



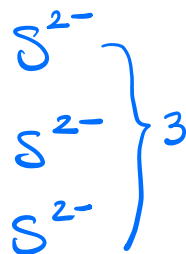
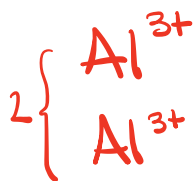
Case 1 - main group cations w/ main group anions  
 $\Rightarrow$  Charges are fixed & found by position on PT

Al  $\Rightarrow$  group 3A  $\Rightarrow$  3<sup>+</sup> cation      Al<sup>3+</sup>

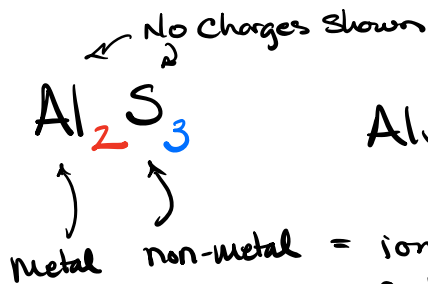
S  $\Rightarrow$  group 6A  $\Rightarrow$  2<sup>-</sup> anion      S<sup>2-</sup>

Cation First

Anion Second



Balance Charges



Naming - Cation first  
 anion second  
 -ide

Aluminum sulfide

= ionic in nature with  
 cation & anion & charges  
 are found by position in  
 PT

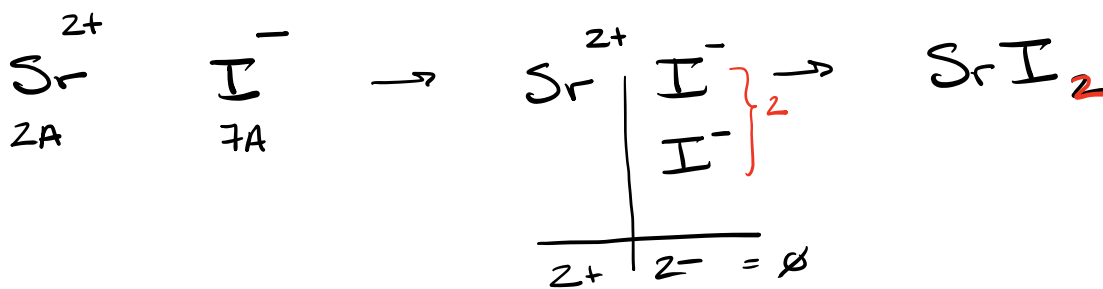
1 H Hydrogen 1.008	2 He Helium 4.003											13 Al Aluminum 26.98	14 Si Silicon 28.09	15 P Phosphorus 30.97	16 S Sulfur 32.07	17 Cl Chlorine 35.45	18 Ar Argon 39.95														
3 Li Lithium 6.941	4 Be Beryllium 9.012											5 B Boron 10.81	6 C Carbon 12.01	7 N Nitrogen 14.01	8 O Oxygen 16.00	9 F Fluorine 19.00	10 Ne Neon 20.18														
11 Na Sodium 22.99	12 Mg Magnesium 24.30	3 3B	4 4B	5 5B	6 6B	7 7B	8 8B	9 8B	10 8B	11 1B	12 2B	13 Al Aluminum 26.98	14 Si Silicon 28.09	15 P Phosphorus 30.97	16 S Sulfur 32.07	17 Cl Chlorine 35.45	18 Ar Argon 39.95														
19 K Potassium 39.10	20 Ca Calcium 40.08	21 Sc Scandium 44.96	22 Ti Titanium 47.87	23 V Vanadium 50.94	24 Cr Chromium 52.00	25 Mn Manganese 54.94	26 Fe Iron 55.84	27 Co Cobalt 58.93	28 Ni Nickel 58.69	29 Cu Copper 63.55	30 Zn Zinc 65.41	31 Ga Gallium 69.72	32 Ge Germanium 72.64	33 As Arsenic 74.92	34 Se Selenium 78.96	35 Br Bromine 79.90	36 Kr Krypton 83.80														
37 Rb Rubidium 85.47	38 Sr Strontium 87.62	39 Y Yttrium 88.91	40 Zr Zirconium 91.22	41 Nb Niobium 92.91	42 Mo Molybdenum 95.94	43 Tc Technetium (98)	44 Ru Ruthenium 101.1	45 Rh Rhodium 102.9	46 Pd Palladium 106.4	47 Ag Silver 107.9	48 Cd Cadmium 112.4	49 In Indium 114.8	50 Sn Tin 118.7	51 Sb Antimony 121.8	52 Te Tellurium 127.6	53 I Iodine 126.9	54 Xe Xenon 131.3														
55 Cs Cesium 132.9	56 Ba Barium 137.3	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>Lanthanides</p> <p>Actinides</p> </div> </div>															72 Hf Hafnium 178.5	73 Ta Tantalum 180.9	74 W Tungsten 183.8	75 Re Rhenium 186.2	76 Os Osmium 190.2	77 Ir Iridium 192.2	78 Pt Platinum 195.1	79 Au Gold 197.0	80 Hg Mercury 200.6	81 Tl Thallium 204.4	82 Pb Lead 207.2	83 Bi Bismuth 209.0	84 Po Polonium (209)	85 At Astatine (210)	86 Rn Radon (222)
87 Fr Francium (223)	88 Ra Radium (226)																104 Rf Rutherfordium (261)	105 Db Dubnium (262)	106 Sg Seaborgium (266)	107 Bh Bohrium (264)	108 Hs Hassium (277)	109 Mt Meitnerium (268)	110 Ds Darmstadtium (281)	111 Rg Roentgenium (272)	112 Cn Copernicium (285)	113 Nh Nihonium (284)	114 Fl Flerovium (289)	115 Mc Moscovium (288)	116 Lv Livermorium (289)	117 Ts Tennessine	118 Og Oganesson
																	57 La Lanthanum 138.9	58 Ce Cerium 140.1	59 Pr Praseodymium 140.9	60 Nd Neodymium 144.2	61 Pm Promethium (145)	62 Sm Samarium 150.4	63 Eu Europium 152.0	64 Gd Gadolinium 157.2	65 Tb Terbium 158.9	66 Dy Dysprosium 162.5	67 Ho Holmium 164.9	68 Er Erbium 167.3	69 Tm Thulium 168.9	70 Yb Ytterbium 173.0	71 Lu Lutetium 175.0
		89 Ac Actinium (227)	90 Th Thorium 232.0	91 Pa Protactinium 231.0	92 U Uranium 238.0	93 Np Neptunium (237)	94 Pu Plutonium (244)	95 Am Americium (243)	96 Cm Curium (247)	97 Bk Berkelium (247)	98 Cf Californium (251)	99 Es Einsteinium (252)	100 Fm Fermium (257)	101 Md Mendelevium (258)	102 No Nobelium (259)	103 Lr Lawrencium (262)															

Common anions

		<u>Root</u>		
F	Fluorine	Fluor	F <sup>-</sup>	Fluoride
Cl	Chlorine	Chlor	Cl <sup>-</sup>	Chloride
Br	Bromine	Brom	Br <sup>-</sup>	Bromide
I	Iodine	Iod	I <sup>-</sup>	Iodide
O	Oxygen	ox	O <sup>2-</sup>	Oxide
S	Sulfur	Sulf	S <sup>2-</sup>	Sulfide
N	Nitrogen	Nitr	N <sup>3-</sup>	Nitride
P	Phosphorus	Phosph	P <sup>3-</sup>	Phosphide

Ex

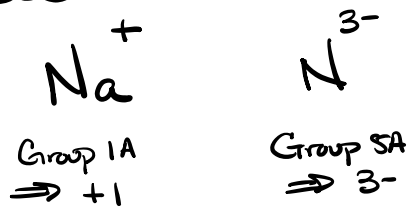
make an ionic compound from Sr & I.



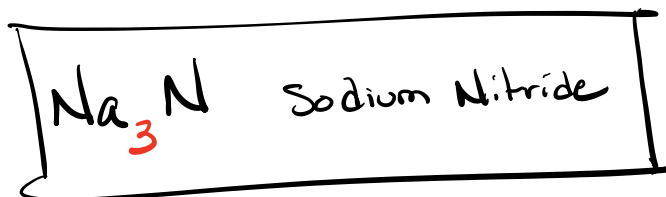
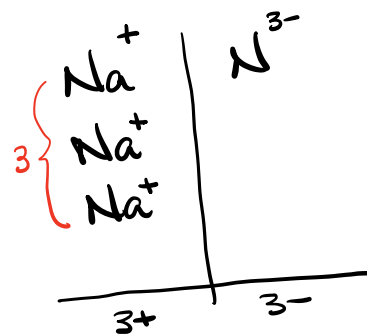
Strontium Iodide SrI<sub>2</sub>

Ex What is the formula for sodium nitride?

Sodium Nitride

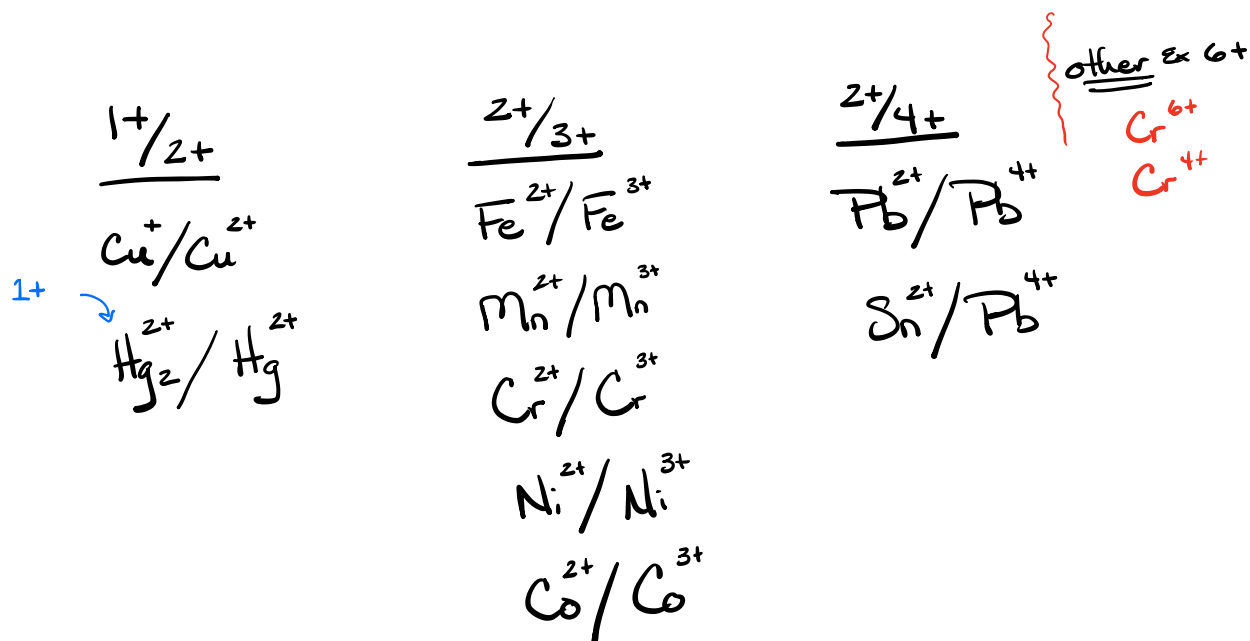


Balance Formula

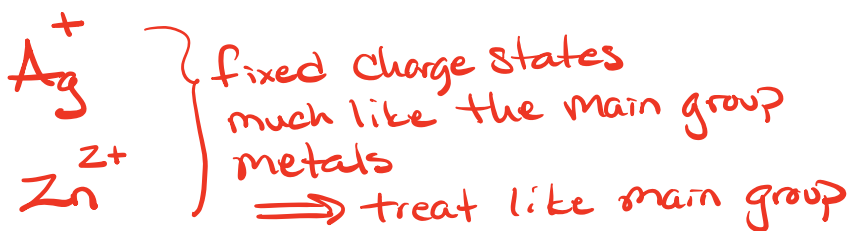


Case 2 - Transition Metals w/ main group anions

⇒ Transition metal charge states cannot be looked up on PT. You must be given the cation charge in the name or must be given a balanced formula.

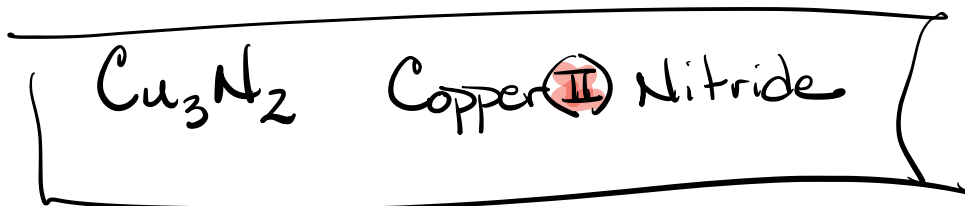
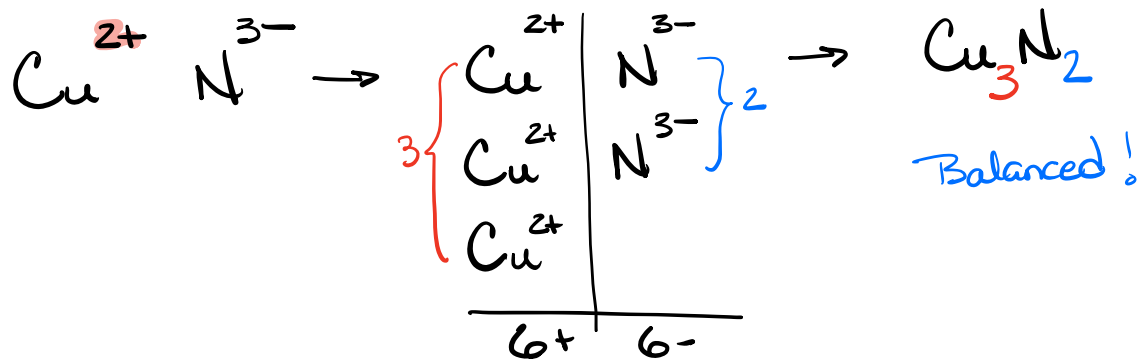


\* Two exceptions

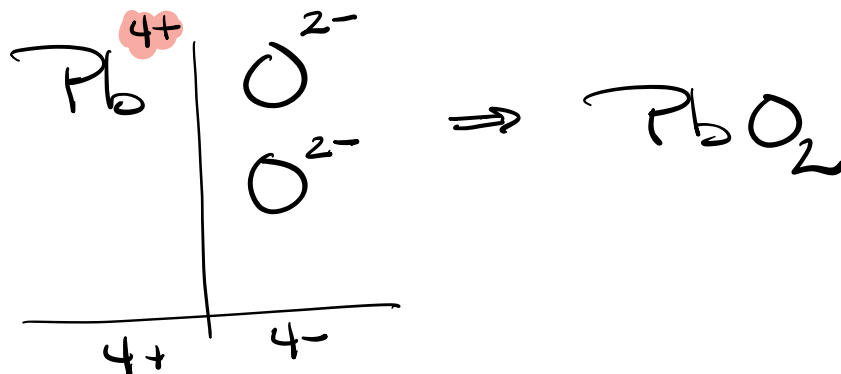


	New System	Older System	↑ -ic	↓ -ous
$\text{Cu}^+$	Copper (I)	Cuprous		
$\text{Cu}^{2+}$	Copper (II)	Cupric		
$\text{Fe}^{2+}$	Iron (II)	Ferrous		
$\text{Fe}^{3+}$	Iron (III)	Ferric		
$\text{Pb}^{2+}$	Lead (II)	Plumbous		
$\text{Pb}^{4+}$	Lead (IV)	Plumbic		

- Make ionic Compound

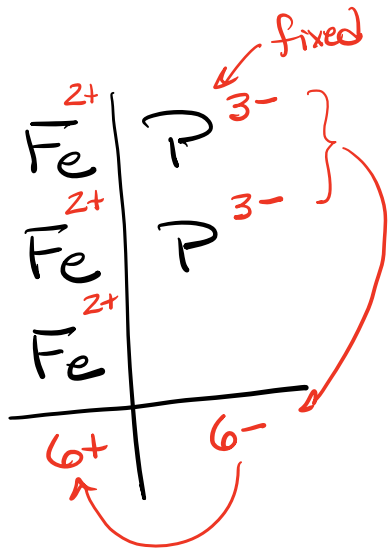
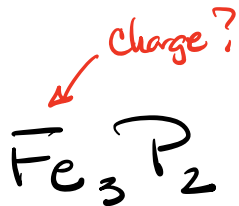


- Write the formula of Lead(IV) oxide



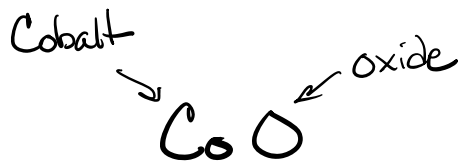


- Give the name of  $\text{Fe}_3\text{P}_2$  Harder

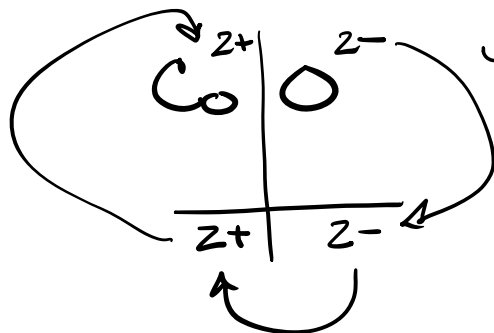


Iron (II) Phosphide?  
Iron (III) Phosphide  
Iron Phosphide

$$\frac{6+}{3\text{Fe}} = \frac{2+}{\text{Fe}}$$

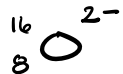
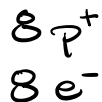


what is the name of this compound?  
work backwards from anion



Cobalt (II) Oxide

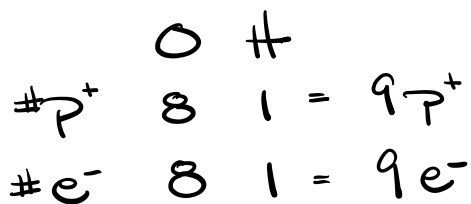
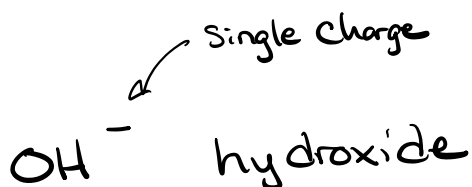
# Polyatomic Ions



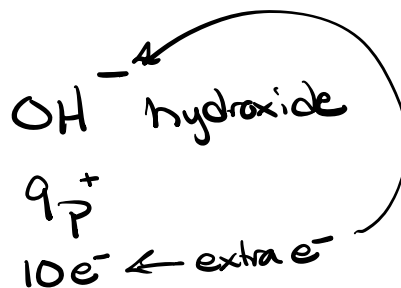
2 more  $e^-$  than  
# of protons

monatomic ion  
1 atom in

polyatomic ion  
many atom ion



Neutral atoms



## Nomenclature of Polyatomic Ions

Same charge as  
Chloride

$\text{Cl}^-$	Chlorine family of oxides	"Chlor"
$\text{ClO}_4^-$	perchlorate	per - more
$\text{ClO}_3^-$	Chlorate	-ate more oxygen
$\text{ClO}_2^-$	Chlorite	-ite less oxygen
$\text{ClO}^-$	hypochlorite	hypo = less

Sulfur family

$\text{S}^{2-}$  Sulfide "sulf"

$\text{SO}_4^{2-}$  sulfate

$\text{SO}_3^{2-}$  sulfite

Phosphorus family

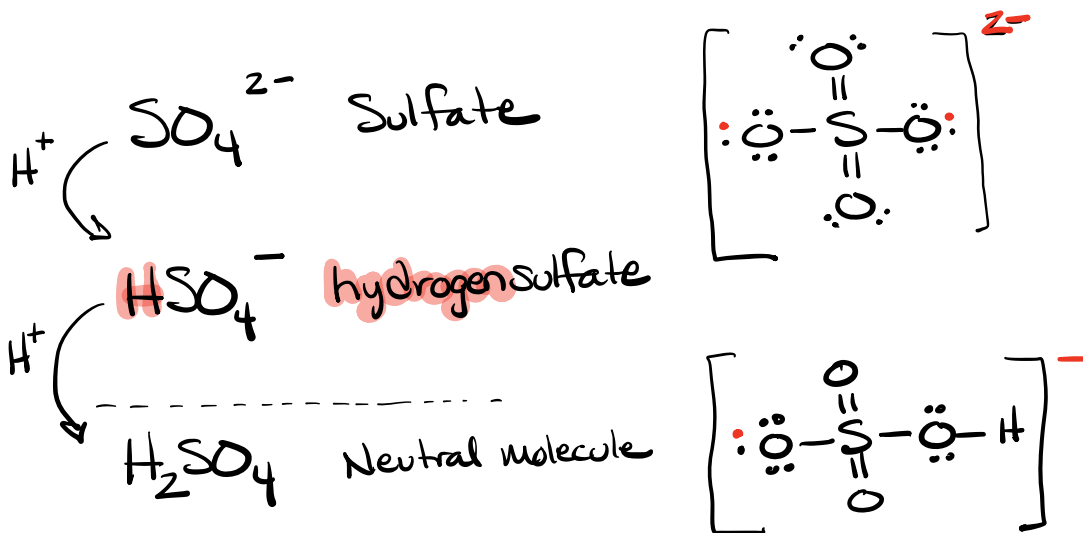
$\text{P}^{3-}$  Phosphide "phosph"

$\text{PO}_4^{3-}$  phosphate

$\text{PO}_3^{3-}$  phosphite

Nitrogen family  
 $N^{3-}$  Nitride "Nitr" Flash Card  
 $NO_3^-$  Nitrate  
 $NO_2^-$  Nitrite

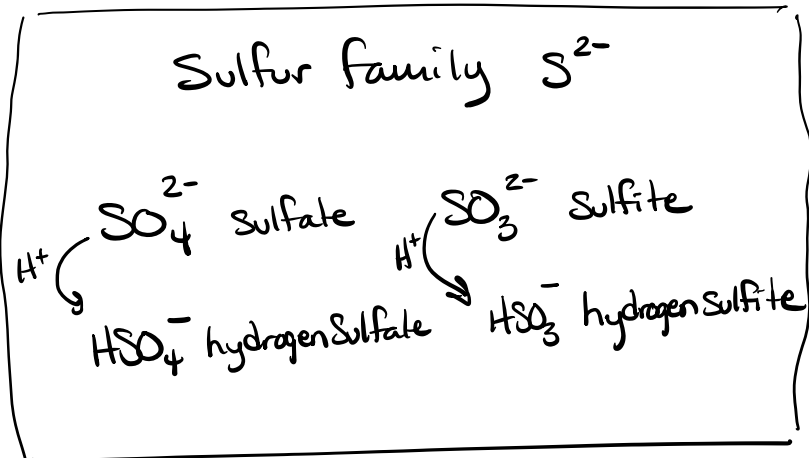
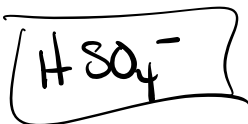
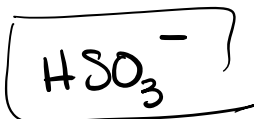
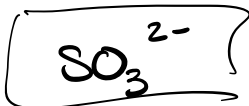
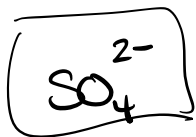
Proton Family "H<sup>+</sup>" Proton =  $H^+$  hydrogen cation  
 $\rightarrow [1p^+]$   
 $\emptyset e^-$   
 $\emptyset n^e$



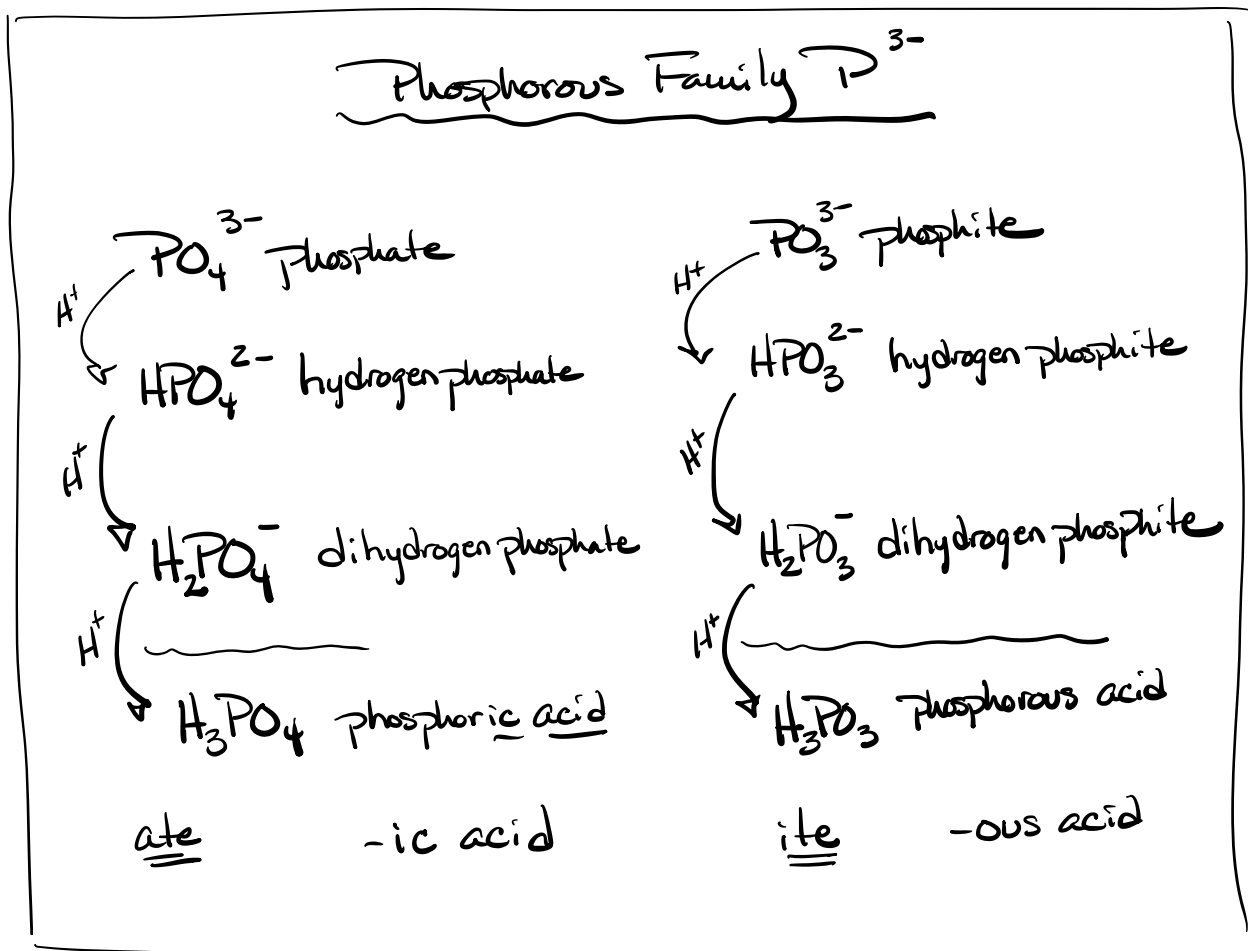
Acid nomenclature

Sulfate ate  $\rightarrow$  -ic acid

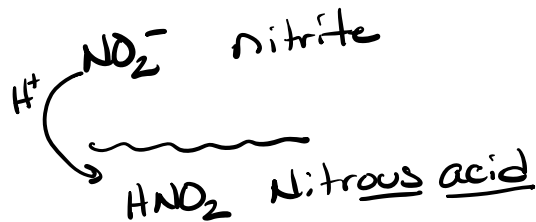
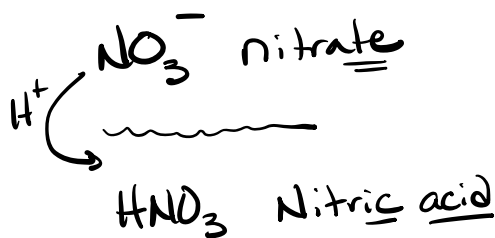
$H_2SO_4$  Sulfuric acid



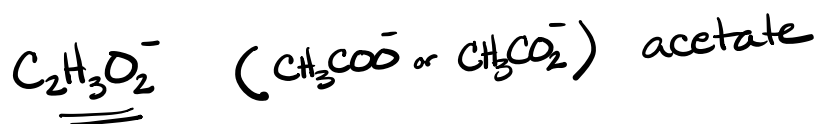
4 things



## Nitrogen family $N^{3-}$



## One-offs



# Common Ions

## Positive Ions (CATIONS)

### **+1 Charge**

Ammonium ( $\text{NH}_4^+$ )\*  
Copper (I) or cuprous ( $\text{Cu}^+$ )\*  
Hydrogen ( $\text{H}^+$ ) “proton”\*  
Hydronium ( $\text{H}_3\text{O}^+$ ) “aqueous proton”\*  
Silver ( $\text{Ag}^+$ )\*

### **+2 Charge**

Cadmium ( $\text{Cd}^{2+}$ )  
Cobalt (II) or cobaltous ( $\text{Co}^{2+}$ )  
Copper (II) or cupric ( $\text{Cu}^{2+}$ )\*  
Iron (II) or ferrous ( $\text{Fe}^{2+}$ )\*  
Lead (II) or plumbous ( $\text{Pb}^{2+}$ )\*  
Manganese (II) or manganous ( $\text{Mn}^{2+}$ )\*  
Mercury (I) or mercurous ( $\text{Hg}_2^{2+}$ )\*  
Mercury (II) or mercuric ( $\text{Hg}^{2+}$ )\*  
Nickel ( $\text{Ni}^{2+}$ )\*  
Tin (II) or stannous ( $\text{Sn}^{2+}$ )\*  
Zinc ( $\text{Zn}^{2+}$ )\*

### **+3 Charge**

Aluminum ( $\text{Al}^{3+}$ )\*  
Chromium (III) or chromic ( $\text{Cr}^{3+}$ )\*  
Iron (III) or ferric ( $\text{Fe}^{3+}$ )\*

### **+4 Charge**

Lead (IV) or plumbic ( $\text{Pb}^{4+}$ )\*  
Tin (IV) or stannic ( $\text{Sn}^{4+}$ )\*

## Negative Ions (ANIONS)

### **-1 Charge**

Acetate ( $\text{C}_2\text{H}_3\text{O}_2^-$ )\*  
Perchlorate ( $\text{ClO}_4^-$ )  
Chlorate ( $\text{ClO}_3^-$ )  
Chlorite ( $\text{ClO}_2^-$ )  
Hypochlorite ( $\text{ClO}^-$ )\*  
Cyanide ( $\text{CN}^-$ )  
Dihydrogen phosphate ( $\text{H}_2\text{PO}_4^-$ )\*  
Hydrogen carbonate or bicarbonate ( $\text{HCO}_3^-$ )\*  
Hydrogen sulfate or bisulfate ( $\text{HSO}_4^-$ )\*  
Hydrogen sulfite or bisulfite ( $\text{HSO}_3^-$ )\*  
Hydroxide ( $\text{OH}^-$ )\*  
Nitrate ( $\text{NO}_3^-$ )\*  
Nitrite ( $\text{NO}_2^-$ )\*  
Permanganate ( $\text{MnO}_4^-$ )\*  
Thiocyanate ( $\text{SCN}^-$ )

### **-2 Charge**

Carbonate ( $\text{CO}_3^{2-}$ )\*  
Chromate ( $\text{CrO}_4^{2-}$ )  
Dichromate ( $\text{Cr}_2\text{O}_7^{2-}$ )  
Hydrogen phosphate ( $\text{HPO}_4^{2-}$ )\*  
Oxalate ( $\text{C}_2\text{O}_4^{2-}$ )  
Sulfate ( $\text{SO}_4^{2-}$ )\*  
Sulfite ( $\text{SO}_3^{2-}$ )\*  
Peroxide ( $\text{O}_2^{2-}$ )\*

### **-3 Charge**

Phosphate ( $\text{PO}_4^{3-}$ )\*

