

# Outline for Today

## Monday, Sept. 17

- Chapter 2: Atoms, Molecules, and Ions
  - Ions and Ionic Compounds
  - Naming Inorganic Compounds
- Chapter 3: Stoichiometry: Calculations with Chemical Formulas and Equations
  - Balancing Chemical Reactions

# Rules for Naming Inorganic Compounds

## Cations

1. Cations formed from metal atoms have the **same name** as the metal. Ends with *ion*.
2. If a metal can form cations with different charges, **indicate positive charge** with a Roman numeral after the metal.
3. Cations formed from nonmetal atoms end in *-ium*.

**Table 2.4 Common Cations<sup>a</sup>**

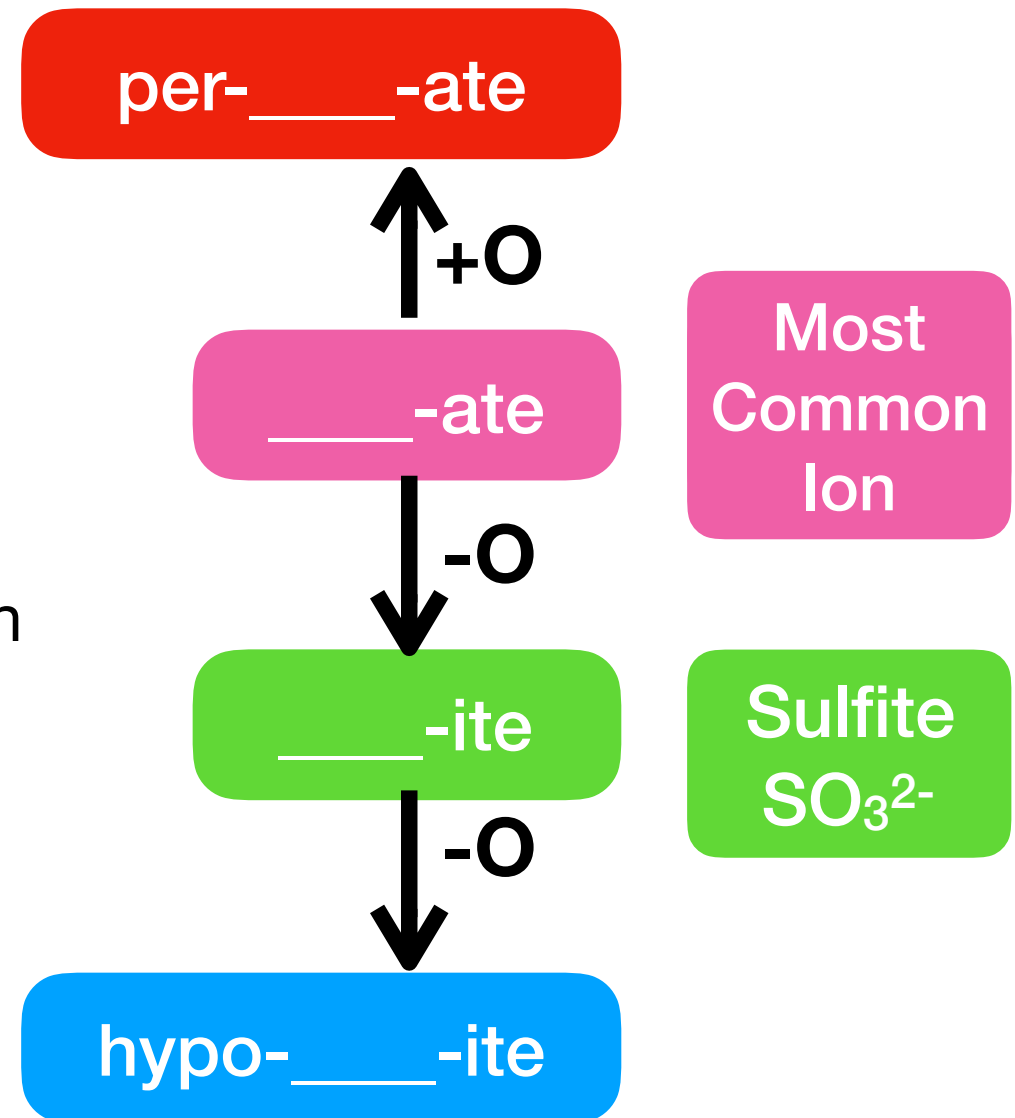
Charge	Formula	Name	Formula	Name
1+	<b>H<sup>+</sup></b>	<b>hydrogen ion</b>	<b>NH<sub>4</sub><sup>+</sup></b>	<b>ammonium ion</b>
	Li <sup>+</sup>	lithium ion	Cu <sup>+</sup>	copper(I) or cuprous ion
	<b>Na<sup>+</sup></b>	<b>sodium ion</b>		
	<b>K<sup>+</sup></b>	<b>potassium ion</b>		
	Cs <sup>+</sup>	cesium ion		
	<b>Ag<sup>+</sup></b>	<b>silver ion</b>		
2+	<b>Mg<sup>2+</sup></b>	<b>magnesium ion</b>	Co <sup>2+</sup>	cobalt(II) or cobaltous ion
	<b>Ca<sup>2+</sup></b>	<b>calcium ion</b>	<b>Cu<sup>2+</sup></b>	<b>copper(II) or cupric ion</b>
	Sr <sup>2+</sup>	strontium ion	<b>Fe<sup>2+</sup></b>	<b>iron(II) or ferrous ion</b>
	Ba <sup>2+</sup>	barium ion	Mn <sup>2+</sup>	manganese(II) or manganous ion
	<b>Zn<sup>2+</sup></b>	<b>zinc ion</b>	Hg <sub>2</sub> <sup>2+</sup>	mercury(I) or mercurous ion
	Cd <sup>2+</sup>	cadmium ion	<b>Hg<sup>2+</sup></b>	<b>mercury(II) or mercuric ion</b>
			Ni <sup>2+</sup>	nickel(II) or nickelous ion
			<b>Pb<sup>2+</sup></b>	<b>lead(II) or plumbous ion</b>
			Sn <sup>2+</sup>	tin(II) or stannous ion
3+	<b>Al<sup>3+</sup></b>	<b>aluminum ion</b>	Cr <sup>3+</sup>	chromium(III) or chromic ion
			<b>Fe<sup>3+</sup></b>	<b>iron(III) or ferric ion</b>

<sup>a</sup>The ions we use most often in this course are in boldface. Learn them first.

# Rules for Naming Inorganic Compounds

## Anions

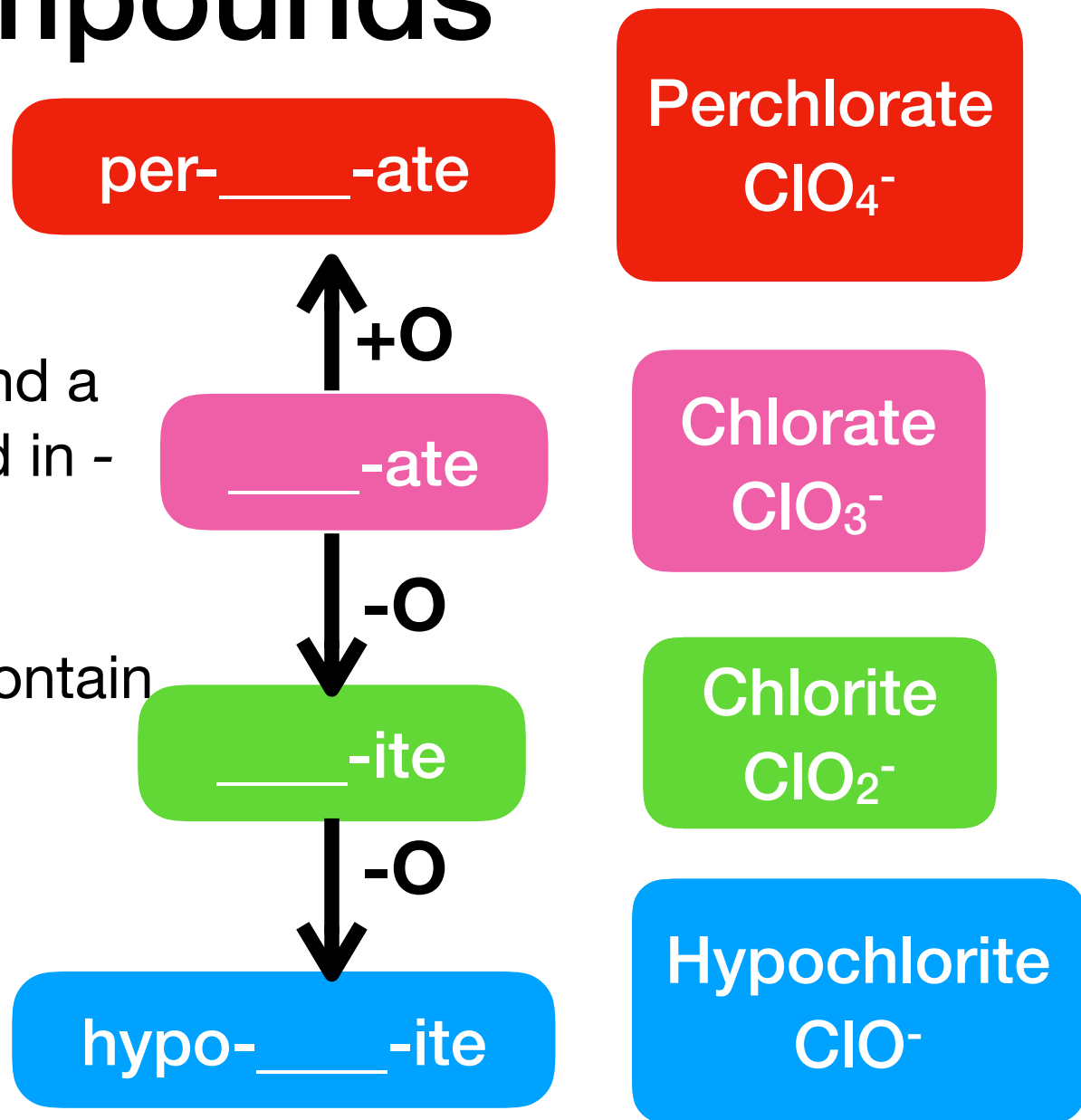
1. **All monatomic** anions and a few polyatomic anions end in *-ide*.
2. Polyatomic anions that contain oxygen (**oxyanions**) have prefixes and suffixes that depend on the number of oxygen atoms



# Rules for Naming Inorganic Compounds

## Anions

1. **All monatomic** anions and a few polyatomic anions end in *-ide*.
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# Tip on remembering the Oxyanions and their charges

	Group 4A	Group 5A	Group 6A	Group 7A
Period 2	$\text{CO}_3^{2-}$ Carbonate ion	$\text{NO}_3^-$ Nitrate ion		
Period 3		$\text{PO}_4^{3-}$ Phosphate ion	$\text{SO}_4^{2-}$ Sulfate ion	$\text{ClO}_4^-$ <b>Perchlorate</b> ion

Based on figure 2.27 in the textbook

**Table 2.5 Common Anions<sup>a</sup>**

Charge	Formula	Name	Formula	Name
1-	H <sup>-</sup>	hydride ion	<b>CH<sub>3</sub>COO<sup>-</sup></b> (or C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> <sup>-</sup> )	<b>acetate ion</b>
	<b>F<sup>-</sup></b>	<b>fluoride ion</b>	ClO <sub>3</sub> <sup>-</sup>	chlorate ion
	<b>Cl<sup>-</sup></b>	<b>chloride ion</b>	<b>ClO<sub>4</sub><sup>-</sup></b>	<b>perchlorate ion</b>
	<b>Br<sup>-</sup></b>	<b>bromide ion</b>	NO <sub>3</sub> <sup>-</sup>	<b>nitrate ion</b>
	<b>I<sup>-</sup></b>	<b>iodide ion</b>	MnO <sub>4</sub> <sup>-</sup>	permanganate ion
	CN <sup>-</sup>	cyanide ion		
	<b>OH<sup>-</sup></b>	<b>hydroxide ion</b>		
2-	<b>O<sup>2-</sup></b>	<b>oxide ion</b>	<b>CO<sub>3</sub><sup>2-</sup></b>	<b>carbonate ion</b>
	O <sub>2</sub> <sup>2-</sup>	peroxide ion	CrO <sub>4</sub> <sup>2-</sup>	chromate ion
	<b>S<sup>2-</sup></b>	<b>sulfide ion</b>	Cr <sub>2</sub> O <sub>7</sub> <sup>2-</sup>	dichromate ion
			<b>SO<sub>4</sub><sup>2-</sup></b>	<b>sulfate ion</b>
3-	N <sup>3-</sup>	nitride ion	<b>PO<sub>4</sub><sup>3-</sup></b>	<b>phosphate ion</b>

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# Rules for Naming Inorganic Compounds

## Anions

3. Adding an H to an oxyanion? Add *hydrogen* or *dihydrogen* as a prefix.



# Rules for Naming Inorganic Compounds

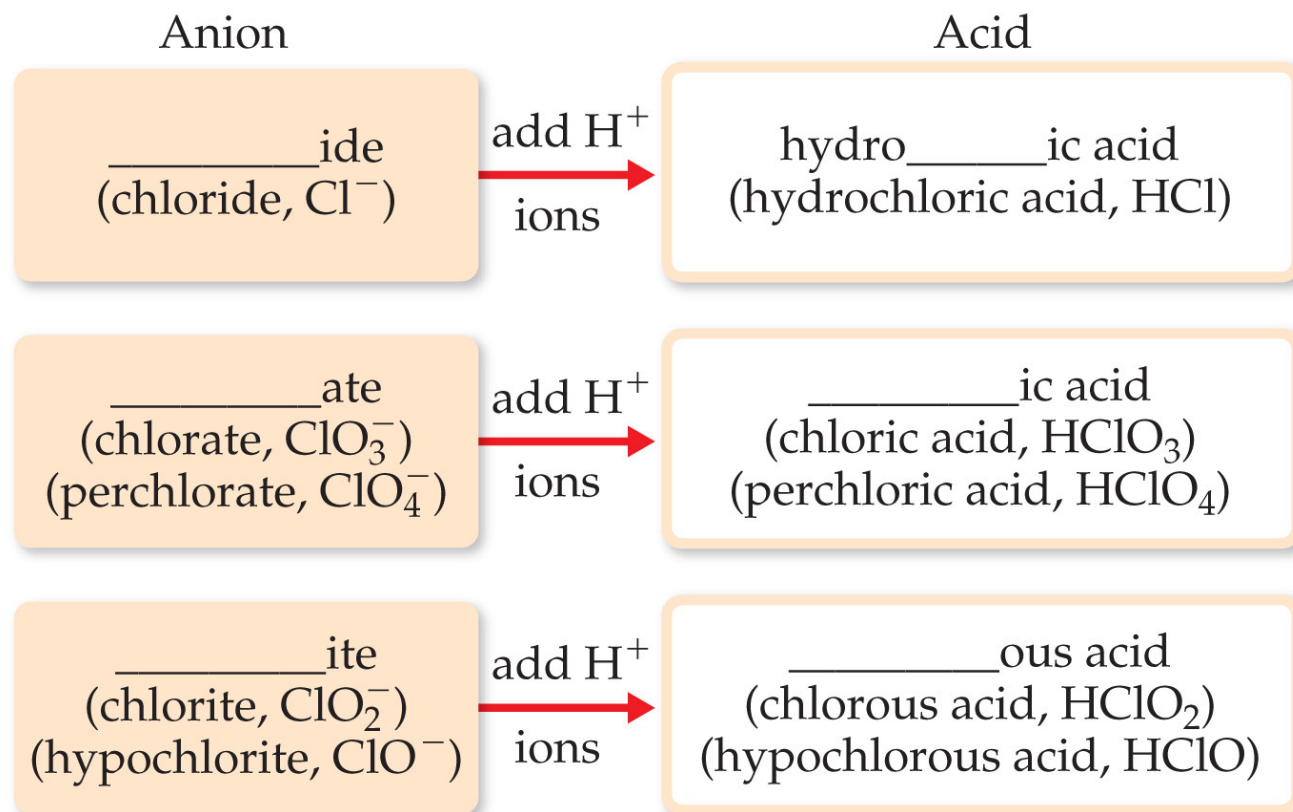
## Ionic Compounds

1. Cation name comes first. Anion name comes second.

# Rules for Naming Inorganic Compounds

## Acids

1. Based on the name of the anion.



# Rules for Naming Inorganic Compounds

## Binary Molecular Compounds

1. Element from the farthest *left* on the periodic table is written first. *EXCEPTION: Oxygen goes last*
2. Same group? Write the bottom one first.
3. The second element ends in *-ide*.
4. Greek prefixes (*di-*, *tri-*, *tetra-*, *penta-*, etc.) indicate number. *EXCEPTION: don't start a name with -mon*

# Suggested Practice for Nomenclature

<b>Chemical Formula</b>	<b>Name</b>	<b>Type (Ionic, Acid, or Binary Molecular)</b>
<b>SrF<sub>2</sub></b>		
<b>HClO</b>		
	<b>Copper (III) Iodide</b>	
	<b>Hydrogen Sulfide</b>	
<b>N<sub>2</sub>O<sub>4</sub></b>		
	<b>Lead (II) nitrate</b>	
	<b>Sulfur dioxide</b>	
<b>Al(NO<sub>3</sub>)<sub>3</sub></b>		
<b>Mg(ClO<sub>4</sub>)<sub>2</sub></b>		