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:

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. $\overset{2}{Ca}\ \overset{4}{C}$

3. Divide valences by the highest common multiple. Ex. $\overset{1}{Ca}\ \overset{2}{C}$

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 (2 3)	Ca_3N_2	silicon oxide (4 2)	SiO_2
aluminum carbide (3 4)	Al_4C_3	aluminum bromide (3 1)	$AlBr_3$
silver sulphide (1 2)	Ag_2S	zinc silicide (2 4)	Zn_2Si
sodium fluoride (1 1)	NaF	potassium bromide (1 1)	KBr
barium iodide (2 1)	BaI_2	magnesium chloride (2 1)	$MgCl_2$
$LiCl$	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:

iron(III) chloride	$FeCl_3$	tin(IV) iodide	SnI_4
phosphorus(III) oxide	P_2O_3	mercury(II) oxide	HgO

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

iron(III) chloride	$FeCl_3$	copper(II) sulphide	CuS
tin(IV) oxide	SnO_2	arsenic(V) iodide	AsI_5
phosphorus(V) chloride	PCl_5	gold(I) telluride	Au_2Te
copper(I) bromide	CuBr	sulphur(VI) oxide	SO_3
antimony(V) sulphide	Sb_2S_5	bismuth(v) phosphide	Bi_3P_5
arsenic(III) oxide	As_2O_3	mercury(II) chloride	$HgCl_2$
mercury(I) sulphide	Hg_2S	gold(III) chloride	$AuCl_3$
Pb_3N_2	lead(II) nitride	SbF_3	antimony(III) fluoride
NiI_2	nickel(II) iodide	MnO_2	manganese(IV) oxide
Co_2Se_3	cobalt(III) selenide	BiF_5	bismuth(V) fluoride
SnO_2	tin(IV) oxide	ZnO	zinc oxide

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	platonic	(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:

stannous chloride	$SnCl_2$	phosphorous oxide	P_2O_3
arsenic phosphide	As_3P_5	nitric oxide	NO

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

ferric oxide	Fe_2O_3
phosphoric sulfide	P_2S_5
cuprous fluoride	CuF
stannic fluoride	SnF_4
antimonous sulfide	Sb_2S_3
arsenious bromide	$AsBr_3$
NiI_2	nickelous iodide
HgBr	mercurous bromide
$CoCl_3$	cobaltic chloride
As_3N_5	arsenic nitride

stannic oxide	SnO_2
arsenious nitride	AsN
mercuric fluoride	HgF_2
cuprous nitride	Cu_3N
auric chloride	$AuCl_3$
cupric sulfide	CuS
Sb_2S_5	antimonic sulphide
As_4C_5	arsenic carbide
Au_2S	aurous sulfide
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	P_2O_5	arsenic trichloride	$AsCl_3$
	carbon monoxide	CO	xenon tetrafluoride	XeF_4

Exercise:

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

Xenom hexafluoride	XeF_6	sulfur dioxide	SO_2
sulphur trioxide	SO_3	carbon dioxide	CO_2
carbon disulphide	CS_2	diphosphorus trisulfide	P_2S_3
silicon dioxide	SiO_2	carbon tetrachloride	CCl_4
lead dioxide	PbO_2	manganese dioxide	MnO_2
nitrogen dioxide	NO_2	nitrogen tetroxide	NO_4
carbon tetrachloride	CCl_4	lead dioxide	PbO_2
dichlorine monoxide	Cl_2O	diphosphorus pentasulphide	P_2S_5
KrF_2	krypton difluoride	ICl	iodine monochloride
$SeCl_2$	selenium dichloride	ICl_7	iodine heptachloride
NF_3	nitrogen trifluoride	P_2S_5	diphosphorus pentasulfide

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! HONC FBI

- **the diatomic gases:** H O F Br I N Cl [HONK FBI] or H7
- they always exist as pairs

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 S_8 phosphorus P_4

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.
- 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_3^{2-} sulfite	AsO_3^{3-} arsenite
		NO_3^- nitrate	SO_4^{2-} sulfate	AsO_4^{3-} arsenate
		ClO^- hypochlorite		
		ClO_2^- chlorite		
		ClO_3^- chlorate		
		ClO_4^- perchlorate		
		HCO_3^- bicarbonate hydrogen carbonate	CO_3^{2-} carbonate	
		$H_2PO_4^-$ dihydrogen phosphate	HPO_4^{2-} hydrogen phosphate	PO_4^{3-} phosphate
		CH_3COO^- acetate	$C_2O_4^{2-}$ oxalate	

Examples:

sodium hydroxide	$NaOH$	potassium chromate	K_2CrO_4
lithium cyanide	$LiCN$	ammonium hydroxide	NH_4OH
sodium dichromate	$Na_2Cr_2O_7$	magnesium permanganate	$Mg(MnO_4)_2$

potassium hydroxide	KOH	iron(III) cyanate	$Fe(CNO)_3$
barium hydroxide	$Ba(OH)_2$	ammonium chloride	NH_4Cl
copper(II) chromate	$Cu(CrO_4)$	ammonium dichromate	$(NH_4)_2Cr_2O_7$
ammonium bromate	$NH_4(BrO_3)$	ferrous hydroxide	$Fe(OH)_2$
nickel(III) cyanide	$Ni(CN)_3$	auric bromide	$AuBr_3$
cobalt(II) cyanate	$Co(CNO)_2$	zinc hydroxide	$Zn(OH)_2$
gallium dichromate	$Ga_2(Cr_2O_7)_3$	potassium chromate	K_2CrO_4
$Sn(CN)_4$	tin(IV) cyanide	$Al(OH)_3$	aluminum hydroxide
$KMnO_4$	potassium permanganate	$CsCN$	cesium cyanide
XeF_6	xenon hexafluoride	$Ca(SCN)_2$	calcium thiocyanate

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	$KClO_3$	sodium carbonate	Na_2CO_3
sodium nitrate	$NaNO_3$	ferric sulfate	$Fe_2(SO_4)_3$
iron(III) acetate	$Fe(CH_3COO)_3$	gold(I) phosphate	Au_3PO_4
aluminum silicate	$Al_4(SiO_4)_3$	magnesium chlorate	$Mg(ClO_3)_2$
magnesium phosphate	$Mg_3(PO_4)_2$	ammonium nitrate	NH_4NO_3
aurous sulfate	Au_2SO_4	K_2CO_3	potassium carbonate
ammonium chlorate	NH_4ClO_3	Na_3PO_4	sodium phosphate
zinc nitrate	$Zn(NO_3)_2$	$Fe(ClO_3)_2$	iron(II) chlorate
potassium acetate	KCH_3COO	$Al(C_2H_3O_2)_3$	aluminum acetate
lithium chromate	Li_2CrO_4	→ $Zn_3(PO_4)_2$	zinc phosphate
→ sodium perchlorate	$NaClO_4$	magnesium phosphite	$Mg_3(PO_3)_2$
aluminum sulfite	$Al_2(SO_3)_3$	copper(I) permanganate	$CuMnO_4$
→ cobalt(III) chlorite	$Co(ClO_2)_3$	→ ammonium hypophosphite	$(NH_4)_3PO_2$
tin(IV) hypochlorite	$Sn(ClO)_4$	mercuric perchlorate	$Hg(ClO_4)_2$
→ sodium phosphite	Na_3PO_3	magnesium sulfite	$MgSO_3$
→ aluminum nitrite	$Al(NO_2)_3$	cuprous chlorite	$CuClO_2$
cobalt(II) hypophosphite	$Co_3(PO_2)_2$	→ ammonium hypoiodite	NH_4IO
stannic perchlorate	$Sn(ClO_4)_4$	gold(III) chromate	$Au_2(CrO_4)_3$
sodium sulphite	Na_2SO_3	$Ga(BrO_4)_3$	gallium(III) perbromate
aluminum chlorite	$Al(ClO_2)_3$	→ $Pt(ClO)_4$	platinum (IV) hypochlorite
nickel(III) hypochlorite	$Ni(ClO)_3$	Ag_2O	silver oxide
tin(IV) phosphite	$Sn_3(PO_3)_4$	NH_4CNO	ammonium cyanate

NOMENCLATURE 4

ACIDS:

All acids start with hydrogen.

There are three groups of acids:
- binary acids (2 elements only)
- oxy acids (2 elements PLUS oxygen)
- derived oxy acids (2 elements PLUS oxygen)

Binary Acids

1. All have the prefix ***hydro*** and end with ***ic.***
2. All must contain hydrogen as the first element.
3. Use the normal cross-over-rule to determine the formula.
4. All are dissociated in water and must be so indicated by using (aq) behind the formula.
5. 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	$HBr(aq)$	HCl	hydrochloric acid
hydroiodic acid	$HI(aq)$	HBr	hydrobromic acid
hydrofluoric acid	$HF(aq)$	hydrofluoric acid	HF
		hydrosulfuric acid	H_2S

Oxy acids

1. All contain H, O and at least one other non-metal element
2. The name of the acid ends in ***ic.***
3. The name of the associated polyatomic ends in ***ate. (i.e "ate" becomes and "ic" acid).***
4. 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 chlor**ite** and the acid is chlor**ous** acid $H\,ClO_{2\,(aq)}$
- 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 $H\,ClO_{(aq)}$

ate → ic acid
ite → ous acid
per-ate → per-ic acid
hypo-ite → hypo-ous acid

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 → 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 fromed 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	$Ca_3(PO_4)_2$
aluminum carbonate	$Al_2(CO_3)_3$	zinc perchlorate	$Zn(ClO_4)_2$
cupric nitrite	$Cu(NO_2)_2$	stannous hypoiodite	$Sn(IO)_2$

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:

$H_3PO_4 \longrightarrow H^{1+} + H_2PO_4^{2-}$

$H_2PO_4^{2-} \longrightarrow H^{1+} + HPO_4^{-}$

$H_2PO_4^{-} \longrightarrow H^{1+} + PO_4^{3-}$

Radical	Name	Valence value
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
monohydrogenphosphite	HPO_3	-2
dihydrogenphosphite	H_2PO_3	-1
hypophosphite	PO_2	-3
monohydrogenhypophosphite	HPO_2	-2
dihydrogenhypophosphite	H_2PO_2	-1
sulphate	SO_4	-2
monohydrogensulphate	HSO_4	-1
suphite	SO_3	-2
monohydrogensulphite	HSO_3	-1
carbonate	CO_3	-2
monohydrogencarbonate	HCO_3	-1
chromate	CrO_4	-2
monohydrogechromate	$HCrO_4$	-1

Acid Salts:

The acid radicals are treated just like any other radical:

Examples:

calcium dihydrogenhypophosphite	$Ca(H_2PO_2)_2$
potassium monohydrogen carbonate	$KHCO_3$
Aluminum hydrogensulphite	$Al(HSO_3)_3$ 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: sodium bicarbonate $NaHCO_3$ potassium bisulphite $KHSO_3$

sodium monohydrogenphosphate	$Na_2(HPO_4)$	ferric monohydrogensulphate	$Fe_2(HSO_4)_3$
magnesium dihydrogenphosphat	$Mg(H_2PO_4)_2$	ammonium hydrogencarbonate	NH_4HCO_3
aluminum dihydrogenphosphite	$Al(H_2PO_3)_3$	chromium(III) hydrogensulphite	$Cr(HSO_3)_3$
chromium(III) hydrogenphosphite	$Cr_2(HPO_3)_3$	nickel(II) monohydrogensilicate	$Ni_2(HSiO_4)_2$
cupric monohydrogenarsenate	$CuHAsO_4$	cadmium monohydrogenselenate	$Cd(HSeO_4)_2$
stannic dihydrogenhypophosphite	$Sn(H_2PO_3)_4$	potassium monohydrogenselenite	$KHSeO_3$

K_2HPO_3	potassium monohydrogen phosphite	$Bi_2(HPO_3)_5$	bismuth (V) hydrogen phosphite
$Ba(HSO_3)_2$	barium hydrogen sulphite	$Pb(H_2PO_2)_2$	lead (II) dihydrogen hypophosphite

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	perbromicacid
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	$H_3PO_{3(aq)}$	phosphite	PO_3	-3
hypophosphorous	$H_3PO_{2(aq)}$	hypophosphite	PO_2	-3
nitric	$HNO_{3(aq)}$	nitrate	NO_3	-1

NOMENCLATURE 6

$CuSO_4 \cdot 5H_2O$

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	$Cl_2 \cdot 8H_2O$

calcium sulfate dihydrate	$CaSO_4 \cdot 2H_2O$	cobalt(II) perchlorate pentahydrate	$Co(ClO_4)_2 \cdot 5H_2O$
magnesium sulfite heptahydrate	$MgSO_3 \cdot 7H_2O$	barium chloride dihydrate	$BaCl_2 \cdot 2H_2O$
sodium carbonate decahydrate	$Na_2CO_3 \cdot 10H_2O$	aluminum nitrate monohydrate	$Al(NO_3)_3 \cdot H_2O$
aluminum oxide monohydrate	$Al_2O_3 \cdot H_2O$	bromine decahydrate	$Br_2 \cdot 10H_2O$
ferric chloride hexahydrate	$FeCl_3 \cdot 6H_2O$	iodine tetrahydrate	$I_2 \cdot 4H_2O$
calcium nitrate trihydrate	$Ca(NO_3)_2 \cdot 3H_2O$	copper(II) bromate hexahydrate	$Cu(BrO_3)_2 \cdot 6H_2O$
cadmium bromide tetrahydrate	$CdBr_2 \cdot 4H_2O$	ferrous iodide tetrahydrate	$FeI_2 \cdot 4H_2O$
chromium(III) nitrate nonahydrate	$Cr(NO_3)_3 \cdot 9H_2O$	lithium chloride monohydrate	$LiCl \cdot H_2O$
barium hydroxide octahydrate	$Ba(OH)_2 \cdot 8H_2O$	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 — Na_2O, H_2O, CaO
2. Add on one extra oxygen atom — Na_2O_2, H_2O_2, CaO_2

Do not at this stage cancel any of the subscripts.

zinc peroxide	ZnO_2	potassium peroxide	K_2O_2
calcium peroxide	CaO_2	strontium peroxide	SrO_2
cesium peroxide	Cs_2O_2	hydrogen peroxide	H_2O_2
copper(II) peroxide	CuO_2	barium peroxide	BaO_2
magnesium peroxide	MgO_2	aluminum peroxide	Al_2O_4

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	potassium thiosulfate	$K_2S_2O_3$
sodium monohydrogenthiosulphate	$NaHS_2O_3$	aluminum thiocarbonate	$Al_2(SCO_2)_3$
CaS_2O_2	calcium thiosulphite	$AlSPO_3$	aluminum thiophosphate