

Nomenclature of Acids Practice

Write the formula for each of the acids listed below:

Nitric acid	(ate)	HNO_3	
Chloric acid	ate	$HClO_3$	
Acetic acid	ate	CH_3COOH	$H(C_2H_3O_2)$
Hydrobromic acid		HBr	
Sulfurous acid	ite	H_2SO_3	
Chlorous acid	ite	$HClO_2$	
Hydrochloric acid		HCl	
Hypophosphorous acid		H_3PO_2	
Nitrous acid		HNO_2	
Hydrofluoric acid		HF	
Perchloric acid		$HClO_4$	
Hydroiodic acid		HI	
Phosphorous acid		H_3PO_3	
Carbonic acid		H_2CO_3	
Sulfuric acid		H_2SO_4	
Perbromic acid		$HBrO_4$	
Hypochlorous acid		$HClO$	

Name each of the following acids:

$HClO_4$	perchloric acid
H_3PO_4	phosphoric acid
$HCl_{(aq)}$	hydrochloric acid
H_3BO_3	boric acid
H_2SO_4	sulfuric acid
HNO	hyponitrous acid
$HI_{(aq)}$	hydroiodic acid
CH_3COOH	acetic acid
$HF_{(aq)}$	hydrofluoric acid
H_3PO_3	phosphorous acid
$HClO_3$	chloric acid
H_2CO_4	percarbonic acid
H_2SO_3	sulfurous acid
$HClO_2$	chloric chlorous acid
HNO_3	nitric acid

5 types of acids } binary → start with hydro-
of acids } oxy → per-ate-ite } -ic acid

Nomenclature Review

15. Write the chemical formula (plus state) for each of the following substances:

- (a) sodium hydrogen sulfate (toilet bowl cleaner) NaHSO_4
 (b) sodium hydroxide (lye, drain cleaner) NaOH
 (c) carbon dioxide (dry ice, soda pop) CO_2
 (d) acetic acid (vinegar) CH_3COOH
 (e) sodium thiosulfate pentahydrate (photographic "hypo") $\text{Na}_2\text{S}_2\text{O}_3$
 (f) sodium hypochlorite (laundry bleach) NaClO
 (g) octasulfur (vulcanizing rubber) S_8
 (h) potassium nitrate (meat preservative) KNO_3
 (i) phosphoric acid (rust remover) $\text{H}_3\text{PO}_4(\text{aq})$
 (j) iodine (disinfectant) I_2
 (k) aluminum oxide (alumina, aluminum ore) Al_2O_3
 (l) potassium hydroxide (caustic potash) KOH
 (o) aqueous hydrogen carbonate (carbonated beverages) H_2CO_3

16. Write the chemical formula for each of the following substances:

- (a) magnesium bromide MgBr_2
 (b) carbon disulfide CS_2
 (c) mercury(II) nitrite $\text{Hg}(\text{NO}_2)_2$
 (d) hydrochloric acid $\text{HCl}(\text{aq})$
 (e) lithium hydroxide LiOH
 (f) silver carbonate Ag_2CO_3
 (g) aluminum perchlorate $\text{Al}(\text{ClO}_4)_3$
 (h) copper(II) sulfate CuSO_4
 (i) sulfur trioxide SO_3
 (j) nickel(III) phosphate NiPO_4
 (k) magnesium oxide MgO
 (l) dinitrogen monoxide N_2O
 (m) iron(II) persulfate FeSO_5
 (n) carbonic acid H_2CO_3
 (o) calcium hydroxide $\text{Ca}(\text{OH})_2$
 (p) zinc hypochlorite $\text{Zn}(\text{ClO})_2$
 (q) lead(IV) perchlorate $\text{Pb}(\text{ClO}_4)_4$
 (r) phosphorous pentabromide PBr_5
 (s) arsenic(V) chloride AsCl_5
 (t) bismuth(III) nitrate $\text{Bi}(\text{NO}_3)_3$
 (u) sodium hypochlorite NaClO
 (v) oxygen dichloride OCl_2
 (w) tin(II) bromide SnBr_2
 (x) sulfuric acid H_2SO_4
 (y) potassium hydroxide KOH
 (z) barium carbonate BaCO_3

17. Write the chemical formula for each of the following substances:

- (a) ammonium dihydrogen phosphite $\text{NH}_4\text{H}_2\text{PO}_3$
 (b) lithium hydrogen sulfite LiHSO_3
 (c) potassium hydrogen sulfate KHSO_4
 (d) barium chloride trihydrate $\text{BaCl}_2 \cdot 3\text{H}_2\text{O}$
 (e) sodium dihydrogen phosphate NaH_2PO_4
 (f) sodium hydrogen carbonate NaHCO_3

18. Give the names of the following substances, using IUPAC chemical nomenclature:

- (a) $\text{CaCO}_3(\text{s})$ (marble, limestone, chalk) calcium carbonate
 (b) $\text{P}_2\text{O}_5(\text{s})$ (fertilizer) diphosphorus pentoxide
 (c) $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}(\text{s})$ (Epsom salts)
 (d) $\text{N}_2\text{O}(\text{g})$ (laughing gas, an anesthetic) dinitrogen monoxide
 (e) $\text{Na}_2\text{SiO}_3(\text{s})$ (water glass) sodium silicate
 (f) $\text{Ca}(\text{HCO}_3)_2(\text{s})$ (hard-water chemical)
 (g) $\text{HCl}(\text{aq})$ (muriatic acid, gastric fluid) hydrochloric acid
 (h) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}(\text{s})$ (copperplating, bluestone)
 (i) $\text{H}_2\text{SO}_4(\text{aq})$ (acid in car battery) sulfuric acid
 (j) $\text{Ca}(\text{OH})_2(\text{s})$ (slaked lime) calcium hydroxide
 (k) $\text{SO}_3(\text{g})$ (a cause of acid rain) sulfur trioxide
 (l) $\text{NaF}(\text{s})$ (toothpaste additive) sodium fluoride

19. Give the IUPAC names of the following substances:

- (a) $\text{NaCl}(\text{s})$ (d) $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2(\text{s})$
 (b) $\text{P}_2\text{O}_3(\text{s})$ (e) $\text{NH}_4\text{OCl}(\text{s})$
 (c) $\text{HNO}_3(\text{aq})$ (f) $\text{Sn}(\text{BrO}_3)_4(\text{s})$
 (g) $\text{Sb}_2\text{O}_3(\text{s})$ (q) $\text{Ba}(\text{C}_2\text{H}_3\text{O}_2)_2(\text{s})$
 (h) $\text{Zn}(\text{IO}_3)_2(\text{s})$ (r) $\text{ICl}(\text{s})$
 (i) $\text{Fe}(\text{NO}_4)_2(\text{s})$ (s) $\text{AuCl}_3(\text{s})$
 (j) $\text{Ca}(\text{OH})_2(\text{s})$ (t) $\text{MgS}(\text{s})$
 (k) $\text{KI}(\text{s})$ (u) $\text{N}_2\text{F}_2(\text{g})$
 (l) $\text{SF}_2(\text{g})$ (v) $\text{NiSO}_4(\text{s})$
 (m) $\text{HBr}(\text{aq})$ (w) $\text{H}_2\text{S}(\text{aq})$
 (n) $\text{CuCO}_3(\text{s})$ (x) $\text{AgBrO}_3(\text{s})$
 (o) $\text{Al}_2(\text{SO}_3)_3(\text{s})$ (y) $\text{LiClO}_4(\text{s})$
 (p) $\text{NH}_4\text{OH}(\text{l})$

20. Give the names of the following substances, using IUPAC chemical nomenclature:

- (a) $\text{CaHPO}_4(\text{s})$ (d) $\text{LiHCO}_3(\text{s})$
 (b) $\text{CuSO}_4 \cdot 7\text{H}_2\text{O}(\text{s})$ (e) $\text{KHSO}_4(\text{s})$
 (c) $\text{Na}_2\text{HPO}_4(\text{s})$

21. Write the name and formula (with state at SATP) for the compound formed by each of the following pairs of elements. Where a molecular compound is formed, give the structural formula. For ionic compounds, assume the most common ion charges for the ions.

- (a) potassium and bromine KBr
 (b) silver and iodine AgI
 (c) lead and oxygen PbO
 (d) zinc and sulfur ZnS
 (e) copper and oxygen CuO
 (f) lithium and nitrogen Li_3N

20. a) calcium hydrogen phosphate
 b) copper(II) sulfate heptahydrate
 c) sodium hydrogen phosphate
 d) lithium hydrogen carbonate
 e) potassium hydrogen sulfate

18. c) magnesium sulfate heptahydrate
f) calcium hydrogen carbonate
h) copper (II) sulfate pentahydrate

19. a) sodium chloride
b) diphosphorus trioxide
c) nitric acid
d) lead (II) acetate
e) ammonium hypochlorite
f) tin (IV) bromate
g) antimony (III) oxide
h) zinc iodate
i) iron (II) pernitrate
j) calcium hydroxide
k) potassium iodide
l) sulfur difluoride
m) hydrobromic acid
n) copper (II) carbonate
o) aluminum sulfite
p) ammonium hydroxide
q) barium acetate
r) iodine monochloride
s) gold (III) chloride
t) magnesium sulfide
u) dinitrogen difluoride
v) nickel (II) sulfate
w) hydrosulfuric acid
x) silver bromate
y) lithium perchlorate

POLYATOMIC NAME	FORMULA	ACID FORMULA	ACID NAME
sulfate	SO_4^{-2}	$H_2SO_4(aq)$	sulfuric acid
persulfate	SO_5^{-2}	$H_2SO_5(aq)$	persulfuric acid
sulfite	SO_3^{-2}	$H_2SO_3(aq)$	sulfurous acid
hyposulfite	SO_2^{-2}	$H_2SO_2(aq)$	hyposulfurous acid
phosphate	PO_4^{-3}	H_3PO_4	phosphoric acid
perphosphate	PO_5	H_3PO_5	perphosphoric acid
phosphite	PO_3	H_3PO_3	phosphorous acid
hypophosphite	PO_2	H_3PO_2	hypophosphorous acid
dichromate	$Cr_2O_7^{-2}$	$H_2Cr_2O_7$	dichromic acid
perdichromate	Cr_2O_8	$H_2Cr_2O_8$	perdichromic acid
dichromite	Cr_2O_6	$H_2Cr_2O_6$	dichromous acid
hypodichromite	Cr_2O_5	$H_2Cr_2O_5$	hypodichromous acid

Pracitice:

Nitric acid	HNO_3
Hydrocyanic acid	HCN
Chloric acid	$HClO_3$
Acetic acid	HCH_3COO
Hydrobromic acid	HBr
Sulfurous acid	H_2SO_3
Chlorous acid	$HClO_2$
Boric acid	H_3BO_3
Hydrochloric acid	HCl
Phosphoric acid	H_3PO_4
Nitrous acid	HNO_2
Hydrofluoric acid	HF
Perchloric acid	$HClO_4$
Hydroiodic acid	HI
Phosphorous acid	H_3PO_3
Carbonic acid	H_2CO_3
Sulfuric acid	H_2SO_4
Formic acid	$HCOOH$

$HIO_3 \rightarrow$ iodic acid

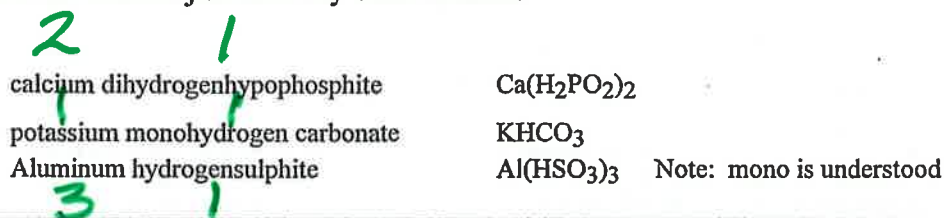
Name each of the following acids:

$HClO_4$	perchloric acid
$HCOOH$	formic acid
H_3PO_4	phosphoric acid
$HCl(aq)$	hydrochloric acid
H_3BO_3	boric acid
H_2SO_4	sulfuric acid
HNO_2	nitrous acid
$HI(aq)$	hydroiodic acid
CH_3COOH	acetic acid
$HF(aq)$	hydrofluoric acid
H_3PO_3	phosphorous acid
$HCN(aq)$	hydrocyanic acid
$HClO_3$	chloric acid
H_2CO_3	carbonic acid
H_2SO_3	sulfurous acid
$HClO_2$	chlorous acid
HNO_3	nitric acid
$HBr(aq)$	hydrobromic acid

Acid Salts:

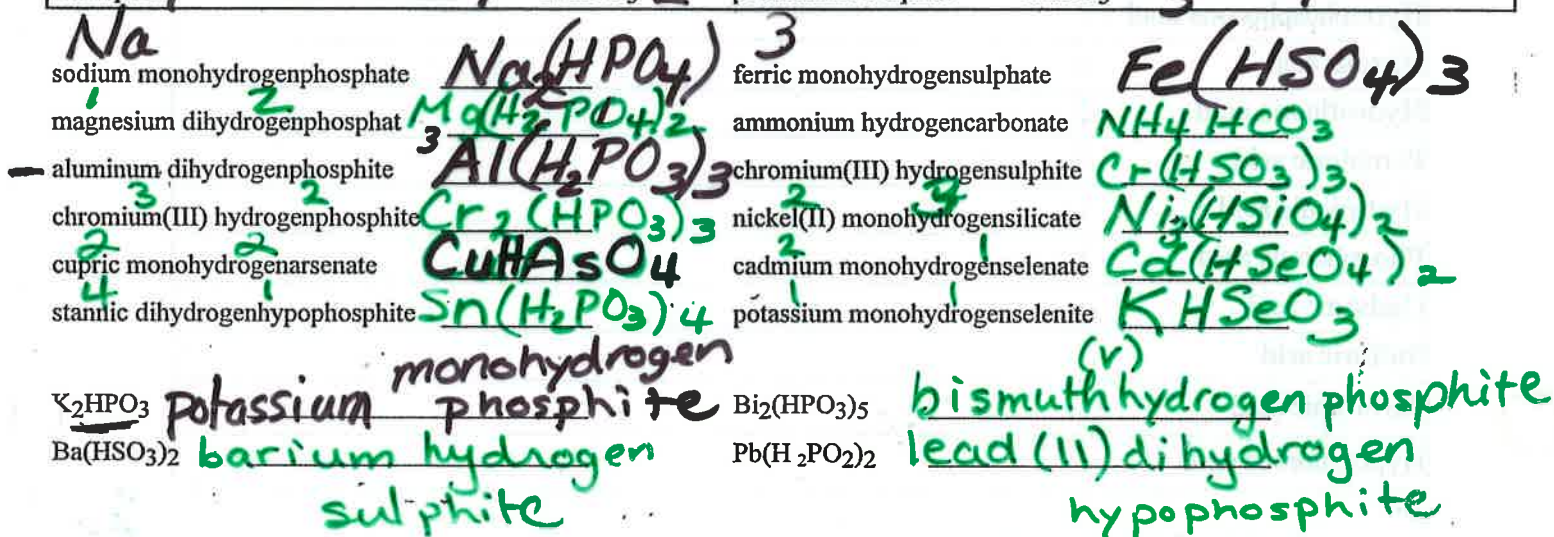
The acid radicals are treated just like any other radical:

Examples:



Note: In some old texts, the prefix "bi" is sometimes used instead of monohydrogen. Its use is very selective and should not be considered to name compounds, but know how to write the formulas when the prefix "bi" is used.

Examples: 1 sodium bicarbonate 1 NaHCO₃ 2 potassium bisulphite KHSO₃ 3 1



Derived Oxy acid and Salts worksheet

Exercise:

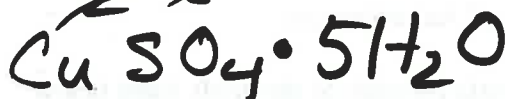
Complete the following table for the acids listed on a separate piece of paper.

phosphorous acid	nitric acid	iodic acid
hypophosphorous acid	bromic acid	perbromic acid
phosphoric acid	bromous acid	iodous acid
sulfuric acid	hypobromous acid	hypoiodous acid
sulfurous acid	periodic acid	

Name of the acid	Formula of the acid	Name of the associated radical	Formula of the associated radical	Valence value of the associated radical
phosphorous	H ₃ PO _{3(aq)}	phosphite	PO ₃	-3
hypophosphorous	H ₃ PO _{2(aq)}	hypophosphite	PO ₂	-3
nitric	HNO _{3(aq)}	nitrate	NO ₃	-1

NOMENCLATURE 6

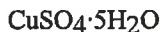
Hydrates:



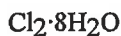
Greek prefixes are used to indicate how many water molecules are associated with the crystal.

Examples:

copper(II) sulfate pentahydrate



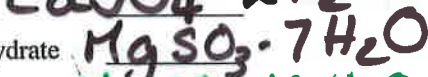
chlorine octahydrate



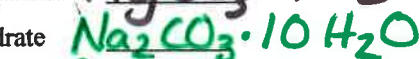
calcium sulfate dihydrate



magnesium sulfite heptahydrate



sodium carbonate decahydrate



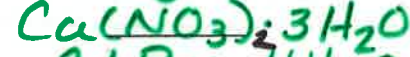
aluminum oxide monohydrate



ferric chloride hexahydrate



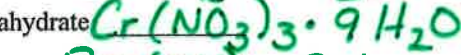
calcium nitrate trihydrate



cadmium bromide tetrahydrate



chromium(III) nitrate nonahydrate



barium hydroxide octahydrate



cobalt(II) perchlorate pentahydrate



barium chloride dihydrate



aluminum nitrate monohydrate



bromine decahydrate



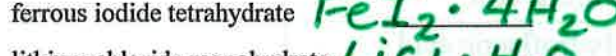
iodine tetrahydrate



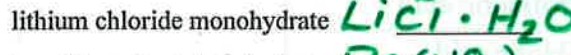
copper(II) bromate hexahydrate



ferrous iodide tetrahydrate



lithium chloride monohydrate



beryllium nitrate tetrahydrate



Peroxides:

These are binary oxides, which contain an extra oxygen atom.

Rule:

1. Write the formula as if the regular oxide



2. Add on one extra oxygen atom



Do not at this stage ~~cancel~~ any of the subscripts.

zinc peroxide



calcium peroxide



cesium peroxide



copper(II) peroxide



magnesium peroxide



potassium peroxide



strontium peroxide



hydrogen peroxide



barium peroxide



aluminum peroxide



Thio Compounds

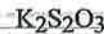
The prefix thio in the name indicates that an oxygen atom has been replaced by a sulphur atom.

Examples:

potassium sulphate



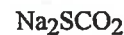
potassium thiosulphate



sodium carbonate



sodium thiocarbonate



potassium cyanate



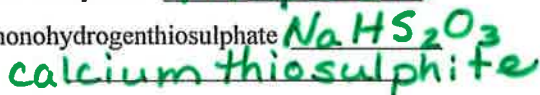
potassium thiocyanate



ammonium thiocyanate



sodium monohydrogenthiosulphate



potassium thiosulfate



aluminum thiocarbonate



aluminum thiophosphate