MOLECULAR IONS

Now to introduce another important class of ions, the **molecular ions**. So far in our study of chemistry, we haven't talked about **molecules**, and we really won't here. For now, let's just say that atoms can bind together in another way, quite different from the ionic bonding we've seen so far, and leave it at that. There are certain molecules that are much more stable after giving up one or more electrons or taking on one or more extra electrons - molecular ions.

You can click on the table below to download a chart of frequently-encountered ions – atomic and molecular. It will be worth your time to memorize the highlighted ions, as you will encounter them frequently. Knowing them and their charges will make life easier as you work through chemistry. With any luck, with some frequent use of the other molecular ions, you'll come to memorize those names, too.

Ionic compounds are very important in almost all of chemistry. Here are some common ones formed by combining atomic and molecular ions. For historical reasons, some are known by a more common name, like the acids below. We will figure out the naming of acids later.

Common Molecular Ions

CATIONS (+)

Name	Symbol	Alternative*
Ammonium	NH_4^+	
Hydronium	H_3O^+	

ANIONS (-)

Name	Symbol	Alternative*
Bromate (I)	BrO^-	(Hypobromite)
Bromate (III)	BrO_2^-	(Bromite)
Bromate (V)	BrO_3^-	(Bromate)
Bromate (VII)	BrO_4^-	(Perbromate)
Carbonate	CO_3^{2-}	
Chlorate (I)	ClO^-	(Hypochlorite)
Chlorate (III)	ClO_2^-	(Chlorite)
Chlorate (V)	ClO_3^-	(Chlorate)
Chlorate (VII)	ClO_4^-	(Perchlorate)
Chromate	CrO_4^{2-}	
Cyanide	CN^-	
Dichromate	$Cr_2O_7^{2-}$	
Dihydrogen Phosphate	$H_2PO_4^-$	
Ethanoate	$C_2H_3O_2^-$	(Acetate)

ANIONS (-)

Name	Symbol	Alternative*
Hydrogen Carbonate	HCO_3^-	(Bicarbonate)
Hydrogen Oxalate	$HC_2O_4^-$	(Binoxalate)
Hydrogen Phosphate	HPO_4^{2-}	
Hydrogen Sulfate	HSO_4^-	(Bisulfate)
Hydrogen Sulfide	HS^-	(Bisulfide)
Hydrogen Sulfite	HSO_3^-	(Bisulfite)
Hydroxide	OH^-	
Iodate (I)	IO^-	(Hypoiodite)
Iodate (III)	IO_2^-	(Iodite)
Iodate (V)	IO_3^-	(Iodate)
Iodate (VII)	IO_4^-	(Periodate)
Manganate (VII)	MnO_4^-	(Permanganate)
Nitrate	NO_3^-	
Nitrite	NO_2^-	
Oxalate	$C_2O_4^{2-}$	(Ethandioate)
Peroxide	O_2^{2-}	
Phosphate	PO_4^{3-}	
Phosphite	PO_3^{3-}	
Sulfate	SO_4^{2-}	
Sulfite	SO_3^{2-}	
Thiosulfate	$S_2O_3^{2-}$	
Thiocyanate	SCN^-	

Formula	Name	Common name	Composition
H_2SO_4	Hydrogen sulfate	Sulfuric acid	$2H^+$, SO_4^{2-}
Na_2SO_4	Sodium sulfate		$2Na^+$, SO_4^{2-}
H_3COOH	Hydrogen acetate	Acetic acid	H^+, H_3COO^-
$NaNO_3$	Sodium nitrate		Na^+, NO_3^-

$KClO_4$	Potassium (VII) chlorate	Potassium perchlorate	K^+, ClO_4^-
Li_3PO_4	Lithium phosphate		$3Li^+$, PO_4^{3-}
$CuCr_2O_7$	Copper dichromate		Cu^{2+}, $Cr_2O_7^{2-}$
NH_4OH	Ammonium hydroxide		NH_4^+, OH^-
HNO_3	Hydrogen nitrate	Nitric acid	H^+, NO_3^-

Naming Atomic Ionic Compounds

You probably noticed that we have naming conventions for ions. For **atomic** ionic compounds, it's pretty easy, just substitute the suffix "**ide**" for the last syllable of the anion and let the cation name stay the way it is. Generally, the subscripts don't play a role in naming, although, because chemistry is an old field, there are some exceptions. Here are some examples:

NaBr	Sodium bromide	K_2O	Potassium oxide
BeF_2	Beryllium fluoride	ScN	Scandium nitride
$CaCl_2$	Calcium chloride	MoI_6	Molybdenum iodide

Source: http://www.drcruzan.com/Chemistry_Ionic.html