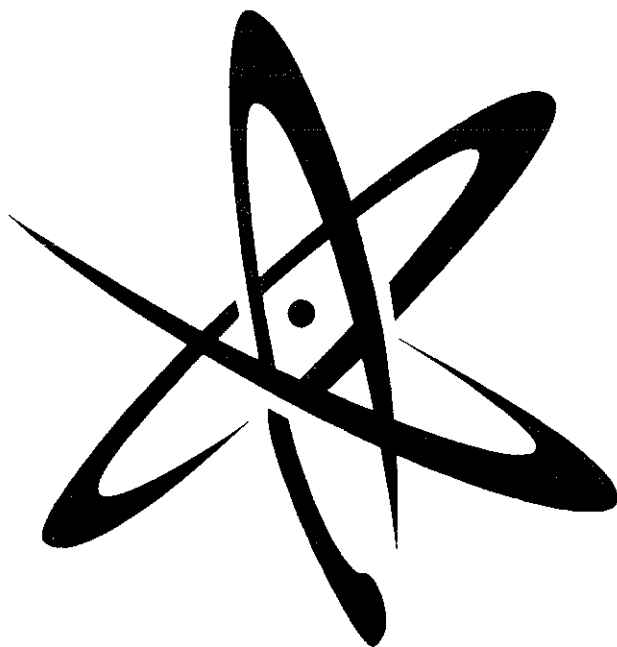


**Grade 12**

**Chemistry**

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**Formulas, Tables, and Charts**



### Solubility Chart

Negative ions	Positive Ions	Solubility
essentially all	alkali ions ( $\text{Li}^+$ , $\text{Na}^+$ , $\text{K}^+$ , $\text{Rb}^+$ , $\text{Cs}^+$ )	soluble
essentially all	hydrogen ion $\text{H}^+_{(\text{aq})}$	soluble
essentially all	ammonium ion ( $\text{NH}_4^+$ )	soluble
nitrate, $\text{NO}_3^-$	essentially all	soluble
acetate, $\text{CH}_3\text{COO}^-$	essentially all (EXCEPT $\text{Ag}^+$ )	soluble
chloride, $\text{Cl}^-$ bromide, $\text{Br}^-$ iodide, $\text{I}^-$	$\text{Ag}^+$ , $\text{Pb}^{2+}$ , $\text{Hg}_2^{2+}$ , $\text{Cu}^+$ , $\text{Tl}^+$	low solubility
	all others	soluble
sulfate, $\text{SO}_4^{2-}$	$\text{Ca}^{2+}$ , $\text{Sr}^{2+}$ , $\text{Ba}^{2+}$ , $\text{Pb}^{2+}$ , $\text{Ra}^{2+}$	low solubility
	all others	soluble
sulfide, $\text{S}^{2-}$	alkali ions, $\text{H}^+_{(\text{aq})}$ , $\text{NH}_4^+$ , $\text{Be}^{2+}$ , $\text{Mg}^{2+}$ , $\text{Ca}^{2+}$ , $\text{Sr}^{2+}$ , $\text{Ba}^{2+}$ , $\text{Ra}^{2+}$	soluble
	all others	low solubility
hydroxide, $\text{OH}^-$	alkali ions, $\text{H}^+_{(\text{aq})}$ , $\text{NH}_4^+$ , $\text{Sr}^{2+}$ , $\text{Ba}^{2+}$ , $\text{Ra}^{2+}$ , $\text{Tl}^+$	soluble
	all others	low solubility
phosphate, $\text{PO}_4^{3-}$ carbonate, $\text{CO}_3^{2-}$ sulfite, $\text{SO}_3^{2-}$	alkali ions, $\text{H}^+_{(\text{aq})}$ , $\text{NH}_4^+$	soluble
	all others	low solubility
chromate, $\text{CrO}_4^{2-}$	$\text{Ba}^{2+}$ , $\text{Sr}^{2+}$ , $\text{Pb}^{2+}$ , $\text{Ag}^+$	low solubility
	all others	soluble

$$n_{e^-} = \frac{It}{96500 \frac{\text{C}}{\text{mole}^-}}$$

where:  $n_{e^-}$  = moles of electrons  
 $I$  = current  
 $t$  = time

## Relative Strengths of Acids

\* Acids 1.0 mol/L in water at 25°C

<u>Acid</u>	<u>Reaction</u>	<u>K<sub>a</sub></u>
Perchloric acid	$\text{HClO}_4 + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{ClO}_4^-$	very large
Hydriodic acid	$\text{HI} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{I}^-$	very large
Hydrobromic acid	$\text{HBr} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{Br}^-$	very large
Hydrochloric acid	$\text{HCl} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{Cl}^-$	very large
Nitric acid	$\text{HNO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{NO}_3^-$	very large
Sulfuric acid	$\text{H}_2\text{SO}_4 + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{HSO}_4^-$	very large
Oxalic acid	$\text{H}_2\text{C}_2\text{O}_4 + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{HC}_2\text{O}_4^-$	$5.4 \times 10^{-2}$
Sulfurous acid	$\text{H}_2\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{HSO}_3^-$	$1.7 \times 10^{-2}$
Hydrogen sulfate ion	$\text{HSO}_4^- + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{SO}_4^{2-}$	$1.3 \times 10^{-2}$
Phosphoric acid	$\text{H}_3\text{PO}_4 + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{H}_2\text{PO}_4^-$	$7.1 \times 10^{-3}$
Ferric ion	$\text{Fe}(\text{H}_2\text{O})_6^{3+} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{Fe}(\text{H}_2\text{O})_5(\text{OH})^{2+}$	$6.0 \times 10^{-3}$
Hydrogen telluride	$\text{H}_2\text{Te} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{HTe}^-$	$2.3 \times 10^{-3}$
Hydrofluoric acid	$\text{HF} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{F}^-$	$6.7 \times 10^{-4}$
Nitrous acid	$\text{HNO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{NO}_2^-$	$5.1 \times 10^{-4}$
Hydrogen selenide	$\text{H}_2\text{Se} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{HSe}^-$	$1.7 \times 10^{-4}$
Chromic ion	$\text{Cr}(\text{H}_2\text{O})_6^{3+} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{Cr}(\text{H}_2\text{O})_5(\text{OH})^{2+}$	$1.5 \times 10^{-4}$
Benzoic acid	$\text{C}_6\text{H}_5\text{COOH} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{C}_6\text{H}_5\text{COO}^-$	$6.6 \times 10^{-5}$
Hydrogen oxalate ion	$\text{HC}_2\text{O}_4^- + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{C}_2\text{O}_4^{2-}$	$5.4 \times 10^{-5}$
Acetic acid	$\text{HC}_2\text{H}_3\text{O}_2 + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{C}_2\text{H}_3\text{O}_2^-$	$1.8 \times 10^{-5}$
Aluminum ion	$\text{Al}(\text{H}_2\text{O})_6^{3+} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{Al}(\text{H}_2\text{O})_5(\text{OH})^{2+}$	$1.4 \times 10^{-5}$
Carbonic acid	$\text{H}_2\text{CO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{HCO}_3^-$	$4.4 \times 10^{-7}$
Hydrogen sulfide	$\text{H}_2\text{S} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{HS}^-$	$1.0 \times 10^{-7}$
Dihydrogen phosphate ion	$\text{H}_2\text{PO}_4^- + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{HPO}_4^{2-}$	$6.3 \times 10^{-8}$
Hydrogen sulfite ion	$\text{HSO}_3^- + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{SO}_3^{2-}$	$6.2 \times 10^{-8}$
Ammonium ion	$\text{NH}_4^+ + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{NH}_3$	$5.7 \times 10^{-10}$
Hydrogen carbonate ion	$\text{HCO}_3^- + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{CO}_3^{2-}$	$4.7 \times 10^{-11}$
Hydrogen telluride ion	$\text{HTe}^- + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{Te}^{2-}$	$1.0 \times 10^{-11}$
Hydrogen peroxide	$\text{H}_2\text{O}_2 + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{HO}_2^-$	$2.4 \times 10^{-12}$
Monohydrogen phosphate	$\text{HPO}_4^{2-} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{PO}_4^{3-}$	$4.4 \times 10^{-13}$
Hydrogen sulfide ion	$\text{HS}^- + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{S}^{2-}$	$1.2 \times 10^{-15}$
Water	$\text{H}_2\text{O} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{OH}^-$	$1.8 \times 10^{-16}$
Hydroxide ion	$\text{OH}^- + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{O}^{2-}$	$< 10^{-36}$
Ammonia	$\text{NH}_3 + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{NH}_2^-$	very small

## Standard Reduction Potentials

All values are for 1.0 M aqueous solutions at 25°C

<u>Half-Reaction</u>	<u>E°(volts)</u>
$F_2(g) + 2e^- \rightarrow 2 F^-$	+2.87
$H_2O_2 + 2 H^+ + 2e^- \rightarrow 2 H_2O$	+1.77
$MnO_4^- + 8 H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$	+1.52
$Au^{3+} + 3e^- \rightarrow Au(s)$	+1.50
$Cl_2(g) + 2e^- \rightarrow 2 Cl^-$	+1.36
$Cr_2O_7^{2-} + 14 H^+ + 6e^- \rightarrow 2 Cr^{3+} + 7H_2O$	+1.33
$MnO_2(s) + 4 H^+ + 2e^- \rightarrow Mn^{2+} + 2H_2O$	+1.28
$1/2 O_2(g) + 2 H^+ + 2e^- \rightarrow H_2O$	+1.23
$Br_2(g) + 2e^- \rightarrow 2 Br^-$	+1.06
$AuCl_4^- + 3e^- \rightarrow Au(s) + 4 Cl^-$	+1.00
$NO_3^- + 4H^+ + 3e^- \rightarrow NO(g) + 2 H_2O$	+0.96
$Ag^+ + e^- \rightarrow Ag(s)$	+0.80
$1/2 Hg_2^{2+} + e^- \rightarrow Hg(l)$	+0.79
$Hg^{2+} + 2e^- \rightarrow Hg(l)$	+0.78
$NO_3^- + 2 H^+ + e^- \rightarrow NO_2(g) + H_2O$	+0.78
$Fe^{3+} + e^- \rightarrow Fe^{2+}$	+0.77
$O_2(g) + 2 H^+ + 2e^- \rightarrow H_2O_2$	+0.68
$I_2(s) + 2e^- \rightarrow 2 I^-$	+0.53
$Cu^+ + e^- \rightarrow Cu(s)$	+0.52
$Cu^{2+} + 2e^- \rightarrow Cu(s)$	+0.34
$SO_4^{2-} + 4 H^+ + 2e^- \rightarrow SO_2(g) + 2H_2O$	+0.17
$Cu^{2+} + e^- \rightarrow Cu^+$	+0.15
$Sn^{4+} + 2e^- \rightarrow Sn^{2+}$	+0.15
$S + 2 H^+ + 2e^- \rightarrow H_2S(g)$	+0.14
$2 H^+ + 2e^- \rightarrow H_2(g)$	0.00
$Pb^{2+} + 2e^- \rightarrow Pb(s)$	-0.13
$Sn^{2+} + 2e^- \rightarrow Sn(s)$	-0.14
$Ni^{2+} + 2e^- \rightarrow Ni(s)$	-0.25
$Co^{2+} + 2e^- \rightarrow Co(s)$	-0.28
$Se + 2 H^+ + 2e^- \rightarrow H_2Se(g)$	-0.40
$Cr^{3+} + e^- \rightarrow Cr^{2+}$	-0.41
$Fe^{2+} + 2e^- \rightarrow Fe(s)$	-0.44
$Cr^{2+} + 2e^- \rightarrow Cr(s)$	-0.56
$Ag_2S + 2e^- \rightarrow 2 Ag(s) + S^{2-}$	-0.69
$Te + 2 H^+ + 2e^- \rightarrow H_2Te(g)$	-0.72
$Cr^{3+} + 3e^- \rightarrow Cr(s)$	-0.74
$Zn^{2+} + 2e^- \rightarrow Zn(s)$	-0.76
$2 H_2O + 2e^- \rightarrow 2 OH^- + H_2(g)$	-0.83
$Mn^{2+} + 2e^- \rightarrow Mn(s)$	-1.18
$Al^{3+} + 3e^- \rightarrow Al(s)$	-1.66
$Mg^{2+} + 2e^- \rightarrow Mg(s)$	-2.37
$Na^+ + e^- \rightarrow Na(s)$	-2.71
$Ca^{2+} + 2e^- \rightarrow Ca(s)$	-2.87
$Sr^{2+} + 2e^- \rightarrow Sr(s)$	-2.89
$Ba^{2+} + 2e^- \rightarrow Ba(s)$	-2.90
$Cs^+ + e^- \rightarrow Cs(s)$	-2.92
$K^+ + e^- \rightarrow K(s)$	-2.92
$Rb^+ + e^- \rightarrow Rb(s)$	-2.92
$Li^+ + e^- \rightarrow Li(s)$	-3.00

GROUP

Periodic Table of Elements

NONMETALS

NOBLE GASES

PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	I A	II A	III B	IV B	V B	VI B	VII B	VIII B			I B	IV B	III A	IV A	V A	VI A	VII A	VIII A

key:  
 element name  
 atomic number  
 element symbol  
 ionic charge (top; most common)  
 atomic weight (mean relative mass)

blue = solid  
 orange = gas  
 orange = liquid

key:  
 METALS

TRANSITION ELEMENTS

1 hydrogen 1 H <sup>+</sup> 1.00794(7)	2 beryllium 4 Be <sup>2+</sup> 9.012182(3)	3 lithium 3 Li <sup>+</sup> 6.941(2)	4 boron 5 B 10.811(7)	5 beryllium 4 Be <sup>2+</sup> 9.012182(3)	6 boron 5 B 10.811(7)	7 lithium 3 Li <sup>+</sup> 6.941(2)	8 beryllium 4 Be <sup>2+</sup> 9.012182(3)	9 boron 5 B 10.811(7)	10 carbon 6 C 12.0107(8)	11 nitrogen 7 N <sup>-3</sup> 14.00674(7)	12 oxygen 8 O <sup>-2</sup> 15.9994(3)	13 fluorine 9 F 18.9984032(5)	14 neon 10 Ne 20.1797(6)	15 sodium 11 Na <sup>+</sup> 22.989770(2)	16 magnesium 12 Mg <sup>2+</sup> 24.3050(6)	17 aluminum 13 Al <sup>3+</sup> 26.981538(2)	18 silicon 14 Si 28.0855(3)	19 phosphorus 15 P <sup>-3</sup> 30.973761(2)	20 sulfur 16 S <sup>-2</sup> 32.066(6)	21 chlorine 17 Cl 35.4527(9)	22 argon 18 Ar 39.948(1)	23 potassium 19 K <sup>+</sup> 39.0983(1)	24 calcium 20 Ca <sup>2+</sup> 40.078(4)	25 scandium 21 Sc <sup>3+</sup> 44.955910(8)	26 titanium 22 Ti <sup>4+</sup> 47.867(1)	27 vanadium 23 V <sup>3+</sup> 50.9415(1)	28 chromium 24 Cr <sup>3+</sup> 51.9961(6)	29 manganese 25 Mn <sup>2+</sup> 54.938049(9)	30 iron 26 Fe <sup>2+</sup> 55.845(2)	31 cobalt 27 Co <sup>3+</sup> 58.933200(9)	32 nickel 28 Ni <sup>2+</sup> 58.6934(2)	33 copper 29 Cu <sup>2+</sup> 63.546(3)	34 zinc 30 Zn <sup>2+</sup> 65.39(2)	35 gallium 31 Ga <sup>3+</sup> 69.723(1)	36 germanium 32 Ge <sup>4+</sup> 72.61(2)	37 arsenic 33 As <sup>-3</sup> 74.92160(2)	38 selenium 34 Se <sup>-2</sup> 78.96(3)	39 bromine 35 Br 79.904(1)	40 krypton 36 Kr 83.80(1)	41 rubidium 37 Rb <sup>+</sup> 85.4678(3)	42 strontium 38 Sr <sup>2+</sup> 87.62(1)	43 yttrium 39 Y 88.90585(2)	44 zirconium 40 Zr 91.224(2)	45 niobium 41 Nb 92.90638(2)	46 molybdenum 42 Mo 95.94(1)	47 technetium 43 Tc 98.9063	48 ruthenium 44 Ru 101.07(2)	49 rhodium 45 Rh 102.90550(2)	50 palladium 46 Pd <sup>2+</sup> 106.42(1)	51 silver 47 Ag <sup>+</sup> 107.8682(2)	52 cadmium 48 Cd <sup>2+</sup> 112.411(8)	53 indium 49 In <sup>3+</sup> 114.818(3)	54 tin 50 Sn <sup>2+</sup> 118.710(7)	55 antimony 51 Sb <sup>3+</sup> 121.760(1)	56 tellurium 52 Te <sup>-2</sup> 127.60(3)	57 iodine 53 I 126.90447(3)	58 xenon 54 Xe 131.29(2)	59 cesium 55 Cs <sup>+</sup> 132.90545(2)	60 barium 56 Ba <sup>2+</sup> 137.327(7)	61 lanthanum 57 La 138.90547(2)	62 praseodymium 59 Pr <sup>3+</sup> 140.90765(2)	63 cerium 58 Ce <sup>3+</sup> 140.116(1)	64 gadolinium 64 Gd <sup>3+</sup> 157.25(3)	65 terbium 65 Tb <sup>3+</sup> 158.92534(2)	66 dysprosium 66 Dy <sup>3+</sup> 164.93032(2)	67 holmium 67 Ho <sup>3+</sup> 164.93032(2)	68 erbium 68 Er <sup>3+</sup> 167.26(3)	69 thulium 69 Tm <sup>3+</sup> 168.93421(2)	70 ytterbium 70 Yb <sup>3+</sup> 173.04(3)	71 lutetium 71 Lu <sup>3+</sup> 174.967(1)	72 hafnium 72 Hf 178.49(2)	73 tantalum 73 Ta 180.9479(1)	74 tungsten 74 W 183.84(1)	75 rhenium 75 Re 186.207(1)	76 osmium 76 Os 190.23(3)	77 iridium 77 Ir 192.2217(3)	78 platinum 78 Pt <sup>2+</sup> 195.078(2)	79 gold 79 Au <sup>3+</sup> 196.96657(2)	80 mercury 80 Hg <sup>2+</sup> 200.59(2)	81 thallium 81 Tl <sup>3+</sup> 204.3833(2)	82 lead 82 Pb <sup>2+</sup> 207.2(1)	83 bismuth 83 Bi <sup>3+</sup> 208.98038(2)	84 polonium 84 Po <sup>4+</sup> 208.9824	85 astatine 85 At 209.98711	86 radon 86 Rn 222.01761	87 francium 87 Fr <sup>+</sup> (223)	88 radium 88 Ra <sup>2+</sup> (226.0254)	89-102 actinoids	89 actinium 89 Ac <sup>3+</sup> (227)	90 thorium 90 Th <sup>4+</sup> (232.0377)	91 protactinium 91 Pa <sup>3+</sup> (231.03688)	92 uranium 92 U <sup>6+</sup> (238.02891)	93 neptunium 93 Np <sup>5+</sup> (237.04817)	94 plutonium 94 Pu <sup>6+</sup> (244.0642)	95 americium 95 Am <sup>3+</sup> (243.0614)	96 curium 96 Cm <sup>3+</sup> (247.0703)	97 berkelium 97 Bk <sup>3+</sup> (247.0703)	98 californium 98 Cf <sup>4+</sup> (251.0796)	99 einsteinium 99 Es (252.0830)	100 fermium 100 Fm (257.0951)	101 mendelevium 101 Md (258.10)	102 nobelium 102 No (259.1011)
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RARE EARTH ELEMENTS

lanthanum 57 La 138.90547(2)	cerium 58 Ce <sup>3+</sup> 140.116(1)	praseodymium 59 Pr <sup>3+</sup> 140.90765(2)	neodymium 60 Nd <sup>3+</sup> 144.24(3)	promethium 61 Pm (144.9127)	europium 63 Eu <sup>2+</sup> 151.964(1)	gadolinium 64 Gd <sup>3+</sup> 157.25(3)	terbium 65 Tb <sup>3+</sup> 158.92534(2)	dysprosium 66 Dy <sup>3+</sup> 162.50(3)	holmium 67 Ho <sup>3+</sup> 164.93032(2)	erbium 68 Er <sup>3+</sup> 167.26(3)	thulium 69 Tm <sup>3+</sup> 168.93421(2)	ytterbium 70 Yb <sup>3+</sup> 173.04(3)	lutetium 71 Lu <sup>3+</sup> 174.967(1)	hafnium 72 Hf 178.49(2)	tantalum 73 Ta 180.9479(1)	tungsten 74 W 183.84(1)	rhenium 75 Re 186.207(1)	osmium 76 Os 190.23(3)	iridium 77 Ir 192.2217(3)	platinum 78 Pt <sup>2+</sup> 195.078(2)	gold 79 Au <sup>3+</sup> 196.96657(2)	mercury 80 Hg <sup>2+</sup> 200.59(2)	thallium 81 Tl <sup>3+</sup> 204.3833(2)	lead 82 Pb <sup>2+</sup> 207.2(1)	bismuth 83 Bi <sup>3+</sup> 208.98038(2)	polonium 84 Po <sup>4+</sup> 208.9824	astatine 85 At 209.98711	radon 86 Rn 222.01761
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Notes: Names have not been assigned to elements 110-112, 114, 116, and 118, so those used are temporary. When the atomic weight is enclosed in brackets, the element's weight is represented by one of the element's most stable isotopes, and no mass data are available.

## Names, Formulas, and Charges of Common Ions

### POSITIVE IONS (CATIONS)

Name	Symbol	Name	Symbol
aluminum	Al <sup>3+</sup>	lithium	Li <sup>+</sup>
ammonium	NH <sub>4</sub> <sup>+</sup>	magnesium	Mg <sup>2+</sup>
barium	Ba <sup>2+</sup>	manganese(II)	Mn <sup>2+</sup>
cadmium	Cd <sup>2+</sup>	manganese(IV)	Mn <sup>4+</sup>
calcium	Ca <sup>2+</sup>	mercury(I)	Hg <sub>2</sub> <sup>2+</sup>
chromium(II)	Cr <sup>2+</sup>	mercury(II)	Hg <sup>2+</sup>
chromium(III)	Cr <sup>3+</sup>	nickel(II)	Ni <sup>2+</sup>
copper(I)	Cu <sup>+</sup>	potassium	K <sup>+</sup>
copper(II)	Cu <sup>2+</sup>	silver	Ag <sup>+</sup>
hydrogen,	H <sup>+</sup>	sodium	Na <sup>+</sup>
iron(II)	Fe <sup>2+</sup>	strontium	Sr <sup>2+</sup>
iron(III)	Fe <sup>3+</sup>	tin(II)	Sn <sup>2+</sup>
lead(II)	Pb <sup>2+</sup>	tin(IV)	Sn <sup>4+</sup>
lead(IV)	Pb <sup>4+</sup>	zinc	Zn <sup>2+</sup>

### NEGATIVE IONS (ANIONS)

Name	Symbol	Name	Symbol
acetate	C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> <sup>-</sup> (CH <sub>3</sub> COO <sup>-</sup> )	nitrate	NO <sub>3</sub> <sup>-</sup>
azide	N <sub>3</sub> <sup>-</sup>	nitride	N <sup>3-</sup>
bromide	Br <sup>-</sup>	nitrite	NO <sub>2</sub> <sup>-</sup>
bromate	BrO <sub>3</sub> <sup>-</sup>	oxalate	C <sub>2</sub> O <sub>4</sub> <sup>2-</sup>
carbonate	CO <sub>3</sub> <sup>2-</sup>	hydrogen oxalate	H C <sub>2</sub> O <sub>4</sub> <sup>-</sup>
hydride	H <sup>-</sup>	oxide	O <sup>2-</sup>
hydrogen carbonate	HCO <sub>3</sub> <sup>-</sup>	perchlorate	ClO <sub>4</sub> <sup>-</sup>
chlorate	ClO <sub>3</sub> <sup>-</sup>	permanganate	MnO <sub>4</sub> <sup>-</sup>
chloride (bicarbonate)	Cl <sup>-</sup>	phosphate	PO <sub>4</sub> <sup>3-</sup>
chlorite	ClO <sub>2</sub> <sup>-</sup>	monohydrogen phosphate	HPO <sub>4</sub> <sup>2-</sup>
chromate	CrO <sub>4</sub> <sup>2-</sup>	dihydrogen phosphate	H <sub>2</sub> PO <sub>4</sub> <sup>-</sup>
citrate	C <sub>6</sub> H <sub>5</sub> O <sub>7</sub> <sup>3-</sup>	silicate	SiO <sub>3</sub> <sup>2-</sup>
cyanide	CN <sup>-</sup>	sulfate (sulphate)	SO <sub>4</sub> <sup>2-</sup>
dichromate	Cr <sub>2</sub> O <sub>7</sub> <sup>2-</sup> (bisulfate)	hydrogen sulfate (sulphate)	HSO <sub>4</sub> <sup>-</sup>
fluoride	F <sup>-</sup>	sulfide (sulphide)	S <sup>2-</sup>
hydroxide	OH <sup>-</sup> (bisulfide)	hydrogen sulfide (sulphide)	HS <sup>-</sup>
hypochlorite	ClO <sup>-</sup>	sulfite (sulphite)	SO <sub>3</sub> <sup>2-</sup>
iodide	I <sup>-</sup> (bisulfite)	hydrogen sulfite (sulphite)	HSO <sub>3</sub> <sup>-</sup>
iodate	IO <sub>3</sub> <sup>-</sup>	thiocyanate	SCN <sup>-</sup>