

Achieve the smallest whole number ratio of cations to anions

Name of cation + name of anion + ide  
metal nonmetal

<b>I A</b>																								<b>VIA</b>								<b>He</b>			
<b>H</b> 1 1.008		<b>IIA</b>																						<b>III A</b>		<b>IV A</b>		<b>V A</b>		<b>VIA</b>		<b>VII A</b>		<b>He</b> 4 4.003	
<b>Li</b> 3 6.941		<b>Be</b> 4 9.012																						<b>B</b> 5 10.81		<b>C</b> 6 12.01		<b>N</b> 7 14.01		<b>O</b> 8 16.00		<b>F</b> 9 19.00		<b>Ne</b> 10 20.18	
<b>Na</b> 11 22.99		<b>Mg</b> 12 24.31																						<b>Al</b> 13 26.98		<b>Si</b> 14 28.09		<b>P</b> 15 30.97		<b>S</b> 16 32.06		<b>Cl</b> 17 35.45		<b>Ar</b> 18 39.95	
<b>K</b> 19 39.10		<b>Ca</b> 20 40.08		<b>Sc</b> 21 44.96		<b>Ti</b> 22 47.88		<b>V</b> 23 50.94		<b>Cr</b> 24 52.00		<b>Mn</b> 25 54.94		<b>Fe</b> 26 55.85		<b>Co</b> 27 58.93		<b>Ni</b> 28 58.71		<b>Cu</b> 29 63.55		<b>Zn</b> 30 65.38		<b>Ga</b> 31 69.72		<b>Ge</b> 32 72.64		<b>As</b> 33 74.92		<b>Se</b> 34 78.96		<b>Br</b> 35 79.90		<b>Kr</b> 36 83.80	
<b>Rb</b> 37 85.47		<b>Sr</b> 38 87.62		<b>Y</b> 39 88.91		<b>Zr</b> 40 91.22		<b>Nb</b> 41 92.91		<b>Mo</b> 42 95.94		<b>Tc</b> 43 98.91		<b>Ru</b> 44 101.1		<b>Rh</b> 45 102.9		<b>Pd</b> 46 106.4		<b>Ag</b> 47 107.9		<b>Cd</b> 48 112.4		<b>In</b> 49 114.8		<b>Sn</b> 50 118.7		<b>Sb</b> 51 121.8		<b>Te</b> 52 127.6		<b>I</b> 53 126.9		<b>Xe</b> 54 131.3	
<b>Cs</b> 55 132.9		<b>Ba</b> 56 137.3		<b>La</b> 57 138.9		<b>Hf</b> 72 178.5		<b>Ta</b> 73 180.9		<b>W</b> 74 183.8		<b>Re</b> 75 186.2		<b>Os</b> 76 190.2		<b>Ir</b> 77 192.2		<b>Pt</b> 78 195.1		<b>Au</b> 79 197.0		<b>Hg</b> 80 200.6		<b>Tl</b> 81 204.4		<b>Pb</b> 82 207.2		<b>Bi</b> 83 209.0		<b>Po</b> 84 (210)		<b>At</b> 85 210		<b>Rn</b> 86 222	
<b>Fr</b> 87 (223)		<b>Ra</b> 88 226.0		<b>Ac</b> 89 227.0																															

Periodic Table of Elements  
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Metal	Nonmetal	Formula	Name
Na	Cl	NaCl	Sodium chloride
Ca	O	CaO	Calcium oxide
K	S	K <sub>2</sub> S	Potassium sulfide
Sr	F	SrF <sub>2</sub>	Strontium fluoride

## Metals that form more than one type of cation

Binary compounds containing a metal that forms more than one type of cation:

Name of cation (charge) +  
Name of anion + ide

Metal	Ion	Name
Chromium	Cr <sup>2+</sup> Cr <sup>3+</sup>	Chromium(II) Chromium(III)
Iron	Fe <sup>2+</sup> Fe <sup>3+</sup>	Iron(II) Iron(III)
Cobalt	Co <sup>2+</sup> Co <sup>3+</sup>	Cobalt(II) Cobalt(III)
Copper	Cu <sup>+</sup> Cu <sup>2+</sup>	Copper(I) Copper(II)
Tin	Sn <sup>2+</sup> Sn <sup>4+</sup>	Tin(II) Tin(IV)
Mercury	Hg <sub>2</sub> <sup>2+</sup> Hg <sup>2+</sup>	Mercury(I) Mercury(II)
Lead	Pb <sup>2+</sup> Pb <sup>4+</sup>	Lead(II) Lead(IV)

Metal	Nonmetal
Fe	O
Cu	I

Formula	Name
FeO	Iron (II) oxide
Fe <sub>2</sub> O <sub>3</sub>	Iron (III) oxide
CuI	Copper (I) iodide
CuI <sub>2</sub>	Copper (II) iodide

## Polyatomic Ions oxyanions

TABLE 3.4 ■ Some Common Polyatomic Ions

Name	Formula	Name	Formula
Acetate	C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> <sup>-</sup>	Hypochlorite	ClO <sup>-</sup>
Carbonate	CO <sub>3</sub> <sup>2-</sup>	Chlorite	ClO <sub>2</sub> <sup>-</sup>
Hydrogen carbonate (or bicarbonate)	HCO <sub>3</sub> <sup>-</sup>	Chlorate	ClO <sub>3</sub> <sup>-</sup>
Hydroxide	OH <sup>-</sup>	Perchlorate	ClO <sub>4</sub> <sup>-</sup>
Nitrite	NO <sub>2</sub> <sup>-</sup>	Permanganate	MnO <sub>4</sub> <sup>-</sup>
Nitrate	NO <sub>3</sub> <sup>-</sup>	Sulfite	SO <sub>3</sub> <sup>2-</sup>
Chromate	CrO <sub>4</sub> <sup>2-</sup>	Hydrogen sulfite (or bisulfite)	HSO <sub>3</sub>
Dichromate	Cr <sub>2</sub> O <sub>7</sub> <sup>2-</sup>	Sulfate	SO <sub>4</sub> <sup>2-</sup>
Phosphate	PO <sub>4</sub> <sup>3-</sup>	Hydrogen sulfate (or bisulfate)	HSO <sub>4</sub>
Hydrogen phosphate	HPO <sub>4</sub> <sup>2-</sup>	Cyanide	CN <sup>-</sup>
Dihydrogen phosphate	H <sub>2</sub> PO <sub>4</sub>	Peroxide	O <sub>2</sub> <sup>2-</sup>
Ammonium	NH <sub>4</sub> <sup>+</sup>		

## Naming Polyatomic Ions

4A	5A	6A	7A
$\text{C}$ $\text{CO}_3^{2-}$ Carbonate $\text{C}_2\text{O}_4^{2-}$ Oxalate	$\text{N}$ $\text{NO}_2^-$ Nitrite $\text{NO}_3^-$ Nitrate	$\text{O}$	$\text{ClO}^-$ Hypochlorite
$\text{HCO}_3^-$ Bicarbonate	$\text{P}$ $\text{PO}_4^{3-}$ Phosphate	$\text{S}$ $\text{SO}_3^{2-}$ Sulfite $\text{SO}_4^{2-}$ Sulfate $\text{S}_2\text{O}_3^{2-}$ Thiosulfate	$\text{Cl}$ $\text{ClO}_2^-$ Chlorite $\text{ClO}_3^-$ Chlorate $\text{ClO}_4^-$ Perchlorate

\*When there are two oxyanions for an element, the one with the smaller number of oxygens ends in *-ite*, and the one with the largest number of oxygens ends in *-ate*.  
 \*\*When there are more than two oxyanions for an element the one with the smallest number of oxygens begins with *hypo-*, and the one with the largest number of oxygen atoms begins with *per-*.

### Naming ionic compounds containing polyatomic ions

Name of cation + name of anion

$\text{Na}_2\text{SO}_4$  Sodium sulfate

$\text{Ca}_3(\text{PO}_4)_2$  Calcium phosphate