

# Ion Formula Chart

## Names and Charges of Some Common Ions

1+	2+	3+
ammonium, $\text{NH}_4^+$ cesium, $\text{Cs}^+$ copper(I), $\text{Cu}^+$ gold(I), $\text{Au}^+$ hydrogen, $\text{H}^+$ lithium, $\text{Li}^+$ potassium, $\text{K}^+$ rubidium, $\text{Rb}^+$ silver, $\text{Ag}^+$ sodium, $\text{Na}^+$	barium, $\text{Ba}^{2+}$ beryllium, $\text{Be}^{2+}$ cadmium, $\text{Cd}^{2+}$ calcium, $\text{Ca}^{2+}$ chromium(II), $\text{Cr}^{2+}$ cobalt(II), $\text{Co}^{2+}$ copper(II), $\text{Cu}^{2+}$ iron(II), $\text{Fe}^{2+}$ lead(II), $\text{Pb}^{2+}$ magnesium, $\text{Mg}^{2+}$ mercury(I), $\text{Hg}_2^{2+}$ mercury(II), $\text{Hg}^{2+}$ nickel, $\text{Ni}^{2+}$ strontium, $\text{Sr}^{2+}$ tin(II), $\text{Sn}^{2+}$ zinc, $\text{Zn}^{2+}$	aluminum, $\text{Al}^{3+}$ chromium(III), $\text{Cr}^{3+}$ cobalt(III), $\text{Co}^{3+}$ gallium, $\text{Ga}^{3+}$ gold(III), $\text{Au}^{3+}$ iron(III), $\text{Fe}^{3+}$
		4+ lead(IV), $\text{Pb}^{4+}$ tin(IV), $\text{Sn}^{4+}$
1-	2-	3-
acetate, $\text{C}_2\text{H}_3\text{O}_2^-$ bromate, $\text{BrO}_3^-$ bromide, $\text{Br}^-$ chlorate, $\text{ClO}_3^-$ chloride, $\text{Cl}^-$ chlorite, $\text{ClO}_2^-$ cyanide, $\text{CN}^-$ dihydrogen phosphate, $\text{H}_2\text{PO}_4^-$ fluoride, $\text{F}^-$ hydrogen carbonate, or bicarbonate, $\text{HCO}_3^-$ hypochlorite, $\text{ClO}^-$ hydroxide, $\text{OH}^-$ iodate, $\text{IO}_3^-$ iodide, $\text{I}^-$ nitrate, $\text{NO}_3^-$ nitrite, $\text{NO}_2^-$ permanganate, $\text{MnO}_4^-$	carbonate, $\text{CO}_3^{2-}$ chromate, $\text{CrO}_4^{2-}$ dichromate, $\text{Cr}_2\text{O}_7^{2-}$ hydrogen phosphate, $\text{HPO}_4^{2-}$ oxide, $\text{O}^{2-}$ oxalate, $\text{C}_2\text{O}_4^{2-}$ peroxide, $\text{O}_2^{2-}$ selenide, $\text{Se}^{2-}$ sulfate, $\text{SO}_4^{2-}$ sulfide, $\text{S}^{2-}$ sulfite, $\text{SO}_3^{2-}$ thiosulfate, $\text{S}_2\text{O}_3^{2-}$	borate, $\text{BO}_3^{3-}$ nitride, $\text{N}^{3-}$ phosphate, $\text{PO}_4^{3-}$ phosphide, $\text{P}^{3-}$ phosphite, $\text{PO}_3^{3-}$ arsenate, $\text{AsO}_4^{3-}$

### Activity Series

#### Metals

Li  
 K  
 Ba  
 Sr  
 Ca  
 Na  
 Mg  
 Al  
 Mn  
 Zn  
 Fe  
 Cd  
 Co  
 Ni  
 Sn  
 Pb  
 H  
 Cu  
 Ag  
 Hg  
 Au

### Solubility Rules for Ionic Compounds

Compounds containing the following ions are generally *soluble* in water:

1. alkali metal ions and ammonium ions,  $\text{Li}^+$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{NH}_4^+$
2. acetate ion,  $\text{C}_2\text{H}_3\text{O}_2^-$
3. nitrate ion,  $\text{NO}_3^-$
4. halide ions ( $\text{X}^-$ ),  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ , ( $\text{AgX}$ ,  $\text{Hg}_2\text{X}_2$ , and  $\text{PbX}_2$  are insoluble exceptions)
5. sulfate ion,  $\text{SO}_4^{2-}$  ( $\text{SrSO}_4$ ,  $\text{BaSO}_4$ , and  $\text{PbSO}_4$  are insoluble exceptions)

Compounds containing the following ions are generally *insoluble* in water:

6. carbonate ion,  $\text{CO}_3^{2-}$  (see rule 1 exceptions, which are soluble)
7. chromate ion,  $\text{CrO}_4^{2-}$  (see rule 1 exceptions, which are soluble)
8. phosphate ion,  $\text{PO}_4^{3-}$  (see rule 1 exceptions, which are soluble)
9. sulfide ion,  $\text{S}^{2-}$  ( $\text{CaS}$ ,  $\text{SrS}$ ,  $\text{BaS}$ , and rule 1 exceptions are soluble)
10. hydroxide ion,  $\text{OH}^-$  [ $\text{Ca}(\text{OH})_2$ ,  $\text{Sr}(\text{OH})_2$ ,  $\text{Ba}(\text{OH})_2$ , and rule 1 exceptions are soluble]

# IONS, ELEMENTS AND THEIR CHARGES

$C_2H_3O_2^{-1}$ $Al^{+3}$ $NH_2^{-1}$ $NH_4^{-1}$ NOT AN ION $\rightarrow NH_3$ $Sb^{+3}$ $N_3^{-1}$ $Ba^{+2}$ $Be^{+2}$ $Bi^{+3}$ $BO_3^{-1}$ $BrO_3^{-1}$ $Br^{-1}$ $BrO_2^{-1}$ $Cd^{+2}$ $Ca^{+2}$ $C^{-4}$ $CO_3^{-2}$ $Cs^{+1}$ $ClO_3^{-1}$ $Cl^{-1}$ $ClO_2^{-1}$ $CrO_4^{-2}$ $Cr^{+2}$ $Cr^{+3}$ $Co^{+2}$ $Co^{+3}$ $Cu^{+1}$ $OCN^{-1}$ $CN^{-1}$ $Cr_2O_7^{-2}$ $H_2PO_4^{-1}$  $S_2O_3^{-2}$ $Fe(CN)_6^{-3}$ $Fe(CN)_6^{-4}$ $F^{-1}$ $Fr^{+1}$ $H^{-1}$ $H^{+1}$ $HSO_4^{-1}$ $HSO_3^{-1}$ $HS^{-1}$ $HPO_4^{-2}$ $HCO_3^{-1}$ $H_3O^{+1}$ $OH^{-1}$ $BrO^{-1}$ $ClO^{-1}$ $IO^{-1}$ $NO^{-1}$ $PO_2^{-3}$ $SO_2^{-2}$	ACETATE ALUMINUM AMIDE AMMONIUM AMMONIA ANTIMONY AZIDE BARIUM BERYLLIUM BISMUTH (III) BORATE BROMATE BROMIDE BROMITE CADMIUM CALCIUM CARBON CARBONATE CESIUM CHLORATE CHLORIDE CHLORITE CHROMATE CHROMIUM (II) CHROMIUM (III) COBALT (II) COBALT (III) COPPER (I) CYANATE CYANIDE DICHROMATE DIHYDROGEN PHOSPHATE DISULFITE FERRICYANIDE FERROCYANIDE FLUORIDE FRANCIUM HYDRIDE HYDROGEN HYDROGEN SULFATE HYDROGEN SULFITE HYDROGEN SULFIDE HYDROGEN PHOSPHATE HYDROGEN CARBONATE HYDRONIUM HYDROXIDE HYPOBROMITE HYPOCHLORITE HYPOIODITE HYPONITRITE HYPOPHOSPHITE HYPOSULFITE	$IO_3^{-1}$ $I^{-1}$ $IO_2^{-1}$ $Fe^{+2}$ $Fe^{+3}$ $Pb^{+2}$ $Pb^{+4}$ $Li^{+1}$ $Mg^{+2}$ $MnO_4^{-2}$ $Hg_2^{+2}$ $Hg^{+2}$ $Ni^{+2}$ $NO_3^{-1}$ $N^{-3}$ $NO_2^{-1}$ $N^{-3}$ $C_2O_4^{-2}$ $O^{-2}$ $BrO_4^{-1}$ $ClO_4^{-1}$ $IO_4^{-1}$ $MnO_4^{-1}$ $NO_4^{-1}$ $O_2^{-2}$ $PO_3^{-3}$ $PO_4^{-3}$ $PO_3^{-3}$ $P^{-3}$ $Pt^{+4}$ $Ra^{+2}$ $Rb^{+1}$ $Se^{+4}$ $Si^{+4}$ $Ag^{+1}$ $Na^{+1}$ $Sr^{+2}$ $SO_4^{-2}$ $S^{-2}$ $SO_3^{-2}$ $S^{+6}$ $C_4H_4O_6^{-2}$ $Te^{+4}$ $B_2O_4^{-1}$ $SCN^{-1}$ $S_2O_3^{-2}$ $Th^{+4}$ $Sn^{+2}$ $Sn^{+4}$ $W^{+6}$ $U^{+6}$ $Zn^{+2}$ $P^{-3}$	IODATE IODIDE IODITE IRON (II) IRON (III) LEAD (II) LEAD (IV) LITHIUM MAGNESIUM MANGANATE MERCURY (I) MERCURY (II) NICKEL (II) NITRATE NITRIDE NITRITE NITROGEN OXALATE OXIDE PERBROMATE PERCHLORATE PERIODATE PERMANGANATE PERNITRATE PEROXIDE PERPHOSPHATE PHOSPHATE PHOSPHITE PHOSPHOROUS PLATINUM RADIUM RUBIDIUM SELENIUM SILICON SILVER SODIUM STRONTIUM SULFATE SULFIDE SULFITE SULFUR TARTRATE TELLURIUM TETRABORATE THIOCYANATE THIOSULFATE THORIUM TIN(II) TIN(IV) TUNGSTEN URANIUM ZINC	$Au^{+1}$ GOLD(I) $Au^{+3}$ GOLD(III) $Cu^{+2}$ COPPER(II) $K^{+}$ POTASSIUM
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\* also known as bisulfate, bisulfite, etc