A. REGULAR BINARY COMPOUNDS

Worksheet A1

anions…+++ / cations…999	F^{-1} name: fluoride	O^{-2} name: oxide	N^{-3} name: nitride	C^{-4} name: carbide
Li^{+1} name: lithium	Li_1F_1 or LiF lithium fluoride	Li_2O_1 or Li_2O lithium oxide	Li_3N lithium nitride	Li_4C lithium carbide
Be^{+2} name: beryllium	Be_1F_2 or BeF_2 beryllium fluoride	BeO beryllium oxide	Be_3N_2 beryllium nitride	Be_2C beryllium carbide
B^{+3} name: boron	BF_3 boron fluoride	B_2O_3 boron oxide	BN boron nitride	B_4C_3 boron carbide
Na^{+1} name: sodium	NaF sodium fluoride	Na_2O sodium oxide	Na_3N sodium nitride	Na_4C sodium carbide
Mg^{+2} name: magnesium	MgF_2 magnesium fluoride	MgO magnesium oxide	Mg_3N_2 magnesium nitride	Mg_2C magnesium carbide
Al^{+3} name: aluminum	AlF_3 aluminum fluoride	Al_2O_3 aluminum oxide	AlN aluminum nitride	Al_4C_3 aluminum carbide

***Note: Carbon compounds, where carbon is the cation, will be named more correctly in section D.

Worksheet A2 : More Binary Compounds

chemical name	chemical formula	chemical name	chemical formula
sodium fluoride	**NaF**	**sodium iodide**	NaI
lithium chloride	**LiCl**	**beryllium fluoride**	BeF_2
beryllium bromide	**$BeBr_2$**	**magnesium oxide**	MgO
magnesium oxide	**MgO**	**hydrogen oxide**	H_2O
boron iodide	**BI_3**	**lithium sulfide**	Li_2S
aluminum sulfide	**Al_2S_3**	**boron chloride**	BCl_3
potassium oxide	**K_2O**	**aluminum oxide**	Al_2O_3
calcium fluoride	**CaF_2**	**potassium sulfide**	K_2S
barium nitride	**Ba_3N_2**	**silver chloride**	AgCl
cesium sulfide	**Cs_2S**	**calcium chloride**	$CaCl_2$
strontium oxide	**SrO**	**boron nitride**	BN
francium bromide	**FrBr**	**cesium iodide**	CsI

B. BINARY COMPOUNDS: MULTI-VALENT CATIONS

(Also known as multi-oxidation state cations)

"OUS - IC" METHOD

chemical name	chemical formula	chemical name	chemical formula
ferrous oxide	**FeO**	**ferric oxide**	Fe_2O_3
stannous chloride	**$SnCl_2$**	**stannic chloride**	$SnCl_4$
plumbous sulfide	**PbS**	**plumbic sulfide**	PbS_2
cuprous bromide	**CuBr**	**cupric bromide**	$CuBr_2$
aurous iodide	**AuI**	**auric iodide**	AuI_3
mercurous fluoride	**HgF**	**mercuric fluoride**	HgF_2

ROMAN NUMERAL METHOD (Also called the "STOCK SYSTEM")

chemical name	chemical formula	chemical name	chemical formula
copper(I) fluoride	**CuF**	**copper(II) fluoride**	CuF_2
manganese(II) oxide	**MnO**	**manganese(IV) oxide**	MnO_2
nickel(II) chloride	**$NiCl_2$**	**nickel(III) chloride**	$NiCl_3$
tin(II) sulfide	**SnS**	**tin(IV) sulfide**	SnS_2
mercury(I) iodide	**HgI**	**mercury(II) iodide**	HgI_2

Worksheet B

chemical formula	"ous-ic" method name	Roman numeral method name (Stock System name)
$SbCl_5$	**antimonic chloride**	**antimony(V) chloride**
As_2O_3	**arsenous oxide**	**arsenic(III) oxide**
CoS	**cobaltous sulfide**	**cobalt(II) sulfide**
Cu_2O	**cuprous oxide**	**copper(I) oxide**
Sn_3N_4	**stannic nitride**	**tin(IV) nitride**
Fe_2O_3	**ferric oxide**	**iron(III) oxide**
$PbBr_4$	plumbic bromide	**lead(IV) bromide**
MnO	manganous oxide	**manganese(II) oxide**
FeF_2	ferrous fluoride	**iron(II) fluoride**
HgI_2	mercuric iodide	**mercury(II) iodide**
NiS	nickelous sulfide	**nickel(II) sulfide**
SnO	stannous oxide	**tin(II) oxide**
Sn_3P_4	**stannic phosphide**	tin(IV) phosphide
SbF_3	**antimonous fluoride**	antimony(III) fluoride
As_2S_5	**arsenic sulfide**	arsenic(V) sulfide
PbO_2	**plumbic oxide**	lead(IV) oxide
Fe_4C_3	**ferric carbide**	iron(III) carbide
$CuCl_2$	**cupric chloride**	copper(II) chloride

C. BINARY COMPOUNDS: TWO NONMETALS

The Prefix Method

Worksheet C

chemical name	chemical formula	chemical name	chemical formula
nitrogen monoxide	**NO**	**carbon dioxide**	CO_2
silicon dioxide	**SiO_2**	**diarsenic trioxide**	As_2O_3
carbon monoxide	**CO**	**nitrogen dioxide**	NO_2
sulfur trioxide	**SO_3**	**diphosphorus pentoxide**	P_2O_5
phosphorus pentabromide	**PBr_5**	**carbon tetrabromide**	CBr_4
dinitrogen trioxide	**N_2O_3**	**sulfur hexafluoride**	SF_6
carbon tetrachloride	**CCl_4**	**selenium dioxide**	SeO_2

D. BINARY COMPOUNDS: "FLIP-FLOP" ELEMENTS

"flip-flop" elements	cation symbol and name	anion symbol and name
H	**H^{+1}, hydrogen**	**H^{-1}, hydride**
N	**$N^{+3, 5, 4, 2}$, nitrogen**	**N^{-3}, nitride**
P	**$P^{+3, 5, 4}$, phosphorus**	**P^{-3}, phosphide**
S	**$S^{+2, 4, 6}$, sulfur**	**S^{-2}, sulfide**
C	**$C^{+4, 2}$, carbon**	**C^{-4}, carbide**
Sb	**$Sb^{+3, 5}$, antimony**	**Sb^{-3}, antimonide**
As	**$As^{+3, 5}$, arsenic**	**As^{-3}, arsenide**

Worksheet D

chemical name	chemical formula	chemical name	chemical formula
aluminum carbide	**Al_4C_3**	**phosphorus mononitride**	PN
lithium hydride	**LiH**	**carbon dioxide**	CO_2
sodium arsenide	**Na_3As**	**magnesium phosphide**	Mg_3P_2
magnesium antimonide	**Mg_3Sb_2**	**hydrogen oxide**	H_2O
calcium nitride	**Ca_3N_2**	**dinitrogen pentoxide**	N_2O_5

E. BINARY ACIDS

Worksheet E

binary acid formula	name of binary acid (liquid form)	name of gas (vapour form)
HF	**hydrofluoric acid**	**hydrogen fluoride**
HCl	**hydrochloric acid**	**hydrogen chloride**
HBr	**hydrobromic acid**	**hydrogen bromide**
HI	**hydroiodic acid**	**hydrogen iodide**
H_2S	**hydrosulfuric acid**	**hydrogen sulfide**
H_2Se	**hydroselenic acid**	**hydrogen selenide**

F. DIATOMIC GASES

Name of diatomic gas	Formula for diatomic gas
hydrogen	H_2
oxygen	O_2
nitrogen	N_2
fluorine	F_2
chlorine	Cl_2
bromine	Br_2
iodine	I_2

G. MONATOMIC GASES

period	name of gas	formula or symbol
period 1	**helium**	**He**
period 2	**neon**	**Ne**
period 3	**argon**	**Ar**
period 4	**krypton**	**Kr**
period 5	**xenon**	**Xe**
period 6	**radon**	**Rn**

H. BINARY COMPOUNDS: SUMMARY

Although all chemical compounds with multi-valent cations **may** be named using all three methods learned, there is/are **preferred method(s)** for naming each type of chemical compound. An asterik (*) indicates the **preferred method** for the compounds summarized below. Chemical compounds having cations with only a single oxidation state only have one method for naming them.

chemical formula (metal and nonmetal)	**$CaCl_2$**	**B_2O_3**
chemical name	**calcium chloride**	**boron oxide**

chemical formula (multi-valent metal)	**MnO**	**Mn_2O_7**
ous-ic method	**manganous oxide**	**manganic oxide**
Roman numeral method (*)	**manganese(II) oxide**	**manganese(VII) oxide**
Prefix method (seldom used, but may be written)	**manganese monoxide**	**dimanganese heptoxide**

chemical formula (two nonmetals)	**P_2O_3**	**P_2O_5**
ous-ic name (seldom used, but may be written)	**phosphorous oxide**	**phosphoric oxide**
Roman numeral name (seldom used, but may be written)	**phosphorus(III) oxide**	**phosphorus(V) oxide**
Prefix name (*)	**diphosphorus trioxide**	**diphosphorus pentoxide**

chemical formula (binary acid)	**HCl (liquid) or HCl (*l*)**	**HF (gas) or HF (*g*)**
chemical name	**hydrochloric acid**	**hydrogen fluoride**

chemical formula (diatomic or monatomic gas)	**Br_2**	**Rn**
chemical name (diatomic or monatomic gas)	**bromine**	**radon**

REVIEW WORKSHEETS

AA. BINARY COMPOUNDS - REGULAR

Write Formulas		Write Names	
1.	sodium chloride NaCl	26.	CaO calcium oxide
2.	calcium fluoride CaF_2	27.	AgCl silver chloride
3.	barium bromide $BaBr_2$	28.	Ca_3N_2 calcium nitride
4.	lithium carbide Li_4C	29.	H_2O hydrogen oxide
5.	silver iodide AgI	30.	$SiBr_4$ silicon bromide
6.	potassium oxide K_2O	31.	Al_2S_3 aluminum sulfide
7.	aluminum bromide $AlBr_3$	32.	Ag_3N silver nitride
8.	calcium nitride Ca_3N_2	33.	AlF_3 aluminum fluoride
9.	radium oxide RaO	34.	NaCl sodium chloride
10.	boron fluoride BF_3	35.	KBr potassium bromide
11.	hydrogen sulfide H_2S (g)	36.	BaS barium sulfide
12.	rubidium hydride RbH	37.	AlN aluminum nitride
13.	cesium oxide Cs_2O	38.	BAs boron arsenide
14.	magnesium sulfide MgS	39.	HBr (ℓ) hydrobromic acid
15.	calcium carbide Ca_2C	40.	$ZnCl_2$ zinc chloride
16.	zinc oxide ZnO	41.	MgI_2 magnesium iodide
17.	potassium phosphide K_3P	42.	K_3N potassium nitride
18.	beryllium chloride $BeCl_2$	43.	HI (g) hydrogen iodide
19.	aluminum arsenide AlAs	44.	$SrCl_2$ strontium chloride
20.	boron iodide BI_3	45.	NaH sodium hydride
21.	silicon oxide SiO_2	46.	SiF_4 silicon fluoride
22.	lithium nitride Li_3N	47.	Ag_2O silver oxide
23.	zinc nitride Zn_3N_2	48.	CaS calcium sulfide
24.	francium sulfide Fr_2S	49.	Al_2O_3 aluminum oxide
25.	hydrogen oxide H_2O	50.	MgO magnesium oxide

BB1. BINARY COMPOUNDS - "ous - ic" method

Write Formulas		Write Names	
1.	auric iodide AuI_3	26.	CuS cupric sulfide
2.	aurous sulfide Au_2S	27.	Cu_2S cuprous sulfide
3.	antimonic oxide Sb_2O_5	28.	HgBr mercurous bromide
4.	antimonous chloride $SbCl_3$	29.	Fe_2O_3 ferric oxide
5.	mercuric oxide HgO	30.	FeO ferrous oxide
6.	mercurous fluoride HgF	31.	SnF_2 stannous fluoride
7.	plumbous arsenide Pb_3As_2	32.	SnF_4 stannic fluoride
8.	plumbic nitride Pb_3N_4	33.	$MnBr_7$ manganic bromide
9.	stannic oxide SnO_2	34.	MnO manganous oxide
10.	stannous fluoride SnF_2	35.	$PbCl_2$ plumbous chloride
11.	ferric sulfide Fe_2S_3	36.	$PbCl_4$ plumbic chloride
12.	ferrous hydride FeH_2	37.	Sb_2S_5 antimonic sulfide
13.	nickelic oxide Ni_2O_3	38.	SbAs antimonous arsenide
14.	nickelous sulfide NiS	39.	AsI_3 arsenous iodide
15.	cuprous carbide Cu_4C	40.	NiO nickelous oxide
16.	cupric oxide CuO	41.	CoN cobaltic nitride
17.	manganous phosphide Mn_3P_2	42.	FeF_2 ferrous fluoride
18.	manganic chloride $MnCl_7$	43.	HgF_2 mercuric fluoride
19.	mercurous arsenide Hg_3As	44.	$CuCl_2$ cupric chloride
20.	cobaltic iodide CoI_3	45.	Sn_3As_4 stannous arsenide
21.	arsenous oxide As_2O_3	46.	NiP nickelic phosphide
22.	antimonic nitride Sb_3N_5	47.	NiS nickelous sulfide
23.	arsenic nitride As_3N_5	48.	FeS ferrous sulfide
24.	cobaltous sulfide CoS	49.	PbC plumbic carbide
25.	plumbic oxide PbO_2	50.	Hg_2O mercurous oxide

BB2. BINARY COMPOUNDS - Roman numeral method

Write Formulas		Write Names	
1.	phosphorus(III) sulfide P_2S_3	26.	CuBr copper(I) bromide
2.	phosphorus(V) oxide P_2O_5	27.	Cu_2O copper(I) oxide
3.	antimony(V) chloride $SbCl_5$	28.	HgCl mercury(I) chloride
4.	antimony(III) oxide Sb_2O_3	29.	Fe_2O_3 iron(III) oxide
5.	mercury(II) fluoride HgF_2	30.	FeS iron(II) sulfide
6.	mercury(I) arsenide Hg_3As	31.	$SnBr_2$ tin(II) bromide
7.	lead(II) nitride Pb_3N_2	32.	SnF_4 tin(IV) fluoride
8.	lead(IV) oxide PbO_2	33.	MnO_2 manganese(IV) oxide
9.	tin(II) fluoride SnF_2	34.	MnF_2 manganese(II) fluoride
10.	tin(IV) sulfide SnS_2	35.	PbI_2 lead(II) iodide
11.	iron(III) hydride FeH_3	36.	$PbCl_4$ lead(IV) chloride
12.	iron(II) oxide FeO	37.	Sb_2O_5 antimony(V) oxide
13.	nickel(III) sulfide Ni_2S_3	38.	SbAs antimony(III) arsenide
14.	nickel(II) carbide Ni_2C	39.	AsF_5 arsenic(V) fluoride
15.	copper(I) oxide Cu_2O	40.	N_2O_5 nitrogen(V) oxide
16.	copper(II) phosphide Cu_3P_2	41.	CoAs cobalt(III) arsenide
17.	manganese(II) chloride $MnCl_2$	42.	PBr_5 phosphorus(V) bromide
18.	manganese(VII) arsenide Mn_3As_7	43.	PF_3 phosphorus(III) fluoride
19.	carbon(II) iodide CI_2	44.	SF_4 sulfur(IV) fluoride
20.	carbon(IV) oxide CO_2	45.	SAs_2 sulfur(VI) arsenide
21.	arsenic(III) nitride AsN	46.	NiP nickel(III) phosphide
22.	sulfur(IV) chloride SCl_4	47.	NiO nickel(II) oxide
23.	arsenic(V) sulfide As_2S_5	48.	FeS iron(II) sulfide
24.	cobalt(II) oxide CoO	49.	PbC lead(IV) carbide
25.	sulfur(VI) phosphide SP_2	50.	Hg_2S mercury(I) sulfide

CC. BINARY COMPOUNDS - prefix method

Write Formulas		Write Names	
1.	carbon dioxide CO_2	8.	CO_2 carbon dioxide
2.	carbon monoxide CO	9.	SiO_2 silicon dioxide
3.	sulfur dioxide SO_2	10.	SO_2 sulfur dioxide
4.	sulfur trioxide SO_3	11.	NO_2 nitrogen dioxide
5.	carbon tetrachloride CCl_4	12.	CO carbon monoxide
6.	nitrogen dioxide NO_2	13.	CCl_4 carbon tetrachloride
7.	diphosphorus pentoxide P_2O_5	14.	P_2O_3 diphosphorus trioxide

EE. BINARY COMPOUNDS - binary acids

Write Formulas		Write Names	
1.	hydrochloric acid HCl (ℓ)	6.	H_2S (g) dihydrogen sulfide
2.	hydrofluoric acid HF (ℓ)	7.	HCl (g) hydrogen chloride
3.	hydrobromic acid HBr (ℓ)	8.	HBr (ℓ) hydrobromic acid
4.	hydroiodic acid HI (ℓ)	9.	HF (ℓ) hydrofluoric acid
5.	hydrosulfuric acid H_2S (ℓ)	10.	HI (g) hydrogen iodide

FG. GASES - monatomic and diatomic

Write Formulas		Write Names	
1.	hydrogen gas H_2	8.	He helium
2.	oxygen gas O_2	9.	Ne neon
3.	nitrogen gas N_2	10.	Ar argon
4.	fluorine gas F_2	11.	Kr krypton
5.	chlorine gas Cl_2	12.	Xe xenon
6.	bromine vapour Br_2	13.	Rn radon
7.	iodine vapour I_2		