NAMES and FORMULAS of ACIDS

Acids are generally hydrogen ions (the cations) combined with various anions. Since the cation part of the molecule is always hydrogen, it does not need to be named as "hydrogen". The word "acid" indicates the hydrogen part of the compound. The acid name depends upon the anion involved.

1. Acids formed from anions ending in **ate**: drop the **ate** and add **ic acid**.
   $HNO_3(aq)$ [hydrogen H^+ and nitrate NO_3^-] is **nitric acid** ("nitrate" – "ate" + "ic acid ")
   $H_2SO_4(aq)$ [H^+ and sulfate SO_4^{2-}] is **sulfuric acid** ("sulfate" – "ate" + "ur" + "ic acid")
   $H_3PO_4(aq)$ [H^+ and phosphate PO_4^{3-}] is **phosphoric acid** [3 H^+ with 1 PO_4^{3-} to balance charges]
   $HClO_3(aq)$ [H^+ and chlorate ClO_3^-] is **chloric acid**
   $HIO_4(aq)$ [H^+ and periodate IO_4^-] is **periodic acid** ("periodate" – "ate" + "ic acid")
   $HC_2H_3O_2(aq)$ [H^+ and acetate $C_2H_3O_2^-$] is **acetic acid**

2. Acids formed from ions ending in **ite**: drop **ite** and add **ous acid**.
   $HNO_2(aq)$ [hydrogen H^+ and nitrite NO_2^-] is **nitrous acid** ("nitrite" – "ite" + "ous acid ")
   $H_2SO_3(aq)$ [H^+ and sulfite SO_3^{2-}] is **sulfurous acid** ("sulfite" – "ite" + "ur" + "ous acid")
   $H_3PO_3(aq)$ [H^+ and phosphite PO_3^{3-}] is **phosphorous acid**
   $HBrO_2(aq)$ [H^+ and bromite BrO_2^-] is **bromous acid**
   $HClO(aq)$ [H^+ and hypochlorite ClO^-] is **hypochlorous acid** ("hypochlorite" – "ite" + "ous acid")

3. Acid formed from anions ending in **ide**: add prefix **hydro** drop **ide** and add **ic acid.**
   $HCl(aq)$ [H^+ and chloride Cl^-] is **hydrochloric acid** ("hydro" + "chlor" + "ic acid")
   $H_2S(aq)$ [H^+ and sulfide S^{2-}] is **hydrosulfuric acid** ("hydro" essentially means no oxygen)
   $HCN(aq)$ [H^+ and cyanide CN^-] is **hydrocyanic acid**
   $HF(aq)$ [H^+ and fluoride F^-] is **hydrofluoric acid** [$HF(g)$ is named hydrogen fluoride]

You should be able to name the following acids and salts of oxyacids.

a. $MgSO_3$
b. $AgClO_4$
c. $H_2SO_4(aq)$
d. $KClO$
e. Li_3PO_3
f. $H_2SO_3(aq)$
g. $HBr(aq)$
h. $Ba(IO_4)_2$
i. $Cu(BrO_3)_2$
j. $HBrO_3(aq)$
k. $HC_2H_3O_2(aq)$
l. $Zn(ClO_2)_2$
m. $HIO(aq)$
n. $H_2S_2O_3(aq)$
o. $Ca_3(PO_3)_2$
p. $Hg_3(AsO_4)_2$
o. NH_4NO_2
p. $FeSO_3$

Answers are on the other side.

NAMES and FORMULAS with OXYANIONS

The rule for naming these compounds is the same as for other compounds, however, these compounds have polyatomic ions derived from oxyacids. These names and formulas are derived in a systematic way from "ate" polyatomic ions.

1. _____ITE ions

An ion with one less oxygen and the same charge as an "___ate" ion is named "___ite".

NO_3^-	nitrate ion	NO_2^-	**nitrite** ion	e.g.	potassium nitrite KNO_2
ClO_3^-	chlorate ion	ClO_2^-	**chlorite** ion	e.g.	calcium chlorite $Ca(ClO_2)_2$
SO_4^{2-}	sulfate ion	SO_3^{2-}	**sulfite** ion	e.g.	barium sulfite $BaSO_3$
PO_4^{3-}	phosphate ion	PO_3^{3-}	**phosphite** ion	e.g.	lithium phosphite Li_3PO_3

2. HYPO____ITE ions

An ion with one less oxygen than the "____ite" (two less than "___ate") and the same charge is called "hypo____ite" ion.

ClO_2^-	chlorite ion	ClO^-	**hypochlorite** ion	e.g.	sodium hypochlorite NaClO
BrO_3^-	bromate ion	BrO^-	**hypobromite** ion	e.g.	magnesium hypobromite $Mg(BrO)_2$

3. PER____ATE ions

An ion with one more oxygen than the "___ate" and the same charge is called "per___ate" ion.

ClO_3^-	chlorate ion	ClO_4^-	**perchlorate** ion	e.g.	silver perchlorate $AgClO_4$
IO_3^-	iodate ion	IO_4^-	**periodate** ion	e.g.	cesium periodate $CsIO_4$

You should be able to write formulas for the following acids and salts.

a. magnesium sulfite	g. hydrobromic acid	m. hypoiodous acid
b. silver perchlorate	h. barium periodate	n. thiosulfuric acid
c. sulfuric acid	i. copper(II) bromate	o. calcium phosphite
d. potassium hypochlorite	j. bromic acid	p. mercury(II) arsenate
e. lithium phosphite	k. acetic acid	o. ammonium nitrite
f. sulfurous acid	l. zinc chlorite	p. iron(II) sulfite

Answers are on the other side.