

Naming of Compounds Exercise

Do not hand in this work sheet. When you are ready, you will be given an examination over this material. Complete the examination by yourself and hand it in to receive credit.

Rule 1 Usually for metal-nonmetal compounds (including combinations with the polyions) oxidation state of the metal is listed as a roman numeral after the name of the metal. The exception to using the oxidation number of the metal is: use the metal name alone if the metal can assume only one oxidation state. This is true, for example, for the metals from groups IA, IIA, IIIB (American) and Al.

Rule 2 For binary compounds use the ending . . . ide for the nonmetal. (oxide, sulfide, nitride, fluoride, chloride, bromide, iodide, hydride, etc.)

Exercises - Give the names following compounds.

Al_2O_3 aluminum oxide

CaO calcium oxide

NaF sodium fluoride

MgCl_2 magnesium chloride

Na_2C_2 sodium carbide

FeO iron II oxide

Fe_2O_3 iron III oxide

CoCl_2 cobalt II chloride

MnO_2 manganese IV oxide

MgO magnesium oxide

Cu_2O copper I oxide

CuO copper II oxide

SnCl_2 tin II chloride

SnF_4 tin IV fluoride

PbO_2 lead IV oxide

PbI_2 lead II iodide

RbH rubidium hydride

V_3N_4 vanadium IV nitride

CrCl_3 chromium III chloride

Au_2O gold I oxide

AuO gold II oxide

CdF_2 cadmium II fluoride

Nb_2S niobium I sulfide

NbC niobium IV carbide

Nb_2C niobium II carbide

ZrCl_4 zirconium IV chloride

Rule 3 With hydrogen in a solution this become hydro . . . ic acid otherwise it is named the same as in rule 2.

Exercises - Give the names following compounds.

In water solution	Not in solution
H ₂ S <u>hydrosulfuric acid</u>	<u>hydrogen sulfide</u>
HCl <u>hydrochloric acid</u>	<u>hydrogen chloride</u>
HI <u>hydroiodic acid</u>	<u>hydrogen iodide</u>
HF <u>hydrofluoric acid</u>	<u>hydrogen fluoride</u>
HBr <u>hydrobromic acid</u>	<u>hydrogen bromide</u>

Rule 4 The negative polyions combine with metal and the compounds are named with the metal ions first according to the method of rule 1 followed by the polyion name. (Note you must memorize the polyions, their names and their charge.) The hydrogen compounds are named according to the acid name.

Exercises - Give the names following compounds.

NaNO ₃ <u>sodium nitrate</u>	MgSO ₄ <u>magnesium sulfate</u>
KClO ₄ <u>potassium perchlorate</u>	Ca(ClO ₃) ₂ <u>calcium chlorate</u>
Mg(BrO) ₂ <u>magnesium hypobromite</u>	CaCO ₃ <u>calcium carbonate</u>
Ca(OH) ₂ <u>calcium hydroxide</u>	ScPO ₄ <u>scandium phosphate</u>
Ca ₃ (PO ₃) ₂ <u>calcium phosphite</u>	FeSO ₄ <u>iron II sulfate</u>
Pb ₃ (PO ₂) ₂ <u>lead II hypophosphite</u>	SnSO ₄ <u>tin II sulfate</u>
Sn(CO ₃) ₂ <u>tin IV carbonate</u>	Fe(ClO ₄) ₂ <u>iron II perchlorate</u>
Mn(IO ₄) ₂ <u>manganese II periodate</u>	Co(NO ₂) ₂ <u>cobalt II nitrite</u>
CuSO ₄ <u>copper II sulfate</u>	Cu ₂ SO ₄ <u>copper I sulfate</u>
CrPO ₄ <u>chromium III phosphate</u>	CrSO ₄ <u>chromium II sulfate</u>
Mo ₃ (PO ₃) ₄ <u>molybdenum IV phosphite</u>	W(NO ₂) ₃ <u>tungsten III nitrite</u>
Ce(ClO ₄) ₃ <u>cerium III perchlorate</u>	CeSO ₄ <u>cerium II sulfate</u>
HClO ₄ <u>perchloric acid</u>	HClO <u>hypochlorous acid</u>

H_2SO_4 sulfuric acid

$HBrO_2$ bromous acid

$H_2Cr_2O_7$ chromic acid
hydrofluoric acid or

HF hydrogen fluoride

$CoCrO_4$ cobalt II chromate

H_2SO_2 hyposulfurous acid

H_2CO_3 carbonic acid
hydroiodic acid or

HI hydrogen iodide

HNO_3 nitric acid

$KMnO_4$ potassium permanganate
hydrosulfuric acid or

H_2S hydrogen sulfide

HNO_2 nitrous acid

Rule 5 For nonmetals combined with nonmetals, name the compounds according to their stoichiometry with the Greek prefixes:

(1 = mono, not generally used - without a prefix 1 is implied. However, it is used to eliminate ambiguity, especially when the oxidation state is not to be expected.)

2 = di

3 = tri

4 = tetra

5 = penta

6 = hexa

7 = hepta

8 = octa

9 = nona

10 = deca (etc.)

Exercises - Give the names following compounds.

PCl_5 phosphorous pentachloride

P_4O_{10} tetraphosphorous decaoxide

SiF_4 silicon tetrafluoride

PF_3 phosphorous trifluoride

SO_2 sulfur dioxide

N_2O dinitrogen oxide

N_2O_5 dinitrogen pentoxide

NO_2 nitrogen dioxide

SO_3 sulfur trioxide

P_4O_6 tetraphosphorous hexaoxide

CF_4 carbon tetrafluoride

AsCl_3 arsenic trichloride

OF_2 oxygen difluoride

Cl_2O_7 dichlorine heptaoxide

SiF_4 silicon tetrafluoride

IF_3 iodine trifluoride

CO carbon monoxide

CO_2 carbon dioxide

Give the formulas for the following:

cobalt (II) nitrate Co(NO₃)₂

carbon disulfide CS₂

magnesium sulfide MgS

carbon tetrafluoride CF₄

mercury (II) oxide HgO

chromium (III) oxide Cr₂O₃

sodium hydride NaH

calcium nitride Ca(NO₃)₂

niobium (II) oxide NbO

silicon tetrafluoride SiF₄

ammonia NH₃

cobalt (II) hydroxide Co(OH)₂

silicon monoxide SiO

dinitrogen trioxide N₂O₃

iron (III) sulfate Fe₂(SO₄)₃

carbon monoxide CO

sodium dichromate Na₂Cr₂O₇

iron (II) dichromate FeCr₂O₇

hydrogen cyanide HCN

hydrothiocyanic acid HSCN (aq)

acetic acid CH₃COOH

chromium (VI) oxide CrO₂

dinitrogen oxide N₂O

tin (II) chlorate Sn(ClO₃)₂

(Hg₂²⁺ ion - see polyatomic ions)

tin (IV) periodate Sn(IO₄)₄

mercury (I) bromite Hg₂Br₂

sodium hyposulfite Na₂SO₂

scandium carbonate Sc₂(CO₃)₃

(O₂²⁻ ion - see polyatomic ions)

yttrium oxide Y₂O₃

rubidium peroxide Rb₂O₂

potassium permanganate KMnO₄

ammonium hypophosphite (NH₄)₃PO₂

phosphorus pentachloride PCl₅

calcium hydrogen sulfite CaHSO₃ (HSO₃⁻ ion - see polyatomic ions)

sodium hydrogen carbonate NaHCO₃ (HCO₃⁻ ion - see polyatomic ions)