

TABLE OF COMMON MONATOMIC IONS

- fixed-charge metals in Groups IA, IIA, and IIIA
- fixed-charge metals in Groups IB and IIB (transition elements)
- common-charge non-metals from Groups IVA, VA, VIA, and VIIA
- semi-metal from Group IVA

IA	IIA	IB	IIB	IIIA	VA	VIA	VIIA
H ⁺							H ⁻
Li ⁺	Be ²⁺				N ³⁻	O ²⁻	F ⁻
Na ⁺	Mg ²⁺			Al ³⁺	P ³⁻	S ²⁻	Cl ⁻
K ⁺	Ca ²⁺		Zn ²⁺	Ga ³⁺		Se ²⁻	Br ⁻
Rb ⁺	Sr ²⁺	Ag ⁺	Cd ²⁺	In ³⁺			I ⁻
Cs ⁺	Ba ²⁺						

For ions in group VA, VI, and VIIA, the magnitude of charge is calculated by subtracting the group number from 8. Non-metal elements have a common or fixed charge/oxidation when compounded with metals. Yet oxidation values can vary depending on which non-metal elements they are combined with, as in polyatomic ions and molecular compounds.

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TABLE OF COMMON VARIABLE-CHARGE METALS

- variable-charge transition metals
- variable-charge metals from groups IIIA and IVA

IVB	VB	VIB	VIIB	VIII B			IB	IIB	IIIA	IVA
Ti ²⁺ Ti ³⁺	V ²⁺ V ³⁺	Cr ²⁺ Cr ³⁺ Cr ⁶⁺	Mn ²⁺ Mn ³⁺ Mn ⁷⁺	Fe ²⁺ Fe ³⁺	Co ²⁺ Co ³⁺	Ni ²⁺ Ni ³⁺	Cu ⁺ Cu ²⁺			Ge ²⁺ Ge ⁴⁺
						Pd ²⁺ Pd ³⁺				Sn ²⁺ Sn ⁴⁺
						Pt ²⁺ Pt ³⁺	Au ⁺ Au ³⁺	Hg ⁺ Hg ²⁺	Tl ⁺ Tl ³⁺	Pb ²⁺ Pb ⁴⁺

Comment: The variable-charge nature of certain metals presents a unique outcome in compound formation. Since these metals can form multiple charges they will compound with nonmetals (or polyatomic ions) in differing ratios. Therefore, the Roman numeral designation is required in the nomenclature to specify the correct compound. For example, there are several types of manganese oxides, each with characteristic chemical and physical properties. Manganese (III) oxide, Mn₂O₃, is a black mineral insoluble in water. Whereas, manganese (VII) oxide, Mn₂O₇, is a dark reddish mineral which is soluble in water. Manganese will also form two other oxides each with differing colors and solubilities.

LIST OF COMMON POLYATOMIC IONS

(Monatomic ions are listed first in the family.)

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NITROGEN

N^{3-}	nitride
NO_2^-	<u>nitrite</u>
NO_3^-	nitrate
NH_4^+	ammonium

PHOSPHORUS

P^{3-}	phosphide
PO_3^{3-}	phosphite
HPO_3^{2-}	hydrogen phosphite
PO_4^{3-}	phosphate
HPO_4^{2-}	hydrogen phosphate
$H_2PO_4^-$	<u>di</u> hydrogen phosphate

SULFUR

S^{2-}	sulfide
SO_3^{2-}	sulfite
HSO_3^-	hydrogen sulfite
SO_4^{2-}	sulfate
HSO_4^-	hydrogen sulfate
$S_2O_3^{2-}$	<u>thio</u> sulfate
$S_2O_7^{2-}$	<u>disulfate</u>

CARBON

C^{4-}	carbide
CO_3^{2-}	carbonate
HCO_3^-	hydrogen carbonate (or bicarbonate)
CN^-	cyanide

ORGANIC (CARBON CONT.)

$HCOO^-$	formate (derived from <i>formic acid</i> , also written HCO_2^-)
$H_3C_2O_2^-$	acetate (derived from <i>acetic acid</i> , also commonly written CH_3COO^-)
$C_2O_4^{2-}$	oxalate (derived from <i>oxalic acid</i>)

OXYGEN

O^{2-}	oxide
O_2^{2-}	<u>peroxide</u>
OH^-	hydroxide

CHLORINE

Cl^-	chloride
ClO_4^-	<u>perchlorate</u>
ClO_3^-	chlorate
ClO_2^-	<u>chlorite</u>
ClO^-	<u>hypochlorite</u>

METALS/SEMI-METALS

MnO_4^-	permanganate
CrO_4^{2-}	chromate
$Cr_2O_7^{2-}$	<u>dichromate</u>
AsO_4^{3-}	arsenate
SiO_4^{4-}	silicate

OTHER COMMON ANIONS

BO_3^{3-}	borate
BrO_3^-	bromate
IO_3^-	iodate
IO_4^-	<u>periodate</u>
OCN^-	cyanate
SCN^-	<u>thiocyanate</u>

NOTES

-ate	used to designate the oxyanion with the higher number of oxygen atoms
-ite	used to designate the oxyanion with the lower number of oxygen atoms
thio-	add one sulfur, remove one oxygen
per-	one additional oxygen
hypo-	one less oxygen
-ide	although this suffix is reserved for the monatomic anion, the exceptions are cyanide, hydroxide, and peroxide
di-	two or double (i.e., as with dichromate, double the numeric subscripts on the chromate ion and reduce the oxygen by one; retain charge)

SOME COMBINED IONS

HS^-	hydrogen sulfide
$NH_4PO_4^{2-}$	ammonium phosphate
$HC_2O_4^-$	hydrogen oxalate
$Fe(CN)_6^{3-}$	hexacyanoferrate