺³	polonium(IV) Po ⁺⁴				
sodium Na ⁺¹	lead(II) Pb ⁺²	iron(III) Fe ⁺³	uranium(IV) U ⁺⁴				
silver Ag ⁺¹	magnesium Mg ⁺²	manganese(III) Mn ⁺³	zirconium(IV) Zr ⁺⁴				
thallium(I) Tl ⁺¹	manganese(II) Mn ⁺²	nickel(III) Ni ⁺³					
	mercury(II) Hg ⁺²	scandium Sc ⁺³					
	nickel(II) Ni ⁺²	titanium(III) Ti ⁺³					
	strontium Sr ⁺²	uranium(III) U ⁺³					
	tin(II) Sn ⁺²	vanadium(III) V ⁺³					
	zinc Zn ⁺²						

Latin Names

Selected Cations	
cuprous	Cu ⁺¹
cupric	Cu ⁺²
ferrous	Fe ⁺²
ferric	Fe ⁺³
mercurous	Hg ₂ ⁺²
mercuric	Hg ⁺²
stannous	Sn ⁺²
stannic	Sn ⁺⁴
plumbous	Pb ⁺²
plumbic	Pb ⁺⁴
chromous	Cr ⁺²
chromic	Cr ⁺³
manganous	Mn ⁺²
manganic	Mn ⁺³
cobaltous	Co ⁺²
cobaltic	Co ⁺³

Common Acids

acetic	CH ₃ COOH(aq) or HC ₂ H ₃ O ₂ (aq)
hydrobromic	HBr(aq)
hypobromous	HBrO(aq)
bromous	HBrO ₂ (aq)
bromic	HBrO ₃ (aq)
perbromic	HBrO ₄ (aq)
hydrochloric	HCl(aq)
hypochlorous	HClO(aq)
chlorous	HClO ₂ (aq)
chloric	HClO ₃ (aq)
perchloric	HClO ₄ (aq)
hydrofluoric	HF(aq)
hydroiodic	HI(aq)
hypoiodous	HIO(aq)
iodous	HIO ₂ (aq)
iodic	HIO ₃ (aq)
nitric	HNO ₃ (aq)
nitrous	HNO ₂ (aq)
periodic	HIO ₄ (aq)
phosphoric	H ₃ PO ₄ (aq)
phosphorous	H ₃ PO ₃ (aq)
sulfuric	H ₂ SO ₄ (aq)
sulfurous	H ₂ SO ₃ (aq)

Naming Rules

Positive ions			Negative Ions			
Monatomic		Polyatomic	Monatomic	Polyatomic	Generic Names	Hydrogen Polyatomic
Single charge ions	Multiple charges ions	Two or more atoms	Containing oxygen	Containing oxygen	Containing oxygen	Containing hydrogen and oxygen
<p>There is only one ion charge; therefore, no Roman numeral is used.</p> <p>Na⁺¹ sodium ion Mg⁺² magnesium ion H⁺¹ hydrogen ion</p>	<p>There are two or more ion charges. Roman numerals are used to distinguish between the different ions for the same element.</p> <p>Cu⁺¹ copper(I) ion Cu⁺² copper(II) ion Fe⁺² iron(II) ion Fe⁺³ iron(III) ion</p> <p>An older system uses a Latin stem for the element, -ous for the lesser charge and -ic for the greater charge.</p> <p>Cu⁺¹ cuprous ion Cu⁺² cupric ion Hg⁺² mercurous ion Hg⁺² mercuric ion Fe⁺² ferrous ion Fe⁺³ ferric ion Pb⁺² plumbous ion Pb⁺⁴ plumbic ion Sn⁺² stannous ion Sn⁺⁴ stannic ion Cr⁺² chromous ion Cr⁺³ chromic ion Mn⁺² manganous ion Mn⁺³ manganic ion Co⁺² cobaltous ion Co⁺³ cobaltic ion</p>	<p>There very few polyatomic + ions.</p> <p>NH₄⁺¹ ammonium ion H₃O⁺¹ hydronium ion Hg₂⁺² mercury(I) ion</p> <p>Hg₂⁺² is two mercury atoms attached to each other. They each have a charge of +1.</p>	<p>The suffix -ide is added to the stem name of the element.</p> <p>H⁻¹ hydride ion F⁻¹ fluoride ion O⁻² oxide ion N⁻³ nitride ion C⁻⁴ carbide ion</p>	<p>The stem name varies according to the number of oxygens present.</p> <p>least oxygen hypo__ite ion less oxygen __ite ion more oxygen __ate ion most oxygen per__ate ion</p> <p>ClO⁻¹ hypochlorite ion ClO₂⁻¹ chlorite ion ClO₃⁻¹ chlorate ion ClO₄⁻¹ perchlorate ion SO₃⁻² sulfite ion SO₄⁻² sulfate ion</p>	<p>These -ions do NOT fit any common naming system in use. They are names that have stayed in the literature.</p> <p>OH⁻¹ hydroxide ion CN⁻¹ cyanide ion SCN⁻¹ thiocyanate ion OCN⁻¹ cyanate ion O₂⁻² peroxide ion O₂⁻¹ superoxide ion C₂H₃O₂⁻¹ acetate ion Cr₂O₇⁻² dichromate ion C₂O₄⁻² oxalate ion MnO₄⁻¹ permanganate ion</p>	<p>The ion name starts with hydrogen or bi- followed by a space then and the polyatomic ion name.</p> <p>HCO₃⁻¹ hydrogen carbonate ion HSO₄⁻¹ hydrogen sulfate ion HPO₄⁻² hydrogen phosphate ion H₂PO₄⁻¹ dihydrogen phosphate ion HAsO₄⁻² hydrogen arsenate ion H₂AsO₄⁻¹ dihydrogen arsenate ion</p>

Naming Compounds

Salts	Acids		Nonmetal compounds
Binary	Binary	Polyatomic	Nonmetal compounds
<p>There are two parts to the name: the cation name followed by the anion name. The word ion is dropped from the name of both the cation and anion names.</p> <p>NaCl sodium chloride LiBr sodium bromide Sn₃N₂ tin(II) nitride LiH lithium hydride CaH₂ calcium hydride</p> <p style="text-align: center;">© 1997 Thayer ChemSoftWare All rights reserved.</p>	<p>As a solid, liquid or gas they are named as binary salts.</p> <p>HCl hydrogen chloride HF hydrogen fluoride H₂S hydrogen sulfide</p> <p>Dissolved in water, they have the prefix hydro- added and the suffix -ide is change to the suffix -ic.</p> <p>HCl(aq) hydrochloric acid HF(aq) hydrofluoric acid H₂S(aq) hydrosulfuric acid</p>	<p>As a solid, liquid or gas they are named as polyatomic salts.</p> <p>HClO hydrogen hypochlorite HClO₂ hydrogen chlorite HClO₃ hydrogen chlorate HClO₄ hydrogen perchlorate</p> <p>Dissoved in water, the term hydrogen is dropped and the suffixes -ate and -ite are changed to -ic and -ous.</p> <p>HClO(aq) hypochlorous acid HClO₂(aq) chlorous acid HClO₃(aq) chloric acid HClO₄(aq) perchloric acid</p>	<p>The more metallic element is written first, except for hydrogen. The number of each atom type is identified by a Greek prefix. The prefix mono is dropped for the first element.</p> <p>prefixes: 1=mono 6=hexa 2=di 7=hepta 3=tri 8=octa 4=tetra 9=nona 5=penta 10=deca</p> <p>N₂O₄ dinitrogen tetroxide* CO carbon monoxide* CO₂ carbon dioxide SO₂ sulfur dioxide P₂O₅ diphosphorus pentoxide*</p> <p>*Mono, penta and tetra are changed to mon, pent and tetr when used as the prefix for oxygen: this makes for a smoother vowel sound.</p>