

### Common Nonmetallic ROOTS

H = hydr-	B = bor-
C = carb-	N = nitr-
O = ox-	F = fluor-
Si = silic-	P = phosph-
S = sulf-	Cl = chlor-
As = arsen-	Se = selen-
Br = brom-	Sb = antimony-
I = iod-	



### Common NONMETAL Ions

S <sup>2-</sup> sulfide	Br <sup>1-</sup> bromide
F <sup>1-</sup> fluoride	H <sup>1-</sup> hydride
Cl <sup>1-</sup> chloride	I <sup>1-</sup> iodide
P <sup>3-</sup> phosphide	O <sup>2-</sup> oxide
N <sup>3-</sup> nitride	Se <sup>2-</sup> selenide

### Greek PREFIXES

mono- one	hexa- six
di- two	hepta- seven
tri- three	octa- eight
tetra- four	nona- nine
penta- five	deca- ten

### Common METAL Ions

Cu <sup>+</sup> copper (I) (cuprous)	Mn <sup>2+</sup> manganese (II)
Cu <sup>2+</sup> copper (II) (cupric)	Ni <sup>2+</sup> nickel (II)
Fe <sup>2+</sup> iron (II) (ferrous)	Cr <sup>2+</sup> chromium (II)
Fe <sup>3+</sup> iron (III) (ferric)	Cr <sup>3+</sup> chromium (III)
Hg <sub>2</sub> <sup>2+</sup> mercury (I) (mercurious)	Co <sup>2+</sup> cobalt (II)
Hg <sup>2+</sup> mercury (II) (mercuric)	
Pb <sup>2+</sup> lead (II) (plumbous)	
Pb <sup>4+</sup> lead (IV) (plumbic)	
Sn <sup>2+</sup> tin (II) (stannous)	
Sn <sup>4+</sup> tin (IV) (stannic)	

### Polyatomic Ions

BO <sub>3</sub> <sup>3-</sup> borate ion	
BrO <sub>3</sub> <sup>-</sup> bromate ion	
BrO <sub>4</sub> <sup>-</sup> perbromate	
B <sub>4</sub> O <sub>7</sub> <sup>2-</sup> tetraborate	
C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> <sup>-</sup> acetate ion (CH <sub>3</sub> COO <sup>-</sup> )	
C <sub>6</sub> H <sub>5</sub> O <sub>7</sub> <sup>3-</sup> citrate ion	
ClO <sup>-</sup> hypochlorite ion	
ClO <sub>2</sub> <sup>-</sup> chlorite ion	
ClO <sub>3</sub> <sup>-</sup> chlorate ion	
ClO <sub>4</sub> <sup>-</sup> perchlorate ion	
CN <sup>-</sup> cyanide ion	
CO <sub>3</sub> <sup>2-</sup> carbonate ion	
C <sub>2</sub> O <sub>4</sub> <sup>2-</sup> oxalate ion	
CrO <sub>4</sub> <sup>2-</sup> chromate ion	
Cr <sub>2</sub> O <sub>7</sub> <sup>2-</sup> dichromate ion	
HPO <sub>4</sub> <sup>2-</sup> hydrogen phosphate ion	
HSO <sub>4</sub> <sup>-</sup> hydrogen sulfate ion	
HCO <sub>3</sub> <sup>-</sup> hydrogen carbonate ion	
H <sub>2</sub> PO <sub>4</sub> <sup>-</sup> dihydrogen phosphate ion	
IO <sup>-</sup> hypiodite ion	
IO <sub>2</sub> <sup>-</sup> iodite ion	
IO <sub>3</sub> <sup>-</sup> iodate ion	
IO <sub>4</sub> <sup>-</sup> periodate ion	
MnO <sub>4</sub> <sup>-</sup> permanganate ion	
NH <sub>4</sub> <sup>+</sup> ammonium ion	SeO <sub>3</sub> <sup>2-</sup> selenite ion
NO <sub>2</sub> <sup>-</sup> nitrite ion	SeO <sub>4</sub> <sup>2-</sup> selenate ion
NO <sub>3</sub> <sup>-</sup> nitrate ion	SiO <sub>4</sub> <sup>4-</sup> silicate ion
O <sub>2</sub> <sup>2-</sup> peroxide ion	S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> thiosulfate ion
OH <sup>-</sup> hydroxide ion	SO <sub>3</sub> <sup>2-</sup> sulfite ion
PO <sub>3</sub> <sup>3-</sup> phosphite ion	SO <sub>4</sub> <sup>2-</sup> sulfate ion
PO <sub>4</sub> <sup>3-</sup> phosphate ion	SCN <sup>-</sup> thiocyanate ion

## Solubility Rules

**Rule #1** – All alkali metal compounds are soluble.

**Rule #2** – All ammonium salts are soluble.

**Rule #3** – All nitrate, chlorate, acetate and perchlorate salts are soluble.

**Rule #4** – All chloride, bromide and iodide salts are soluble.

EXCEPT –  $\text{Ag}^+$ ,  $\text{Hg}_2^{2+}$ ,  $\text{Pb}_2^{2+}$

**Rule #5** – All sulfates are soluble.

EXCEPT –  $\text{Ba}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Hg}_2^{2+}$ ,  $\text{Pb}_2^{2+}$

**Rule #6** – All hydroxides are insoluble.

EXCEPT –  $\text{Ba}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ , alkali metals

**Rule #7** – All sulfides are insoluble.

EXCEPT – alkali metals and alkaline earth metals

**Rule #8** – All sulfites, carbonates, chromates and phosphates are insoluble.

EXCEPT –  $\text{NH}_4^+$ , alkali metals

*“like dissolves like”*

## Activity Series for Metals

Potassium	$\text{K}^+$	↑ INCREASING REACTIVITY
Sodium	$\text{Na}^+$	
Lithium	$\text{Li}^+$	
Barium	$\text{Ba}^{2+}$	
Strontium	$\text{Sr}^{2+}$	
Calcium	$\text{Ca}^{2+}$	
Magnesium	$\text{Mg}^{2+}$	
Aluminum	$\text{Al}^{3+}$	
Manganese	$\text{Mn}^{2+}$	
Zinc	$\text{Zn}^{2+}$	
Chromium	$\text{Cr}^{2+}$	
Iron	$\text{Fe}^{2+}$	
Cadmium	$\text{Cd}^{2+}$	
Cobalt	$\text{Co}^{2+}$	
Nickel	$\text{Ni}^{2+}$	
Tin	$\text{Sn}^{2+}$	
Lead	$\text{Pb}^{2+}$	
Hydrogen	$\text{H}^+$ (comparison)	↑
Antimony	$\text{Sb}^{2+}$	
Bismuth	$\text{Bi}^{2+}$	
Copper	$\text{Cu}^{2+}$	
Mercury	$\text{Hg}^{2+}$	
Silver	$\text{Ag}^+$	
Platinum	$\text{Pt}^+$	

H		Electron Affinity										He	
-72													(21)
Li	Be (241)	B	C	N	O	F	Ne	-23	-122	0	-142	-322	(29)
-60		Al	Si	P	S	Cl	Ar	-44	-119	-74	-200	-348	(35)
-53	Mg (231)	Ga	Ge	As	Se	Br	Kr	(-36)	-116	-77	-194	-323	(39)
-48	Ca (156)	In	Sn	Sb	Te	I	Xe	(-34)	-120	-101	-190	-295	(40)
-47	Sr (119)	Tl	Pb	Bi	Po	At	Rn	(-48)	-101	-101	(-173)	(-270)	(40)
-45	Ba (52)												

H		Electronegativity																He																	
2.20																		n.a.																	
Li	Be	B	C	N	O	F	Ne	0.98	1.57	2.04	2.55	3.04	3.44	3.98	n.a.																				
Na	Mg	Al	Si	P	S	Cl	Ar	0.93	1.31	1.61	1.90	2.19	2.58	3.16	n.a.																				
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	0.82	1.00	1.36	1.54	1.63	1.66	1.55	1.83	1.88	1.91	1.90	1.65	1.81	2.01	2.18	2.55	2.96	3.00
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	0.82	0.95	1.22	1.33	1.60	2.16	1.90	2.20	2.28	2.20	1.93	1.69	1.78	1.96	2.05	2.10	2.66	2.60
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	0.79	0.89	1.10	1.30	1.50	2.36	1.90	2.20	2.20	2.28	2.54	2.00	1.62	2.33	2.02	2.00	2.20	n.a.
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Uub	—	Uuq	—	—	—	—	0.70	0.89	1.10	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	

