Names and Formulas of Common Ions

Monoatomic anions : negatively charged ions consisting of a single atom of one element (usually a nonmetal). To name a monoatomic anion, use the stem of the element's name and add the ending "-***ide*** ".

Group 14 nonmetals 4- charge		Group 15 nonmetals 3- charge		Group 16 nonmetals 2- charge		Group 17 nonmetals 1- charge	
C^{4-}	carbide	N^{3-}	nitride	O^{2-}	oxide	F^-	fluoride
Si^{4-}	silicide	P^{3-}	phosphide	S^{2-}	sulfide	Cl^-	chloride
		As^{3-}	arsenide	Se^{2-}	selenide	Br^-	bromide
						I^-	iodide

H^-	hydride
Not a Group 17 element, but it can make a 1- charge!	

Nonmetal Oxyanions (polyatomic anions) : These negatively charged ions consist of more than one element (usually oxygen with another nonmetal). The most common form of any oxyanion is named by using the stem of the nonmetal's name and adding the ending "-***ate*** ".

Group 14 nonmetals		Group 15 nonmetals		Group 16 nonmetals		Group 17 nonmetals	
CO_3^{2-}	carbonate	NO_3^-	nitrate	SO_4^{2-}	sulfate	ClO_3^-	chlorate
SiO_3^{2-}	silicate	PO_4^{3-}	phosphate	SeO_4^{2-}	selenate	BrO_3^-	bromate
		AsO_4^{3-}	arsenate			IO_3^-	iodate

If a polyatomic anion has one less oxygen than the most common form, the ending is changed from "-***ate*** " to "-***ite*** " without changing the negative charge. ***(Think: "-ite" is oxygen "lite"!)***

Group 14 nonmetals		Group 15 nonmetals		Group 16 nonmetals		Group 17 nonmetals	
CO_3^{2-}	*carbonate*	*NO_3^-*	*nitrate*	*SO_4^{2-}*	*sulfate*	*ClO_3^-*	*chlorate*
No "-ite" form		**NO_2^-**	**nitrite**	**SO_3^{2-}**	**sulfite**	**ClO_2^-**	**chlorite**
SiO_3^{2-}	*silicate*	*PO_4^{3-}*	*phosphate*	*SeO_4^{2-}*	*selenate*	*BrO_3^-*	*bromate*
No "-ite" form		**PO_3^{3-}**	**phosphite**	**SeO_3^{2-}**	**selenite**	**BrO_2^-**	**bromite**
		AsO_4^{3-}	*arsenate*			*IO_3^-*	*iodate*
		AsO_3^{3-}	**arsenite**			**IO_2^-**	**iodite**

Polyatomic oxyanions with halogens can exist in four different forms, depending on the number of oxygens present. To name the most common form of the anion, use the stem of the halogen's name and add the ending "-***ate*** ". If the oxyanion has one less oxygen than the most common form, the ending changes from "-***ate*** " to "-***ite*** ". If there is one less oxygen than the "-***ite*** " anion, add the prefix "***hypo*** -" to the beginning of the "-***ite*** " anion's name. If there is one more oxygen than the most common anion (the "-***ate*** " anion), add the prefix "***per*** -" to the beginning of the "-***ate*** " anion's name.

ClO_4^-	**per**chlorate	**BrO_4^-**	**per**bromate	**IO_4^-**	**per**iodate
ClO_3^-	*chlorate*	*BrO_3^-*	*bromate*	*IO_3^-*	*iodate*
ClO_2^-	chlor**ite**	**BrO_2^-**	brom**ite**	**IO_2^-**	iod**ite**
ClO^-	**hypo**chlor**ite**	**BrO^-**	**hypo**brom**ite**	**IO^-**	**hypo**iod**ite**

Metal oxyanions : Some polaytomic oxyanions contain a metal instead of a nonmetal. These ions are named by adding the suffix "-***ate*** " to the stem of the metal name.

CrO_4^{2-}	**chromate**
$Cr_2O_7^{2-}$	**dichromate***
**The prefix "di-" indicates 2 chromium atoms!*	

MnO_4^-	**permanganate**
MnO_4^{2-}	**manganate**
Note the difference in these two ions: same formula, but different charges!	

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Adding hydrogen to nonmetal oxyanions : When a hydrogen ion (H^+) is added to an oxyanion, the charge of the oxyanion becomes less negative by *one.* The new anion is named by adding the word "***hydrogen*** " before the name of the original oxyanion (or by adding the prefix "***bi*** -"). If two hydrogens area added to an oxyanion, the charge will become less negative by *two* and the word "***dihydrogen*** " is added in front of the original oxyanion's name.

Group 14 elements		Group 15 elements		Group 16 elements	
CO_3^{2-}	*carbonate*	PO_4^{3-}	*phosphate*	SO_4^{2-}	*sulfate*
HCO_3^-	**hydrogen carbonate (or bicarbonate)**	HPO_4^{2-}	**hydrogen phosphate**	HSO_4^-	**hydrogen sulfate (or bisulfate)**
		$H_2PO_4^-$	**dihydrogen phosphate**		
		PO_3^{3-}	*phosphite*	SO_3^{2-}	*sulfite*
		HPO_3^{2-}	**hydrogen phosphite**	HSO_3^-	**hydrogen sulfite**
		$H_2PO_3^-$	**dihydrogen phosphite**		

Other polyatomic ions: There are a few polyatomic anions that don't fit into any of the previous categories and have been given "common" names. It's best to try to commit these ions to memory!

1- charge		2- charge	
$C_2H_3O_2^-$	**acetate**	O_2^{2-}	**peroxide**
OH^-	**hydroxide**	**Look for the subscript to tell the difference between O^{2-} (oxide ion) and O_2^{2-} (peroxide ion)!*	
CN-	**cyanide**		
CNO^-	**cyanate**		
SCN^-	**thiocyanate**		

Monoatomic cations : positively charged ions consisting of a single atom of one element (usually a metal). There are two categories of monoatomic cations: cations with a single (or set) charge, and cations with variable charges.

To name a monoatomic ion with a set charge, name the element and add the word "***ion*** " to show that there is a charge.

Group 1 elements 1+ charge		Group 2 elements 2+ charge		Other cations with set charges	
H^+	**hydrogen ion**	Be^{2+}	**beryllium ion**	Al^{3+}	**aluminum ion**
Li^+	**lithium ion**	Mg^{2+}	**magnesium ion**	Zn^{2+}	**zinc ion**
Na^+	**sodium ion**	Ca^{2+}	**calcium ion**	Cd^{2+}	**cadmium ion**
K^+	**potassium ion**	Sr^{2+}	**strontium ion**	Ag^+	**silver ion**
Rb^+	**rubidium ion**	Ba^{2+}	**barium ion**		
Cs^+	**cesium ion**				

Some metals,especially the transition metals, can form more than one type of ion, each having a different charge. These charges can be difficult to predict from the periodic table, so they are indicated by using Roman numerals as part of the name.

Co^{2+}	**cobalt (II) ion**	Co^{3+}	**cobalt (III) ion**	Hg^{2+}	**mercury (II) ion**	Hg_2^{2+}	**mercury (I) ion***
Cu^+	**copper (I) ion**	Cu^{2+}	**copper (II) ion**	**Exception - mercury (I) ion is actually a diatomic ion (two atoms), not monoatomic. Look for the subscript to tell the difference between mercury (I) and mercury (II)!*			
Fe^{2+}	**iron (II) ion**	Fe^{3+}	**iron (III) ion**				
Pb^{2+}	**lead (II) ion**	Pb^{4+}	**lead (IV) ion**				
Sn^{2+}	**tin (II) ion**	Sn^{4+}	**tin (IV) ion**				

Mn^{2+}	**manganese (II) ion**	Mn^{3+}	**manganese (III) ion**	Mn^{4+}	**manganese (IV) ion**	Mn^{6+}	**manganese (VI) ion**
Manganese can form several different cations - these are the four most common forms.							

Polyatomic cations : Most polyatomic ions are negatively charged anions - there are only two common polyatomic cations.

NH_4^+	**ammonium ion**	H_3O^+	**hydronium ion**