

# Science 10 Unit A: Chemistry



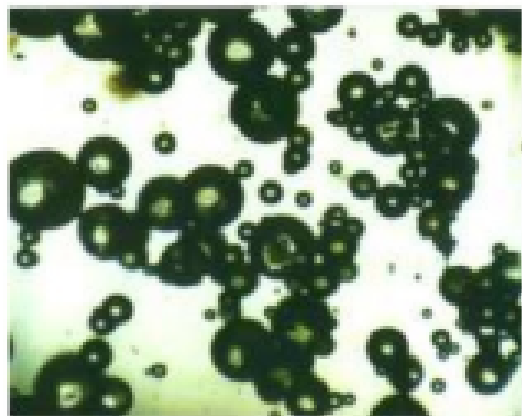
## Nomenclature of Ionic Compounds

# POS Checklist:

- recall principles for assigning names to ionic compounds.
- recall principles for naming molecular substances.
- explain how an ionic bond results from the simultaneous attraction of oppositely charged ions.

# What's in a name?

**The scientific world has adopted a standard method for naming any and all chemical compounds. This is called the IUPAC system (International Union of Pure and Applied Chemistry) of naming.**



**There are three main types of naming:**

- 1. Ionic**
- 2. Molecular**
- 3. Naming Acids**
- 4. Organic Naming (Covered in Chem 30)**

# 1. Writing formulas for Binary Ionic Compounds

**A binary ionic compound is made up of only two (binary means "two") elements: one metal element and one non-metal element**

Metals include all the elements left of the staircase. These elements have positive charges.

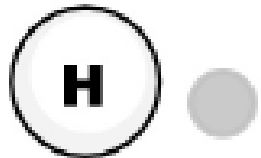
Nonmetals live on the right of the staircase and have negative charges.

Periodic Table of the Elements

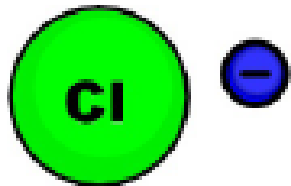
I	II	Transition Metals										III	IV	V	VI	VII	0
H <sup>1</sup>																He <sup>2</sup>	
Li <sup>3</sup>	Be <sup>4</sup>											B <sup>5</sup>	C <sup>6</sup>	N <sup>7</sup>	O <sup>8</sup>	F <sup>9</sup>	Ne <sup>10</sup>
Na <sup>11</sup>	Mg <sup>12</sup>	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Al <sup>13</sup>	Si <sup>14</sup>	P <sup>15</sup>	S <sup>16</sup>	Cl <sup>17</sup>	Ar <sup>18</sup>
K <sup>19</sup>	Ca <sup>20</sup>	Sc <sup>21</sup>	Ti <sup>22</sup>	V <sup>23</sup>	Cr <sup>24</sup>	Mn <sup>25</sup>	Fe <sup>26</sup>	Co <sup>27</sup>	Ni <sup>28</sup>	Cu <sup>29</sup>	Zn <sup>30</sup>	Ga <sup>31</sup>	Ge <sup>32</sup>	As <sup>33</sup>	Se <sup>34</sup>	Br <sup>35</sup>	Kr <sup>36</sup>
Rb <sup>37</sup>	Sr <sup>38</sup>	Y <sup>39</sup>	Zr <sup>40</sup>	Nb <sup>41</sup>	Mo <sup>42</sup>	Tc <sup>43</sup>	Ru <sup>44</sup>	Rh <sup>45</sup>	Pd <sup>46</sup>	Ag <sup>47</sup>	Cd <sup>48</sup>	In <sup>49</sup>	Sn <sup>50</sup>	Sb <sup>51</sup>	Te <sup>52</sup>	I <sup>53</sup>	Xe <sup>54</sup>
Cs <sup>55</sup>	Ba <sup>56</sup>		Hf <sup>57</sup>	Ta <sup>58</sup>	W <sup>59</sup>	Re <sup>60</sup>	Os <sup>61</sup>	Ir <sup>62</sup>	Pt <sup>63</sup>	Au <sup>64</sup>	Hg <sup>65</sup>	Tl <sup>66</sup>	Pb <sup>67</sup>	Bi <sup>68</sup>	Po <sup>69</sup>	At <sup>70</sup>	Rn <sup>71</sup>
Fr <sup>77</sup>	Ra <sup>78</sup>		Rf <sup>104</sup>	Ha <sup>105</sup>													
Lanthanides		La <sup>57</sup>	Ce <sup>58</sup>	Pr <sup>59</sup>	Nd <sup>60</sup>	Pm <sup>61</sup>	Sm <sup>62</sup>	Eu <sup>63</sup>	Gd <sup>64</sup>	Tb <sup>65</sup>	Dy <sup>66</sup>	Ho <sup>67</sup>	Er <sup>68</sup>	Tm <sup>69</sup>	Yb <sup>70</sup>	Lu <sup>71</sup>	
Actinides		Ac <sup>89</sup>	Th <sup>90</sup>	Pa <sup>91</sup>	U <sup>92</sup>	Np <sup>93</sup>	Pu <sup>94</sup>	Am <sup>95</sup>	Cm <sup>96</sup>	Bk <sup>97</sup>	Cf <sup>98</sup>	Es <sup>99</sup>	Fm <sup>100</sup>	Md <sup>101</sup>	No <sup>102</sup>	Lr <sup>103</sup>	

Legend:   Metal      Metalloid      Nonmetal



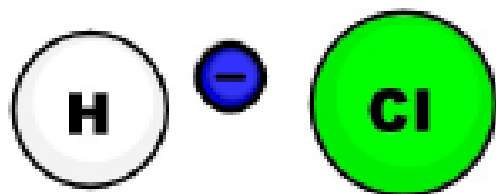


**The hydrogen ion is  $H^+$ . This means it is missing 1 electron (indicated by the grey circle).**

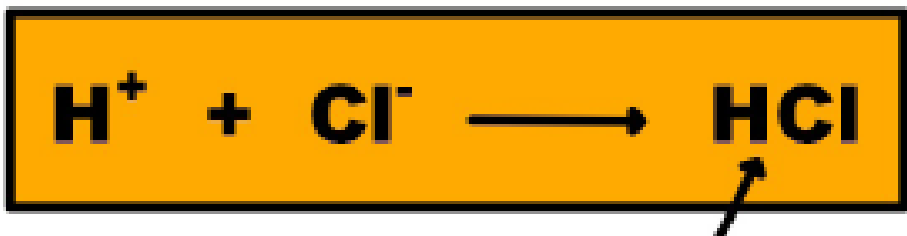


**The chlorine ion is  $Cl^-$ . This means it has one extra electron (in blue).**

If we put the two together, the  $\text{Cl}^-$  will give up its one electron to the  $\text{H}^+$ . The electron forms a bond, represented by the black line. The result is the binary ionic compound  $\text{HCl}$ . This compound is neutral.



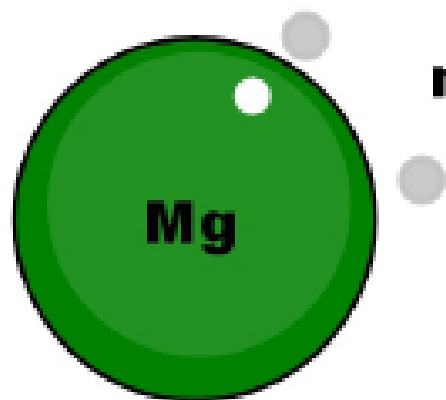
The chemical equation would look like this:



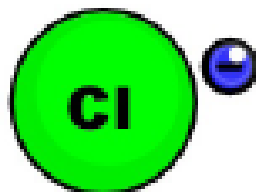
**\*Note: the product is always neutral (no + or - signs on it).**

The product is called **hydrogen chloride**.

**Let's try something else...magnesium and chlorine.**



**magnesium has a charge of 2+**

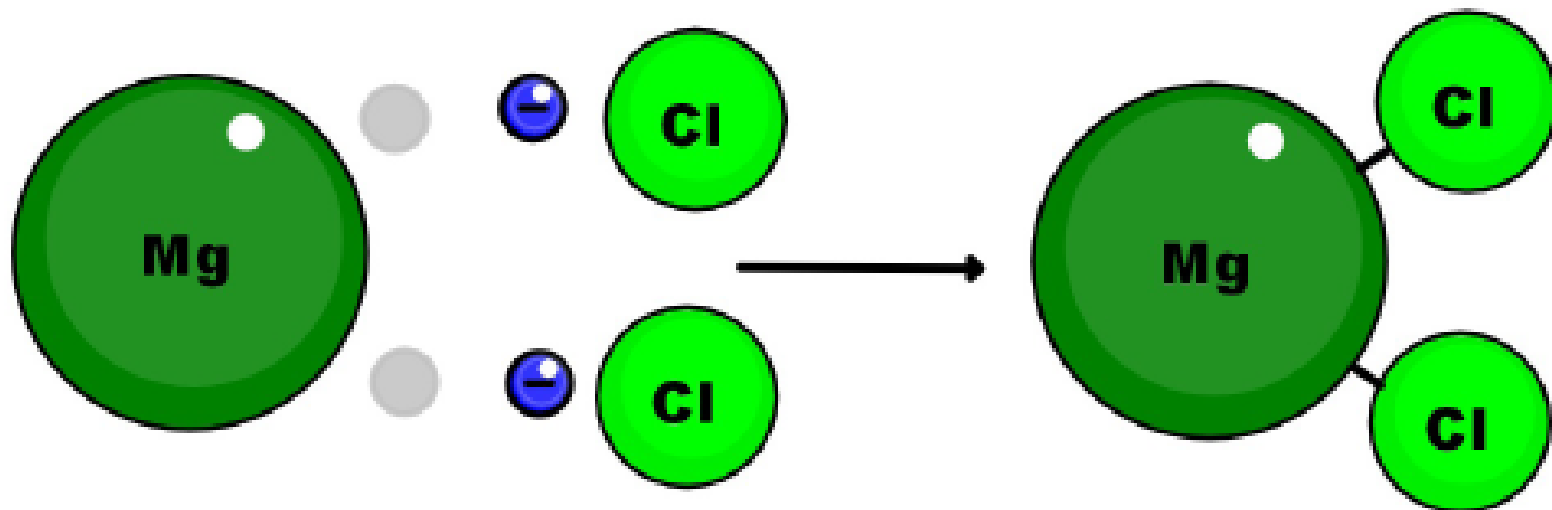


**chlorine has a charge of 1-**

**What will happen if we try to bond these two ions?**

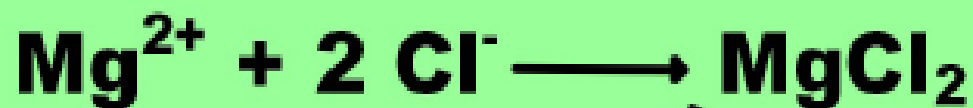


**We need two chlorine ions to fill the holes in magnesium.**



**This explains the chemical formula:**



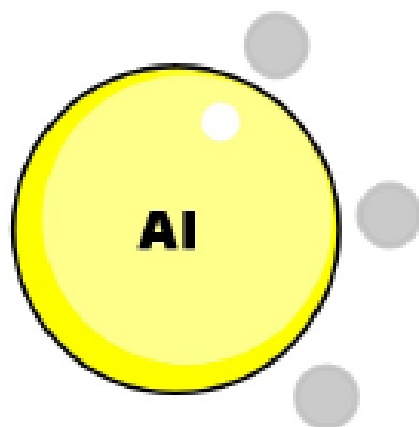


The name of this product is **magnesium chloride**.

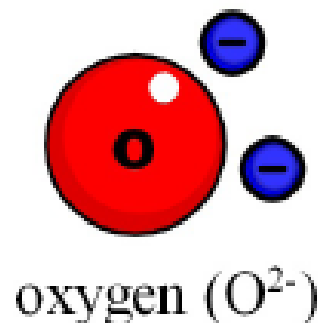
The **2** in subscripts means that there are **two chlorine ions**.

Notice how the formula,  $\text{MgCl}_2$ , can be created by crossing the charges on the products.

**Let's try aluminum and oxygen...**



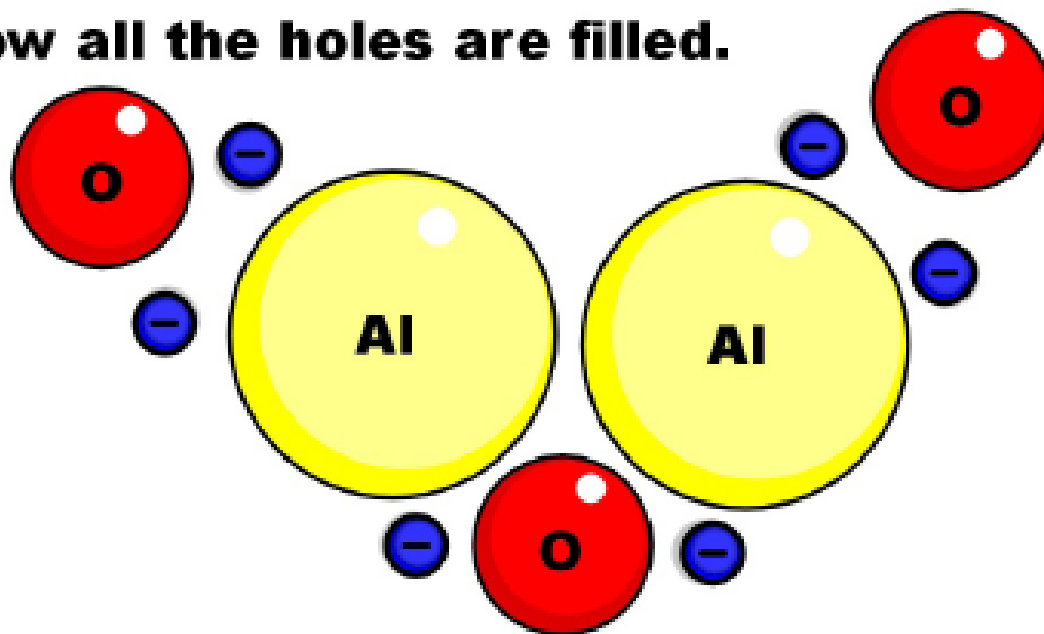
aluminum ( $\text{Al}^{3+}$ )



oxygen ( $\text{O}^{2-}$ )

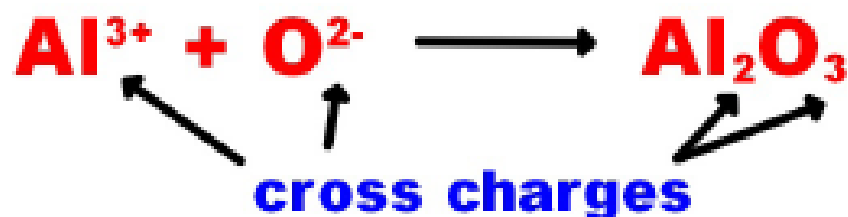
**One oxygen ion and one aluminum ion can't bond. We need two aluminum ions and three oxygen ions.**

**Now all the holes are filled.**



**\*Note: this compound actually forms into a crystal, so it wouldn't look exactly like this structure, but then again, it's not made up of yellow and red balls either.**

**For writing the formula for aluminum oxide or another binary ionic compound, cross the charges:**



**If the two subscripts have a common factor, divide each subscript by the common value.**

**ex. magnesium oxide**



**Weird: two exceptions to the rule are  $\text{H}_2\text{O}_2$  (hydrogen peroxide) and  $\text{Na}_2\text{O}_2$  (sodium peroxide)**

# Naming Binary Ionic Compounds

When naming compounds, the metal ion is named first, followed by the nonmetal ion.

The nonmetal ion changes suffix to end in "ide".

ex) #2 from worksheet:

Formula	Compound Name
NaI	

\*Hint: Use your periodic table to find out the name of Na and the name of I, then change the ending to "ide".

**Practice: try the next four examples.**

<b>Formula</b>	<b>Compound Name</b>
<b>NaI</b>	<b>sodium iodide</b>
<b>MgCl</b>	
<b>ZnO</b>	
<b>AlBr<sub>3</sub></b>	
<b>BaS</b>	

# Naming and writing formulas for ions with multiple charges

**Note that some metal ions can form ions with different charges.**

Key	
Atomic number	26
Electronegativity	1.8
Symbol	Fe
Name	iron
	55.85
	3+, 2+
	2861
	1538

Atomic molar mass (g/mol)<sup>†</sup>

Common ion charges (most common first)

Boiling point (°C)

Melting point (°C)  
<sup>†</sup>(measured at a non-standard pressure)

**Iron is a good example. It can form the Fe<sup>2+</sup> ion or the Fe<sup>3+</sup> ion.**

**In order to distinguish between the two ions, we use roman numerals.**

**ex. Write the formula for iron (II) oxide.**



The roman numeral II indicates the ion with a charge of +2 is used.

**ex. Write the formula for iron (III) oxide.**



## Ex. What is the name of $\text{SnI}_4$ ?



Warning: forgetting the roman numerals is one of the most common mistakes in beginners chemistry (not unlike sig-digs in physics...). Be careful, I can pull marks off for mistakes like this at any time!

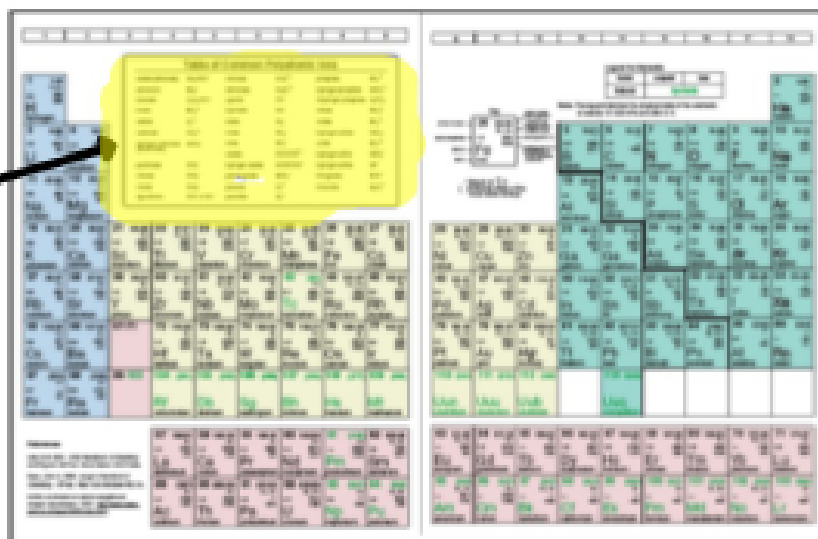
## Practice: try these questions

<b>Formula</b>	<b>Metal Ion Charge</b>	<b>Non-Metal Ion Charge</b>	<b>Name</b>
<b>NiCl<sub>3</sub></b>			
<b>MnO</b>			
<b>Cr<sub>2</sub>O<sub>3</sub></b>			
<b>CuCl<sub>2</sub></b>			
<b>PbO<sub>2</sub></b>			

## Naming and writing formulas for complex (polyatomic) ions

**Complex ions are groups of atoms bonded together that carry a collective charge. They are listed on the data table of your period table.**

These guys up here =  
often used



The image shows a portion of a periodic table with a yellow callout box containing a list of common polyatomic ions. An arrow points from the text 'These guys up here = often used' to the callout box.

Formula	Name
$\text{OH}^-$	hydroxide
$\text{CN}^-$	cyanide
$\text{C}_2\text{O}_4^{2-}$	oxalate
$\text{NO}_2^-$	nitrite
$\text{NO}_3^-$	nitrate
$\text{O}_2^{2-}$	peroxide
$\text{F}_2\text{O}_2^{2-}$	perfluoroperoxide
$\text{S}_2\text{O}_3^{2-}$	thiosulfate
$\text{S}_2\text{O}_8^{2-}$	peroxydisulfate
$\text{SO}_3^{2-}$	sulfite
$\text{SO}_4^{2-}$	sulfate
$\text{S}_2\text{O}_8^{2-}$	peroxydisulfate
$\text{PO}_4^{3-}$	phosphate
$\text{H}_2\text{PO}_4^-$	dihydrogen phosphate
$\text{HPO}_4^{2-}$	hydrogen phosphate
$\text{H}_2\text{PO}_3^-$	dihydrogen phosphite
$\text{HPO}_3^{2-}$	hydrogen phosphite
$\text{H}_2\text{P}_2\text{O}_7^{4-}$	diphosphate
$\text{H}_2\text{P}_2\text{O}_6^{4-}$	diphosphite
$\text{P}_2\text{O}_7^{4-}$	pyrophosphate
$\text{P}_2\text{O}_6^{4-}$	pyrophosphite
$\text{P}_3\text{O}_{10}^{5-}$	triphosphate
$\text{P}_3\text{O}_9^{5-}$	triphosphite
$\text{P}_4\text{O}_{10}^{6-}$	tetraphosphate
$\text{P}_4\text{O}_9^{6-}$	tetraphosphite
$\text{P}_5\text{O}_{14}^{6-}$	pentaphosphate
$\text{P}_5\text{O}_{13}^{6-}$	pentaphosphite
$\text{P}_6\text{O}_{21}^{6-}$	hexaphosphate
$\text{P}_6\text{O}_{20}^{6-}$	hexaphosphite
$\text{P}_7\text{O}_{28}^{6-}$	heptaphosphate
$\text{P}_7\text{O}_{27}^{6-}$	heptaphosphite
$\text{P}_8\text{O}_{36}^{6-}$	octaphosphate
$\text{P}_8\text{O}_{35}^{6-}$	octaphosphite
$\text{P}_9\text{O}_{45}^{6-}$	nonaphosphate
$\text{P}_9\text{O}_{44}^{6-}$	nonaphosphite
$\text{P}_{10}\text{O}_{54}^{6-}$	decaphosphate
$\text{P}_{10}\text{O}_{53}^{6-}$	decaphosphite
$\text{P}_{11}\text{O}_{63}^{6-}$	undecaphosphate
$\text{P}_{11}\text{O}_{62}^{6-}$	undecaphosphite
$\text{P}_{12}\text{O}_{72}^{6-}$	dodecaphosphate
$\text{P}_{12}\text{O}_{71}^{6-}$	dodecaphosphite
$\text{P}_{13}\text{O}_{81}^{6-}$	tridecaphosphate
$\text{P}_{13}\text{O}_{80}^{6-}$	tridecaphosphite
$\text{P}_{14}\text{O}_{90}^{6-}$	tetradecaphosphate
$\text{P}_{14}\text{O}_{89}^{6-}$	tetradecaphosphite
$\text{P}_{15}\text{O}_{99}^{6-}$	pentadecaphosphate
$\text{P}_{15}\text{O}_{98}^{6-}$	pentadecaphosphite
$\text{P}_{16}\text{O}_{108}^{6-}$	hexadecaphosphate
$\text{P}_{16}\text{O}_{107}^{6-}$	hexadecaphosphite
$\text{P}_{17}\text{O}_{117}^{6-}$	heptadecaphosphate
$\text{P}_{17}\text{O}_{116}^{6-}$	heptadecaphosphite
$\text{P}_{18}\text{O}_{126}^{6-}$	octadecaphosphate
$\text{P}_{18}\text{O}_{125}^{6-}$	octadecaphosphite
$\text{P}_{19}\text{O}_{135}^{6-}$	enneadecaphosphate
$\text{P}_{19}\text{O}_{134}^{6-}$	enneadecaphosphite
$\text{P}_{20}\text{O}_{144}^{6-}$	eicetaphosphate
$\text{P}_{20}\text{O}_{143}^{6-}$	eicetaphosphite
$\text{P}_{21}\text{O}_{153}^{6-}$	heneicaphosphate
$\text{P}_{21}\text{O}_{152}^{6-}$	heneicaphosphite
$\text{P}_{22}\text{O}_{162}^{6-}$	triacontaphosphate
$\text{P}_{22}\text{O}_{161}^{6-}$	triacontaphosphite
$\text{P}_{23}\text{O}_{171}^{6-}$	triacontaphosphate
$\text{P}_{23}\text{O}_{170}^{6-}$	triacontaphosphite
$\text{P}_{24}\text{O}_{180}^{6-}$	triacontaphosphate
$\text{P}_{24}\text{O}_{179}^{6-}$	triacontaphosphite
$\text{P}_{25}\text{O}_{189}^{6-}$	triacontaphosphate
$\text{P}_{25}\text{O}_{188}^{6-}$	triacontaphosphite
$\text{P}_{26}\text{O}_{198}^{6-}$	triacontaphosphate
$\text{P}_{26}\text{O}_{197}^{6-}$	triacontaphosphite
$\text{P}_{27}\text{O}_{207}^{6-}$	triacontaphosphate
$\text{P}_{27}\text{O}_{206}^{6-}$	triacontaphosphite
$\text{P}_{28}\text{O}_{216}^{6-}$	triacontaphosphate
$\text{P}_{28}\text{O}_{215}^{6-}$	triacontaphosphite
$\text{P}_{29}\text{O}_{225}^{6-}$	triacontaphosphate
$\text{P}_{29}\text{O}_{224}^{6-}$	triacontaphosphite
$\text{P}_{30}\text{O}_{234}^{6-}$	triacontaphosphate
$\text{P}_{30}\text{O}_{233}^{6-}$	triacontaphosphite

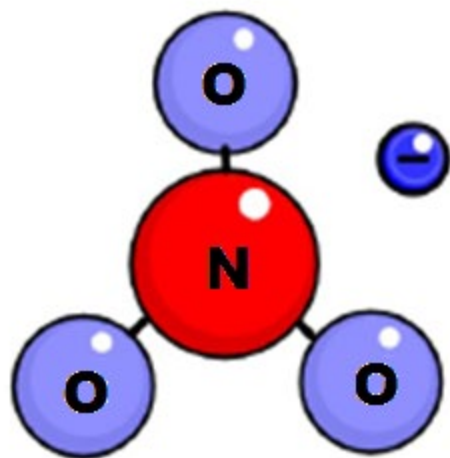
**You will often encounter these ions. If you are having trouble naming a compound, it often contains a complex ion which you forgot about, so familiarize yourself with these names!**

## Table of Common Polyatomic Ions

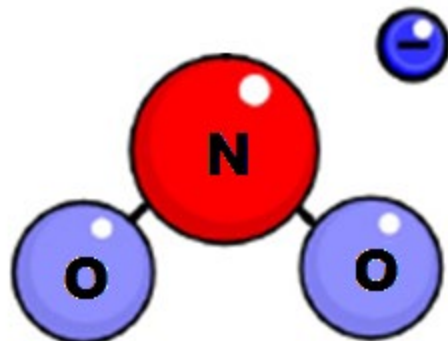
acetate (ethanoate)	$\text{CH}_3\text{COO}^-$	chromate	$\text{CrO}_4^{2-}$	phosphate	$\text{PO}_4^{3-}$
ammonium	$\text{NH}_4^+$	dichromate	$\text{Cr}_2\text{O}_7^{2-}$	hydrogen phosphate	$\text{HPO}_4^{2-}$
benzoate	$\text{C}_6\text{H}_5\text{COO}^-$	cyanide	$\text{CN}^-$	dihydrogen phosphate	$\text{H}_2\text{PO}_4^-$
borate	$\text{BO}_3^{3-}$	hydroxide	$\text{OH}^-$	silicate	$\text{SiO}_3^{2-}$
carbide	$\text{C}_2^{2-}$	iodate	$\text{IO}_3^-$	sulfate	$\text{SO}_4^{2-}$
carbonate	$\text{CO}_3^{2-}$	nitrate	$\text{NO}_3^-$	hydrogen sulfate	$\text{HSO}_4^-$
hydrogen carbonate (bicarbonate)	$\text{HCO}_3^-$	nitrite	$\text{NO}_2^-$	sulfite	$\text{SO}_3^{2-}$
		oxalate	$\text{OOC}^-\text{COO}^{2-}$	hydrogen sulfite	$\text{HSO}_3^-$
perchlorate	$\text{ClO}_4^-$	hydrogen oxalate	$\text{HOOC}^-\text{COO}^-$	hydrogen sulfide	$\text{HS}^-$
chlorate	$\text{ClO}_3^-$	permanganate	$\text{MnO}_4^-$	thiocyanate	$\text{SCN}^-$
chlorite	$\text{ClO}_2^-$	peroxide	$\text{O}_2^{2-}$	thiosulfate	$\text{S}_2\text{O}_3^{2-}$
hypochlorite	$\text{ClO}^-$ or $\text{OCl}^-$	persulfide	$\text{S}_2^{2-}$		

**(On your periodic table in your data booklet.)**

**Most negative complex ions end in "ite" or "ate".**



An example of a complex ion,  
nitrate.

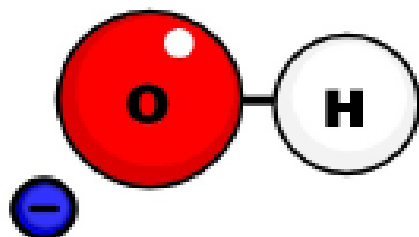


An example of a complex ion,  
nitrite.

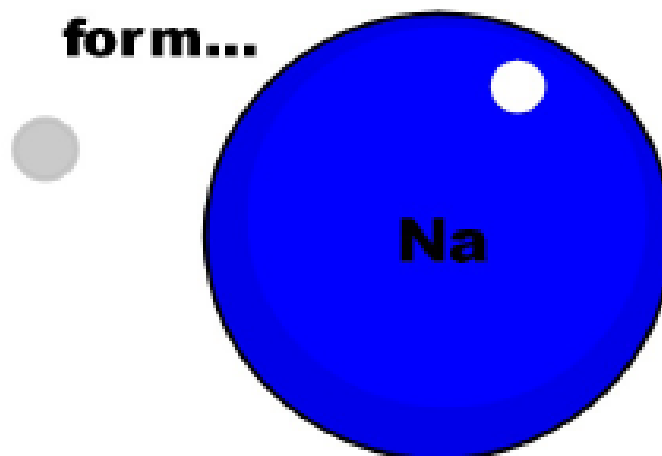
**These ions bond like any other, but if more than one complex ion is present, the formula of the complex ion must be bracketed.**

**Let's create an ionic compound with the complex ion, hydroxide.**

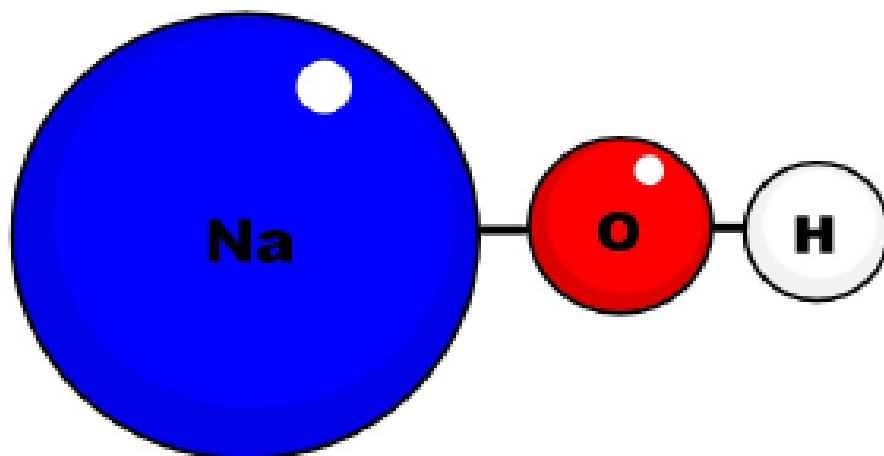
**The hydroxide ion, OH<sup>-</sup>**



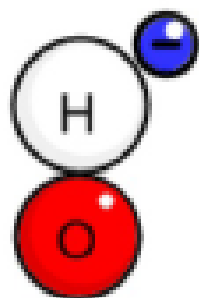
**...and the sodium ion, Na<sup>+</sup> form...**



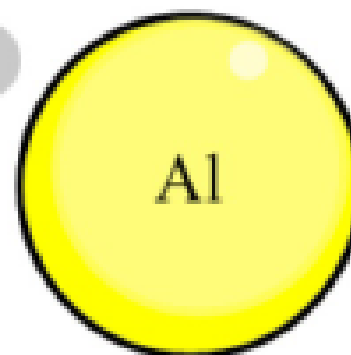
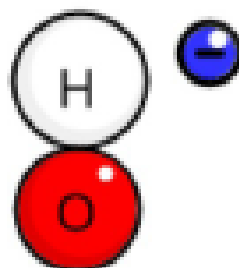
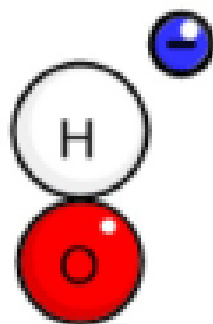
**sodium hydroxide, NaOH.**



**In the case of a compound that has more than one complex ion, put the complex ion in brackets in the formula.**



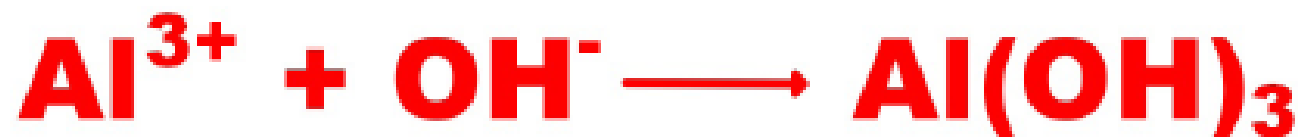
The hydroxide ion, OH<sup>-</sup>



aluminum ion, Al<sup>3+</sup>

**This aluminum ion will need three hydroxide ions to form a compound.**

**The equation for aluminum hydroxide is**



**The subscript 3 only applies to the OH. There is not three Al.**

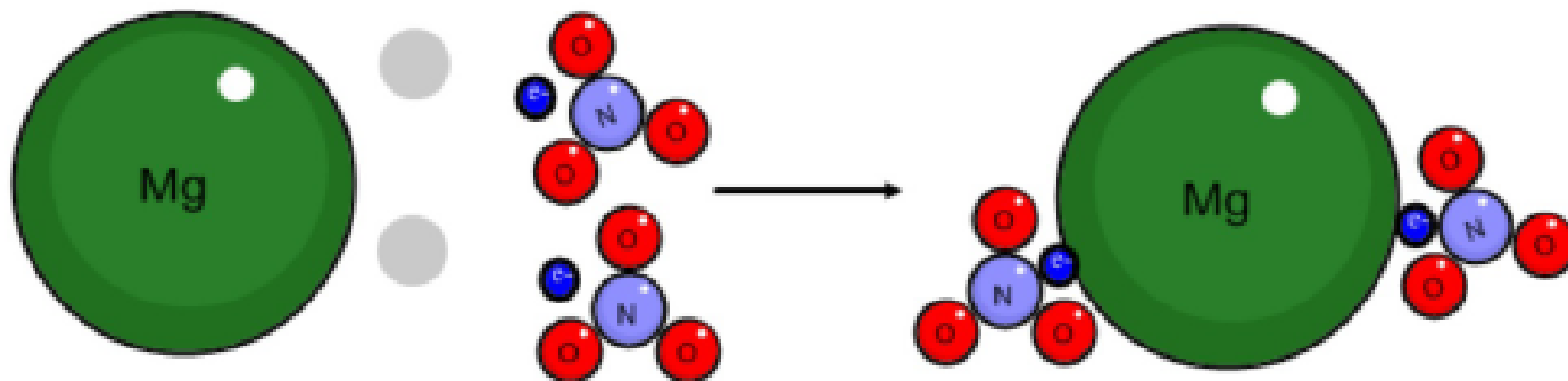


**ex. What is the formula for magnesium nitrate?**

**The magnesium ion is  $\text{Mg}^{2+}$  and nitrate ion is  $\text{NO}_3^-$ .  
Remember to cross the charges.**



We have one Mg ion and two  $\text{NO}_3$  ions.



## Practice: try these questions

<b>Name</b>	<b>Metal Ion Charge</b>	<b>Non-Metal Ion Charge</b>	<b>Formula</b>
<b>sodium chlorate</b>			
<b>aluminium sulfate</b>			
<b>copper (II) nitrate</b>			
<b>lithium hydroxide</b>			
<b>magnesium nitrate</b>			

# Naming and Writing Formulas for Molecular Compounds

**A molecular compound is made up of two or more nonmetals bonded together. In this type of bond, electrons are not exchanged, but shared between atoms.**

Periodic Table of the Elements

I	II											III	IV	V	VI	VII	0																														
H <sup>1</sup>																	He <sup>2</sup>																														
Li <sup>3</sup>	Be <sup>4</sup>	Transition Metals										B <sup>5</sup>	C <sup>6</sup>	N <sup>7</sup>	O <sup>8</sup>	F <sup>9</sup>	Ne <sup>10</sup>																														
Na <sup>11</sup>	Mg <sup>12</sup>	IIIB	IVB	VB	VIB	VII B	VIII			IB	IIB	Al <sup>13</sup>	Si <sup>14</sup>	P <sup>15</sup>	S <sup>16</sup>	Cl <sup>17</sup>	Ar <sup>18</sup>																														
K <sup>19</sup>	Ca <sup>20</sup>	Sc <sup>21</sup>	Ti <sup>22</sup>	V <sup>23</sup>	Cr <sup>24</sup>	Mn <sup>25</sup>	Fe <sup>26</sup>	Co <sup>27</sup>	Ni <sup>28</sup>	Cu <sup>29</sup>	Zn <sup>30</sup>	Ga <sup>31</sup>	Ge <sup>32</sup>	As <sup>33</sup>	Se <sup>34</sup>	Br <sup>35</sup>	Kr <sup>36</sup>																														
Rb <sup>37</sup>	Sr <sup>38</sup>	Y <sup>39</sup>	Zr <sup>40</sup>	Nb <sup>41</sup>	Mo <sup>42</sup>	Tc <sup>43</sup>	Ru <sup>44</sup>	Rh <sup>45</sup>	Pd <sup>46</sup>	Ag <sup>47</sup>	Cd <sup>48</sup>	In <sup>49</sup>	Sn <sup>50</sup>	Sb <sup>51</sup>	Te <sup>52</sup>	I <sup>53</sup>	Xe <sup>54</sup>																														
Cs <sup>55</sup>	Ba <sup>56</sup>	[57-71]	Hf <sup>72</sup>	Ta <sup>73</sup>	W <sup>74</sup>	Re <sup>75</sup>	Os <sup>76</sup>	Ir <sup>77</sup>	Pt <sup>78</sup>	Au <sup>79</sup>	Hg <sup>80</sup>	Tl <sup>81</sup>	Pb <sup>82</sup>	Bi <sup>83</sup>	Po <sup>84</sup>	At <sup>85</sup>	Rn <sup>86</sup>																														
Fr <sup>87</sup>	Ra <sup>88</sup>	[89-103]	Rf <sup>104</sup>	Ha <sup>105</sup>																																											
Lanthanides		<table border="1"> <tr> <td>57</td><td>58</td><td>59</td><td>60</td><td>61</td><td>62</td><td>63</td><td>64</td><td>65</td><td>66</td><td>67</td><td>68</td><td>69</td><td>70</td><td>71</td> </tr> <tr> <td>La</td><td>Ce</td><td>Pr</td><td>Nd</td><td>Pm</td><td>Sm</td><td>Eu</td><td>Gd</td><td>Tb</td><td>Dy</td><td>Ho</td><td>Er</td><td>Tm</td><td>Yb</td><td>Lu</td> </tr> </table>																57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
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89	90	91	92	93	94	95	96	97	98	99	100	101	102	103																																	
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr																																	

nonmetals

Metal
  Metalloid
  Nonmetal

**Latin and Greek prefixes are used to indicate the number of molecules of each element present.**

<b>NUMBER</b>	<b>PREFIX</b>
1	mono*
2	di
3	tri
4	tetra
5	penta
6	hexa
7	hepta
8	octa
9	nona
10	deca

**\*Weird: we don't use prefixes for binary hydrogen compounds (ex. H<sub>2</sub>S is not dihydrogen sulfide, just hydrogen sulfide.)**

**\*Tip: try recording these in the notes section of your data booklet.**

**For example:**

**CO<sub>2</sub> - carbon dioxide.**

**P<sub>2</sub>O<sub>5</sub> - diphosphorous pentaoxide**

**nitrogen dioxide - NO<sub>2</sub>**

**\*note: the mono is only used for the second element, not for the first**

**\*bonus note: note the suffix on the last element changes to "ide"**

NUMBER	PREFIX
1	mono*
2	di
3	tri
4	tetra
5	penta
6	hexa
7	hepta
8	octa
9	nona
10	deca

# Practice: try these questions

<b>Name</b>	<b>Formula</b>
<b>sulphur dioxide</b>	
<b>carbon monoxide</b>	
<b>dihydrogen monosulphide</b>	
<b>sulfur dichloride</b>	
<b>tetraphosphorus decaoxide</b>	

## Molecular Compounds to be Memorized

These compounds have traditional names that are often used. It is helpful to memorize the names and formulas of these compounds.

$\text{NH}_3(\text{g})$	ammonia
$\text{C}_6\text{H}_{12}\text{O}_6(\text{s})$	glucose (simple sugar)
$\text{C}_{12}\text{H}_{22}\text{O}_{11}(\text{s})$	sucrose (table sugar)
$\text{CH}_4(\text{g})$	methane
$\text{C}_3\text{H}_8(\text{g})$	propane
$\text{CH}_3\text{COOH}(\text{l})$	acetic acid (vinegar)
$\text{O}_3(\text{g})$	ozone
$\text{CH}_3\text{OH}(\text{l})$	methanol
$\text{C}_2\text{H}_5\text{OH}(\text{l})$	ethanol (grain alcohol)
$\text{H}_2\text{O}_2(\text{l})$	hydrogen peroxide

**The following elements only exist in molecular form and their formulas also need to be memorized (although most appear in the data table of the periodic table).**

$P_4(s)$	phosphorous
$S_8(s)$	sulfur
$H_2(g)$	hydrogen gas
$O_2(g)$	oxygen gas
$N_2(g)$	nitrogen gas
$F_2(g)$	fluorine gas
$Cl_2(g)$	chlorine gas
$Br_2(l)$	bromine
$I_2(l)$	iodine

**\*Note that all the halogens (group 17) form diatomic molecules.**



# **Naming and writing formulas for Acids**

**For now, we will consider an acid to be any compound which can dissolve in water and contains hydrogen.**

**There are two types of acids we are concerned with now:**

**Binary Acids: consist of two elements: the first always hydrogen and the second a nonmetal ion. Binary acids always end in "ide".**

**Oxy acids: consist of two ions, the first always hydrogen, the second a complex ion containing oxygen, which will end in "ate" or "ite" (eg. sulfate, sulfite, phosphate, phosphite)**

Note: we add an (aq) behind the acid to indicate it is aqueous, or soluble in water.

**To name an acid, first name the compound like any other ionic hydrogen compound, then follow one of these three rules.**

COMPOUND NAME	ACID NAME	ACID TYPE
hydrogen ____ide	hydro____ic acid	binary acid
hydrogen ____ate	____ic acid	oxy acid
hydrogen ____ite	____ous acid	oxy acid

**ex. What is the name of  $\text{HClO}_3(\text{aq})$ ?**

**ex. What is the formula for hydrosulfuric acid?**

# Practice

**Ex. Write the names of the following acids.**

**a)  $\text{HCl(aq)}$**

**b)  $\text{H}_2\text{SO}_4\text{(aq)}$**

**c)  $\text{H}_3\text{BO}_3\text{(aq)}$**

**d)  $\text{HNO}_3\text{(aq)}$**