

NOMENCLATURE 1

Binary Compounds with Elements having one valence value

- Binary compounds contain **two elements only**.
- They are usually ionic compounds (**metal with a non-metal**).
- When naming compounds the least electronegative element (usually the metal) is usually written first.

Rules for Binary Compounds

- The first mentioned element uses its name as it appears on the Periodic table
- The second element in the name of the binary compound always ends in **"ide"**. (ex. oxide, fluoride)
- Elements have a valence value determined by their group on the Periodic table.

Valences:

1	2		3	4	3	2	1	0
Groups: 1	2		13	14	15	16	17	18

Crossover rule for writing Formulas

1. write down the symbols of the elements in the order given in the name. Ex. Ca C
(calcium carbide)
2. Write valences above element's symbol. Ex. $\overset{2}{\text{Ca}} \overset{4}{\text{C}}$
3. Divide valences by the highest common multiple. Ex. $\overset{1}{\text{Ca}} \overset{2}{\text{C}}$
4. Crossover valences. Ex. Ca_2C_1
5. Drop all 1's and unnecessary brackets. Ex. Ca_2C

Other Examples:

sodium oxide Na_2O

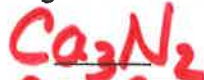
calcium sulfide CaS

magnesium bromide MgBr_2

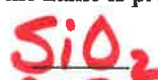
Exercise:

For all exercises you will give the name if formula provided and the formula if the name is provided.

calcium nitride



silicon oxide



aluminum carbide



aluminum bromide



silver sulphide



zinc silicide



sodium fluoride



potassium bromide



barium iodide



magnesium chloride



LiCl lithium chloride

BaO barium oxide

K_2S potassium sulphide

Al_2O_3 aluminum oxide

NOMENCLATURE 2

Binary Compounds with Elements having more than one valence value

Rules

Remember: The names of binary compounds always ends in "ide".

Whenever the first mentioned element has **more than one valence value**, this must be indicated in the name. **It will always be the first element. The second element has a valence value equal to the value for its group on the periodic table** (see NOMENCLATURE 1).

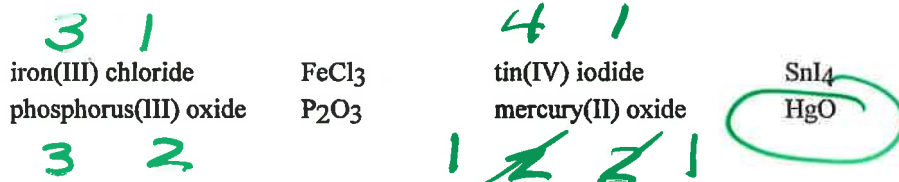
Valence values of transition metals, along with other elements, are listed on the back of your periodic table. By looking on the back of your periodic table you will see that some elements in the left hand column have more than one valence. On the front of the Periodic table, below each symbol are a number of values which the legend calls "oxidation states". In most cases, these also correspond to valence values. These elements, with more than one valence when named first in the compound, **MUST** show which valence is used.

There are 3 ways of indicating the valence used, and the different methods must not be mixed.

Method 1 - Roman numeral method (IUPAC)

- The valence value to be used is indicated by using uncrossed Roman numerals (I, II, III, IV, V, VI, VII, VIII, IX, X)
- It is placed in brackets immediately following the name of the first element.

Examples:



Exercise:

For all exercises you will give the name if formula provided and the formula if the name is provided.

<p style="color: red; font-size: 1.2em;">3 1</p> <p>iron(III) chloride <u>FeCl₃</u></p> <p style="color: red; font-size: 1.2em;">4 2</p> <p>tin(IV) oxide <u>SnO₂</u></p> <p style="color: red; font-size: 1.2em;">5 1</p> <p>phosphorus(V) chloride <u>PCl₅</u></p> <p style="color: red; font-size: 1.2em;">2</p> <p>copper(I) bromide <u>CuBr</u></p> <p style="color: red; font-size: 1.2em;">5 2</p> <p>antimony(V) sulphide <u>Sb₂S₅</u></p> <p style="color: red; font-size: 1.2em;">3 2</p> <p>arsenic(III) oxide <u>As₂O₃</u></p> <p style="color: red; font-size: 1.2em;">2 3</p> <p>mercury(I) sulphide <u>Hg₂S</u></p> <p style="color: red; font-size: 1.2em;">2 3</p> <p>Pb₃N₂ <u>lead(II) nitride</u></p> <p style="color: red; font-size: 1.2em;">2 2</p> <p>NiI₂ <u>nickel(II) iodide</u></p> <p style="color: red; font-size: 1.2em;">4 2</p> <p>Co₂Se₃ <u>cobalt(III) selenide</u></p> <p style="color: red; font-size: 1.2em;">2 2</p> <p>SnO₂ <u>tin(IV) oxide</u></p>	<p style="color: red; font-size: 1.2em;">2 2</p> <p>copper(II) sulphide <u>CuS</u></p> <p style="color: red; font-size: 1.2em;">5 1</p> <p>arsenic(V) iodide <u>AsI₅</u></p> <p style="color: red; font-size: 1.2em;">1 2</p> <p>gold(I) telluride <u>Au₂Te</u></p> <p style="color: red; font-size: 1.2em;">6 2</p> <p>sulphur(VI) oxide <u>SO₃</u></p> <p style="color: red; font-size: 1.2em;">5 3</p> <p>bismuth(v) phosphide <u>Bi₃P₅</u></p> <p style="color: red; font-size: 1.2em;">2 2</p> <p>mercury(II) chloride <u>HgCl₂</u></p> <p style="color: red; font-size: 1.2em;">3 3</p> <p>gold(III) chloride <u>AuCl₃</u></p> <p style="color: red; font-size: 1.2em;">3 3</p> <p>SbF₃ <u>antimony(III) fluoride</u></p> <p style="color: red; font-size: 1.2em;">2 4</p> <p>MnO₂ <u>manganese(IV) oxide</u></p> <p style="color: red; font-size: 1.2em;">3 5</p> <p>BiF₅ <u>bismuth(V) fluoride</u></p> <p style="color: red; font-size: 1.2em;">2 2</p> <p>ZnO <u>zinc oxide</u></p>
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4 2 2 1
SnO

Method 2 - "ous" and "ic" method

- When the first written element has two valences only, the name of the element ending with "ous" denotes the lower valence value
 - The name of the element ending with an "ic" denotes the higher valence values.
- See the back of your periodic table for these names and corresponding valences. But they are also listed below:

1. In some cases, the latin name for the element is used:

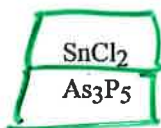
iron:	ferrous	(valence = 2)	and	ferric	(valence = 3)
gold:	aurous	(valence = 1)	and	auric	(valence = 3)
copper:	cuprous	(valence = 1)	and	cupric	(valence = 2)
tin:	stannous	(valence = 2)	and	stannic	(valence = 4)
lead:	plumbous	(valence = 2)	and	plumbic	(valence = 4)
cobalt	cobaltous	(valence = 2)	and	cobaltic	(valence = 3)
nickel	nickelous	(valence = 2)	and	nickelic	(valence = 3)
mercury	mercurous	(valence = 1)	and	mercuric	(valence = 2)
platinum	platinous	(valence = 2)	and	platinic	(valence = 4)

2. Some elements having more than two valence values or oxidation states use specific values for the "ous" and the "ic".

nitrogen	ous = 1	ic = 2	chromium	ous = 2	ic = 3
manganese	ous = 2	ic = 3	phosphorus	ous = 3	ic = 5
arsenic	ous = 3	ic = 5	bismuth	ous = 3	ic = 5

Examples:

2 1
stannous chloride
arsenic phosphide



3 2
phosphorous oxide
nitric oxide

P₂O₃
NO

-2 2

Exercise:

For all exercises you will give the name if formula provided and the formula if the name is provided.

3 2 ferric oxide	Fe ₂ O ₃	4 2 stannic oxide	SnO ₂
5 2 phosphoric sulfide	P ₂ S ₅	3 3 arsenious nitride	As ₃ N
1 1 cuprous fluoride	CuF	2 1 mercuric fluoride	HgF ₂
4 1 stannic fluoride	SnF ₄	1 3 cuprous nitride	Cu ₃ N
3 2 antimonous sulfide	Sb ₂ S ₃	3 1 auric chloride	AuCl ₃
arsenious bromide	AsBr ₃	2 2 cupric sulfide	CuS
NiI ₂	nickelous iodide	5 2 Sb ₂ S ₅	antimonious sulphide
HgBr	mercurous bromide	As ₄ C ₅	arsenic carbide
CoCl ₃	cobaltic chloride	Au ₂ S	aurous sulfide
As ₃ N ₅	arsenic nitride	3 1 3 PAs	phosphorous arsenide

Method 3 - Greek prefix method

- This method **does not use** the valence values and there is no crossover of numbers.
- The Greek **prefix** is placed in front of the element name to indicate how many atoms of the element to place in the formula.
- The word "mono" is usually omitted only if it applies to the first element.

Prefixes: mono = 1 di = 2 tri = 3 tetra = 4 penta = 5
 hexa = 6 hepta = 7 octa = 8 nona = 9 deca = 10

Examples: diphosphorus pentoxide P₂O₅ arsenic trichloride AsCl₃
 carbon monoxide CO xenon tetrafluoride XeF₄

Exercise:

For all exercises you will give the name if formula provided and the formula if the name is provided.

Xenom hexafluoride	<u>XeF₆</u>	sulfur dioxide	<u>SO₂</u>
sulphur trioxide	<u>SO₃</u>	carbon dioxide	<u>CO₂</u>
carbon disulphide	<u>CS₂</u>	diphosphorus trisulfide	<u>P₂S₃</u>
silicon dioxide	<u>SiO₂</u>	carbon tetrachloride	<u>CCl₄</u>
lead dioxide	<u>PbO₂</u>	manganese dioxide	<u>MnO₂</u>
nitrogen dioxide	<u>NO₂</u>	nitrogen tetroxide	<u>NO₄</u>
carbon tetrachloride	<u>CCl₄</u>	lead dioxide	<u>PbO₂</u>
dichlorine monoxide	<u>Cl₂O</u>	diphosphorus pentasulphide	<u>P₂S₅</u>
KrF ₂	<u>krypton difluoride</u>	ICl	<u>iodine monochloride</u>
SeCl ₂	<u>selenium dichloride</u>	ICl ₇	<u>iodine heptachloride</u>
NF ₃	<u>nitrogen trifluoride</u>	P ₂ S ₅	<u>diphosphorus pentasulfide</u>

Formula of elements:

- Most elements are written as single entities.
- All Metals and Noble Gases

Examples: iron Fe (s) copper Cu (s) helium He (g)

The exceptions will have to be memorized!

- **the diatomic gases:**
- they always exist as pairs

H O F Br I N Cl

HONC FBI

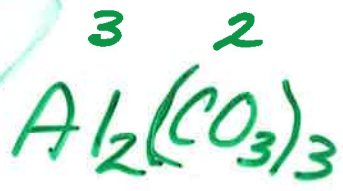
[HONK FBI]

or H7

hydrogen H _{2(g)}	oxygen O _{2(g)}	nitrogen N _{2(g)}	chlorine Cl _{2(g)}
fluorine F _{2(g)}	bromine Br _{2(l)}	iodine I _{2(s)}	

- two other non-metals usually exist as the following:
 sulphur S₈ phosphorus P₄

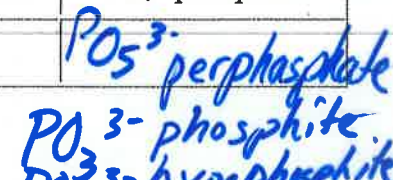
NOMENCLATURE 3



Some Common Polyatomic Ions

- Below is a list of some of the common **polyatomic ions** along with their **charges**. A more complete list is found on the back of your periodic table.
 - These groups of elements are referred to as polyatomic ions, complex ions or radicals.
 - The polyatomics behave as if they were a single entity and follow the cross-over rule in the same manner as other single elements. Brackets are used in the formula, only if there are 2 or more of the polyatomics indicated in the formula. For example, brackets are used in $Al_2(SO_4)_3$ but not in Na_3PO_4
 - The most common polyatomic cation is NH_4^+
 - Most are polyatomic anions (that all carry a negative charge).
- When an element forms two different polyatomics, the ion with one less oxygen atom ends with -ite and the one with one more oxygen atom ends with -ate. (normal)
- When an element forms more than two polyatomics, the prefixes hypo- and per- are used to indicate the one with the fewest number of oxygens and the most number of oxygens, respectively. For example, BrO_4^- is called perbromate ion and IO^- is called hypoiodite ion.
- * NOTE: the ion that ends in "ate" is considered the "normal" one.

Cations		Anions		
+1	+2	-1	-2	-3
NH_4^+ ammonium	VO^{2+} vanadyl	OH^- hydroxide		
H_3O^+ hydronium		CN^- cyanide	CrO_4^{2-} chromate	
NO^+ nitrosyl		MnO_4^- permanganate	$Cr_2O_7^{2-}$ dichromate	
		NO_2^- nitrite	SO_2^{2-} hyposulfite	AsO_3^{3-} arsenite
		NO_3^- nitrate	SO_3^{2-} sulfite	AsO_4^{3-} arsenate
		<u>2 less oxygens</u> → ClO^- hypochlorite	SO_5^{2-} persulfate	
		<u>one less oxygen</u> → ClO_2^- chlorite		
		<u>normal</u> → ClO_3^- chlorate	CO^{2-} hypocarbonite	
		<u>one more oxygen</u> → ClO_4^- perchlorate	CO_2^{2-} carbonite	
		HCO_3^- bicarbonate hydrogen carbonate	CO_3^{2-} carbonate	
		$H_2PO_4^-$ dihydrogen phosphate	CO_4^{2-} percarbonate	
			HPO_4^{2-} hydrogen phosphate	PO_4^{3-} phosphate
		CH_3COO^- acetate	$C_2O_4^{2-}$ oxalate	PO_5^{3-} perphosphate



Examples:

sodium hydroxide



potassium chromate



lithium cyanide



ammonium hydroxide



sodium dichromate



magnesium permanganate



potassium hydroxide



barium hydroxide



copper(II) chromate



ammonium bromate



nickel(III) cyanide



cobalt(II) cyanate



gallium dichromate



Sn(CN)₄



$KMnO_4$



XeF_6



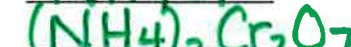
iron(III) cyanate



ammonium chloride



ammonium dichromate



ferrous hydroxide



auric bromide



zinc hydroxide



potassium chromate



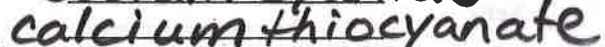
$Al(OH)_3$



CSCN



$Ca(SCN)_2$



Add one oxygen to "ate" ion → becomes "per-ate"

Remove one oxygen from "ate" → becomes "ite"

Remove 2 oxygens from "ate" → becomes "hypo-ite"

potassium chlorate



sodium carbonate



sodium nitrate



ferric sulfate



iron(III) acetate



gold(I) phosphate



aluminum silicate



magnesium chlorate



magnesium phosphate



ammonium nitrate



aurous sulfate



K_2CO_3



ammonium chlorate



Na_3PO_4



zinc nitrate



$Fe(ClO_3)_2$



potassium acetate



$Al(C_2H_3O_2)_3$



lithium chromate



→ $Zn_3(PO_4)_2$



→ sodium perchlorate



magnesium phosphite



aluminum sulfite



copper(I) permanganate



→ cobalt(III) chlorite



→ ammonium hypophosphite



tin(IV) hypochlorite



mercuric perchlorate



→ sodium phosphite



magnesium sulfite



→ aluminum nitrite



cuprous chlorite



cobalt(II) hypophosphite



→ ammonium hypoiodite



stannic perchlorate



gold(III) chromate



sodium sulphite



$Ga(BrO_4)_3$



aluminum chlorite



→ $Pt(ClO_4)$



nickel(III) hypochlorite



Ag_2O



tin(IV) phosphite



NH_4CNO

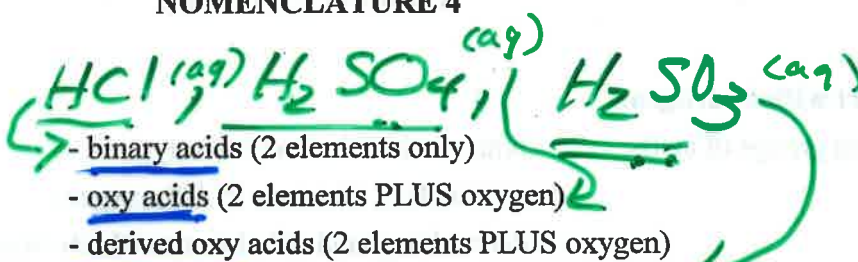


NOMENCLATURE 4

ACIDS:

All acids start with hydrogen.

There are three groups of acids:

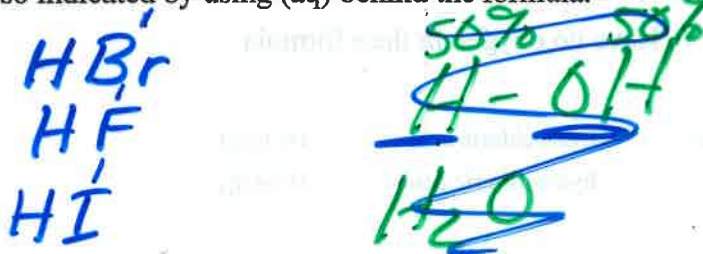


Binary Acids



- All have the prefix hydro and end with ic.
- All must contain hydrogen as the first element.
- Use the normal cross-over-rule to determine the formula.
- All are dissociated in water and must be so indicated by using (aq) behind the formula.
- Have no oxygen in their formula

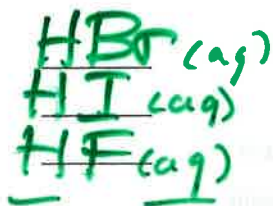
Examples: hydrochloric acid $HCl(aq)$
 hydrosulfuric acid $H_2S(aq)$



Exercise:

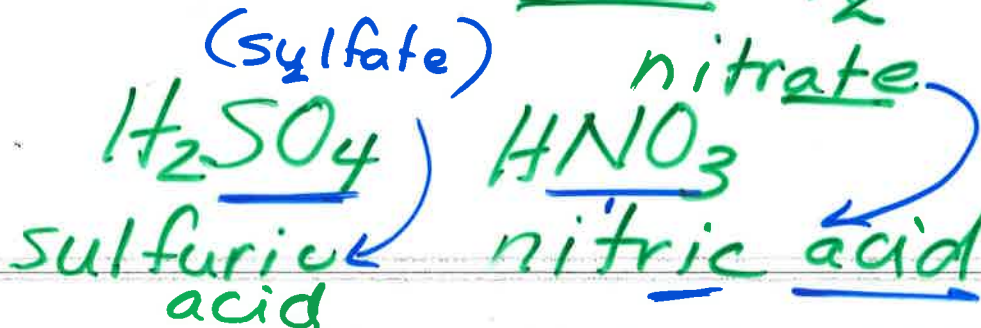
For all exercises you will give the name if formula provided and the formula if the name is provided.

hydrobromic acid
 hydroiodic acid
 hydrofluoric acid

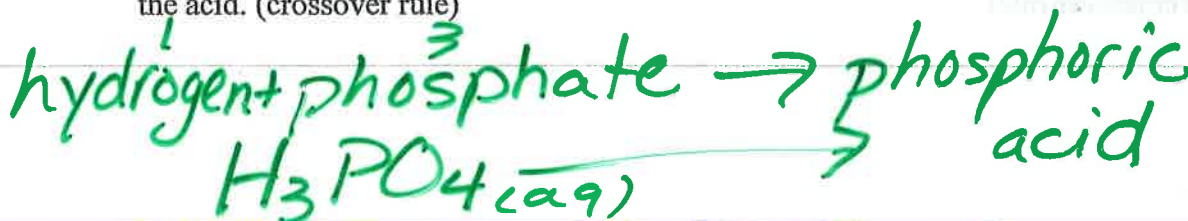


HCl hydrochloric acid
 HBr hydrobromic acid
 hydrofluoric acid HF
 hydrosulfuric acid H_2S

Oxy acids



- All contain H, O and at least one other non-metal element
- The name of the acid ends in ic. ate → ic acid
- The name of the associated polyatomic ends in ate. (i.e. "ate" becomes and "ic" acid).
- The valence value of the associated polyatomic is equal to the number of acidic hydrogen atoms in the acid. (crossover rule)



The following six oxy acids and their associated polyatomics along with their valence values are the most common.

Name of the Acid	Formula of the Acid	Name of the associated polyatomic	Formula of the associated polyatomic	valence value for the associated polyatomic
chromic acid	H_2CrO_4 (aq)	chromate	CrO_4	2
nitric acid	HNO_3 (aq)	nitrate	NO_3	1
fluoric acid	HFO_3 (aq)	fluorate	FO_3	1
carbonic acid	H_2CO_3 (aq)	carbonate	CO_3	2
sulfuric acid	H_2SO_4 (aq)	sulfate	SO_4	2
phosphoric acid	H_3PO_4 (aq)	phosphate	PO_4	3

NOTE:

Using the periodic table it is possible to write the names and formulas for a number of other oxy acids using the fact that members of the same chemical family have similar chemical properties. Elements of the same chemical family (group) follow the pattern of the oxy acid immediately above the oxy acid that has been memorized.

Examples: HFO_3 Fluoric acid $HClO_3$ - Chloric acid HIO_3 - iodic acid $HBrO_3$ - bromic acid.

Exercise: Complete the following chart for the acids listed.

Name of the acid	Formula of the acid	Name of the associated polyatomic	Formula of the associated polyatomic	Valence value of the associated polyatomic

dichromic acid iodic acid manganic acid chromic acid cyanic acid

Derived oxy acids

Derived oxy acids as the name implies are derived from the parent oxy acids.

- the parent oxy acid comes from the polyatomic 'ate' radical bonded with the appropriate number of hydrogen atoms
- ~~in all cases the valence value of the polyatomics remain the same and consequently so do the number of hydrogen atoms in the acid~~
- what changes in the acids and polyatomics is the number of oxygen atoms
- when the polyatomic has an oxygen added the prefix **per** is added ie. ClO_3^- goes to ClO_4^- and is now called **perchlorate** and the acid is **perchloric acid** $HClO_{4(aq)}$
- when the polyatomic has an oxygen subtracted the ending is changed ie. ClO_3^- goes to ClO_2^- and is called chlorite and the acid is chlorous acid $HClO_{2(aq)}$
- when the polyatomic has two oxygen atoms subtracted the ending is changed and a prefix **hypo** is added ie. ClO_3^- goes to ClO^- and is called **hypochlorite** and the acid is **hypochlorous acid** $HClO_{(aq)}$

ate \Rightarrow ic acid } ite \rightarrow ous acid
 per-ate \rightarrow per-ic acid } hypo-ite \rightarrow hypo-ous acid

POLYATOMIC NAME	FORMULA	ACID FORMULA	ACID NAME
sulfate	SO_4^{-2}	$H_2SO_4(aq)$	sulfuric acid
persulfate	$SO_5^{-1.2}$	$H_2SO_5(aq)$	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

NOMENCLATURE 5

Salts

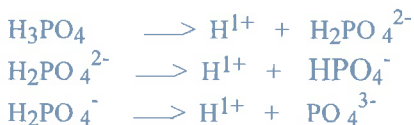
- Salts are compounds which can be formed when an acid and a base neutralize each other.
- Most of the compounds in the section on binary compounds could be considered to be salts formed from a base and a binary acid.
- Salts can also be formed from a base and an oxy acid or derived oxy acid.

Examples:

sodium sulphate	Na_2SO_4	calcium phosphate	$\text{Ca}_3(\text{PO}_4)_2$
aluminum carbonate	$\text{Al}_2(\text{CO}_3)_3$	zinc perchlorate	$\text{Zn}(\text{ClO}_4)_2$
cupric nitrite	$\text{Cu}(\text{NO}_2)_2$	stannous hypoiodite	$\text{Sn}(\text{IO})_2$

Acid Radicals

- The oxy acids which have more than one acidic hydrogen are able to lose the hydrogens, one at a time.
- This gives rise to radicals, with acidic hydrogens still attached
- These radicals are referred to as acid radicals:



<u>Radical</u>	<u>Name</u>	<u>Valence value</u>
PO_4	phosphate	3
HPO_4	monohydrogen phosphate	2
H_2PO_4	dihydrogen phosphate	1

* Valence value = Valence of the non-acid radical - # H's still attached.

For the following give the formula and valence value of the radicals listed:

phosphite	PO_3	-3	monohydrogensulphate	HSO_4	-1
monohydrogenphosphite	HPO_3	-2	sulphite	SO_3	-2
dihydrogenphosphite	H_2PO_3	-1	monohydrogensulphite	HSO_3	-1
hypophosphite	PO_2	-3	carbonate	CO_3	-2
monohydrogenhypophosphite	HPO_2	-2	monohydrogencarbonate	HCO_3	-1
dihydrogenhypophosphite	H_2PO_2	-1	chromate	CrO_4	-2
sulphate	SO_4	-2	monohydrogechromate	HCrO_4	-1

Acid Salts:

The acid radicals are treated just like any other radical:

Examples:

calcium dihydrogenhypophosphite

$\text{Ca}(\text{H}_2\text{PO}_2)_2$

potassium monohydrogen carbonate

KHCO_3

Aluminum hydrogensulphite

$\text{Al}(\text{HSO}_3)_3$ Note: mono is understood

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 NaHCO_3 2 potassium bisulphite KHSO_3 3 1

Na
 sodium monohydrogenphosphate $\text{Na}_2(\text{HPO}_4)$ 3
 magnesium dihydrogenphosphat $\text{Mg}(\text{H}_2\text{PO}_4)_2$
 aluminum dihydrogenphosphite $\text{Al}(\text{H}_2\text{PO}_3)_3$
 chromium(III) hydrogenphosphite $\text{Cr}_2(\text{HPO}_3)_3$
 cupric monohydrogenarsenate CuHAsO_4
 stannic dihydrogenhypophosphite $\text{Sn}(\text{H}_2\text{PO}_3)_4$
 potassium monohydrogen phosphite K_2HPO_3
 barium hydrogen sulphite $\text{Ba}(\text{HSO}_3)_2$
 ferric monohydrogensulphate $\text{Fe}(\text{HSO}_4)_3$
 ammonium hydrogencarbonate NH_4HCO_3
 chromium(III) hydrogensulphite $\text{Cr}(\text{HSO}_3)_3$
 nickel(II) monohydrogensilicate $\text{Ni}_2(\text{HSiO}_4)_2$
 cadmium monohydrogenselenate $\text{Cd}(\text{HSeO}_4)_2$
 potassium monohydrogenselenite KHSeO_3
 bismuth hydrogen phosphite $\text{Bi}_2(\text{HPO}_3)_5$
 lead(II) dihydrogen hypophosphite $\text{Pb}(\text{H}_2\text{PO}_2)_2$

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	$\text{H}_3\text{PO}_3(\text{aq})$	phosphite	PO_3	-3
hypophosphorous	$\text{H}_3\text{PO}_2(\text{aq})$	hypophosphite	PO_2	-3
nitric	$\text{HNO}_3(\text{aq})$	nitrate	NO_3	-1

NOMENCLATURE 6



Hydrates:

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

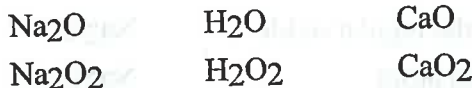
Examples:	copper(II) sulfate pentahydrate	$CuSO_4 \cdot 5H_2O$
	chlorine octahydrate	$Cl_2 \cdot 8H_2O$
2	calcium sulfate dihydrate	$CaSO_4 \cdot 2H_2O$
	magnesium sulfite heptahydrate	$MgSO_3 \cdot 7H_2O$
	sodium carbonate decahydrate	$Na_2CO_3 \cdot 10H_2O$
	aluminum oxide monohydrate	$Al_2O_3 \cdot H_2O$
	ferric chloride hexahydrate	$FeCl_3 \cdot 6H_2O$
	calcium nitrate trihydrate	$Ca(NO_3)_2 \cdot 3H_2O$
	cadmium bromide tetrahydrate	$CdBr_2 \cdot 4H_2O$
	chromium(III) nitrate nonahydrate	$Cr(NO_3)_3 \cdot 9H_2O$
	barium hydroxide octahydrate	$Ba(OH)_2 \cdot 8H_2O$
	cobalt(II) perchlorate pentahydrate	$Co(ClO_4)_2 \cdot 5H_2O$
	barium chloride dihydrate	$BaCl_2 \cdot 2H_2O$
	aluminum nitrate monohydrate	$Al(NO_3)_3 \cdot H_2O$
	bromine decahydrate	$Br_2 \cdot 10H_2O$
	iodine tetrahydrate	$I_2 \cdot 4H_2O$
	copper(II) bromate hexahydrate	$Cu(BrO_3)_2 \cdot 6H_2O$
	ferrous iodide tetrahydrate	$FeI_2 \cdot 4H_2O$
	lithium chloride monohydrate	$LiCl \cdot H_2O$
	beryllium nitrate tetrahydrate	$Be(NO_3)_2 \cdot 4H_2O$

Peroxides:

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

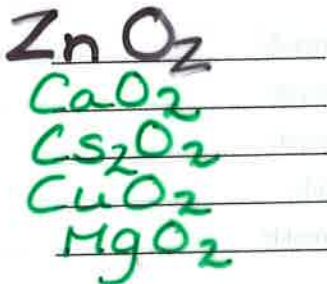
Rule:

1. Write the formula as if the regular oxide
2. Add on one extra oxygen atom

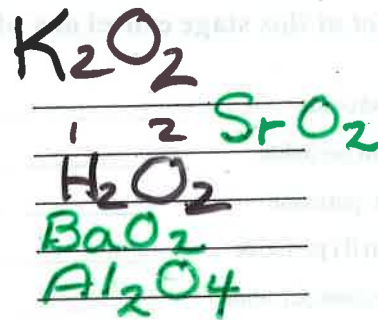


Do not at this stage ~~cancel any~~ of the subscripts.

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	K_2SO_4	potassium thiosulphate	$K_2S_2O_3$
	sodium carbonate	Na_2CO_3	sodium thiocarbonate	Na_2SCO_2
	potassium cyanate	$KCNO$	potassium thiocyanate	$KSCN$

ammonium thiocyanate NH_4SCN
sodium monohydrogenthiosulphate $NaHS_2O_3$
 CaS_2O_2 calcium thiosulphite

potassium thiosulfate $K_2S_2O_3$
aluminum thiocarbonate $Al(SCO_2)_3$
 $AlSPO_3$ aluminum thiophosphate