Topic 2.5 IUPAC Nomenclature Test Outline and Practice Test (Science 9 [Pathways])

SUMMARY:

- Topic I: Compare ionic and covalent compounds simplistically. Identify elements, ionic compounds, and covalent compounds based on their formulas and IUPAC names.
- Topic II: Name and write formulas of elements. List the diatomic elements.
- Topic III: Know the "-ide" endings of the most common non-metal elements.
- Topic IV: Name and write formulas of ionic compounds (including those with multivalent and polyatomic ions).
- Topic V: Name and write formulas of covalent compounds.
- Topic VI (Ext): Given a 'mixed' list of elements, ionic compounds, and covalent compounds, successfully identify them and write their names/formulas.

VOCABULARY:

(Disclaimer: This is not meant to be an exhaustive list. Vocabulary words may appear on the test that are not in this list.)

- Element
- Diatomic element
- Ionic compound
- Covalent compound
- Multivalent
- Polyatomic ion
- Subscript
- Ionic charge
- Prefix
- (Roman numeral)
- Cation
- Anion
- Electron

STUDY MATERIALS:

- Comprehensive chemical compounds powerpoint (IUPAC Nomenclature)
- "Section 3" Notes Handout
- Textbook section 2.5
- Workbook section 2.5

PRACTICE TEST

Topic I: Identify elements, ionic compounds, and covalent compounds based on their formulas and IUPAC names. ("Ionic vs Covalent Compounds" on pg 6 in notes handout)

1) Compare and contrast ionic compounds and covalent compounds (What elements do they form between? Are electrons transferred or shared? Give examples.)

2) Identify the following as elements, ionic compounds, or covalent compounds, based on their chemical formulas.

Formula	**Identification**
$BeCl_2$	
Br_2	
SO_3	
CaF_2	
Ti	
CO_2	
$Co(CH_3COO)_3$	
Ne	
AlP	
H_2O_2 (hydrogen is a non-metal here)	
Ni_3N_2	
Cl_2	
$FeCr_2O_7$	
XeF_6	
$Mg(OH)_2$	
CCl_4	
F_2	
CaH_2 (hydrogen is a non-metal here)	
N_2O	
$(NH_4)_2SO_4$	
SiO_2	
$MnCrO_4$	

3) Identify the following as elements, ionic compounds, or covalent compounds, based on their chemical formulas.

Name	**Identification**
potassium chloride	
niobium(V) oxide	
nitrogen	
manganese(IV) sulfate	
dinitrogen heptaoxide	
zinc hypochlorite	
chromium(II) iodide	
chlorine	
trisulfur monoxide	
molybdenum (II) sulfite	
ammonium nitride	
dicarbon trifluoride	
silver sulfide	
nickel	
trinitrogen dioxide	
yttrium	
germanium cyanide	
oxygen monofluoride	
copper(II) hydrogen sulfate	
titanium(III) phosphide	
phosphorus dichloride	
sodium bisulfite	

Topic II: Name and write formulas of elements. List the diatomic elements.

4) Name the following elements:
    a. As
    b. H_2
    c. Pd
    d. Au
    e. Ca
    f. He
    g. Kr
5) Write the formulas of the following elements. Remember your diatomic elements.
    a. Magnesium
    b. Manganese
    c. Copper
    d. Bromine
    e. Iridium
    f. Oxygen
    g. Iron
    h. Mercury
6) What are the 7 diatomic elements? List their names and their *correct* elemental formulas in diatomic form.

Topic III: Know the "-ide" endings of the most common non-metal elements.

7) Write the 'ide' form of the following:
    a. Nitrogen
    b. Oxygen
    c. Fluorine
    d. Phosphorus
    e. Sulfur
    f. Chlorine
    g. Bromine
    h. Iodine
    i. Selenium
    j. Hydrogen
8) When are these 'ide' forms of the non-metals used in naming? (good to be able to answer, but won't be on test)

Topic IV: Name and write formulas of ionic compounds (including those with multivalent and polyatomic ions).

Name	**Formula**
zinc chloride	
potassium iodide	
manganese(IV) sulfide	
strontium oxide	
iron(II) phosphide	
chromium(II) oxide	
zirconium selenide	
calcium nitride	
palladium(IV) nitride	
nickel(III) bromide	
iron(III) phosphide	
calcium carbonate	
cobalt(II) hydroxide	
zinc bisulfite	
sodium nitrate	
cadmium cyanide	
gallium hypochlorite	
	$Tc(ClO_3)_7$
	$V(HS)_4$
	$Au_2(CrO_4)_3$
	$Sn(MnO_4)_4$
	$CrBr_3$
	Sc_2O_3
	Li_3N
	$MoCr_2O_7$
	Cu_2S
	$AgNO_3$
	Li_2O
	BeH_2
	$CuSO_4$
	$Ti(CH_3COO)_3$
	$Hg(HCO_3)_2$
	$Ca(ClO_4)_2$
	$Pt_3(PO_3)_4$

Topic V: Name and write formulas of covalent compounds.

Cover up the column of the questions you would like practice with. Fill up that column and check your answers using the other side!

Name	**Formula**
dinitrogen tetraoxide	
carbon dioxide	
phosphorus trichloride	
carbon tetrahydride (methane)	
nitrogen dioxide	
carbon monoxide	
phosphorus trichloride	
carbon monosulfide	
chlorine pentafluoride	
silicon disulfide	
	PI_3
	IF_7
	NCl_3
	N_2O
	As_4O_{10}
	Cl_2O_7
	S_2Cl_2
	BH_3
	P_4O_8
	SF_6
	N_2O_5
	SF_4
	ICl

Topic VI (Ext): Given a 'mixed' list of elements, ionic compounds, and covalent compounds, successfully identify them and write their names/formulas.

See the lists of compounds and elements provided in Topic 1. Name and write the formulas where applicable.

ANSWER KEY TO PRACTICE TEST

Topic I: Identify elements, ionic compounds, and covalent compounds based on their formulas and IUPAC names. ("Ionic vs Covalent Compounds" on pg 6 in notes handout)

1) Compare and contrast ionic compounds and covalent compounds (What elements do they form between? Are electrons transferred or shared? Give examples.)

Ionic compounds: metals and non-metals (usually, except where polyatomic ions are involved), transferring electrons

Covalent compounds: non-metals and non-metals, sharing electrons

2) Identify the following as elements, ionic compounds, or covalent compounds, based on their chemical formulas.

Formula	**Identification**
$BeCl_2$	I
Br_2	E
SO_3	C
CaF_2	I
Ti	E
CO_2	C
$Co(CH_3COO)_3$	I
Ne	E
AlP	I
H_2O_2 (hydrogen is a non-metal here)	C
Ni_3N_2	I
Cl_2	E
$FeCr_2O_7$	I
XeF_6	C
$Mg(OH)_2$	I
CCl_4	C
F_2	E
CaH_2 (hydrogen is a non-metal here)	I
N_2O	C
$(NH_4)_2SO_4$	I
SiO_2	C
$MnCrO_4$	I

3) Identify the following as elements, ionic compounds, or covalent compounds, based on their chemical formulas.

Name	Identification
potassium chloride	I
niobium(V) oxide	I
nitrogen	E
manganese(IV) sulfate	I
dinitrogen heptaoxide	C
zinc hypochlorite	I
chromium(II) iodide	I
chlorine	E
trisulfur monoxide	C
molybdenum (II) sulfite	I
ammonium nitride	I
dicarbon trifluoride	C
silver sulfide	I
nickel	E
trinitrogen dioxide	C
yttrium	E
germanium cyanide	I
oxygen monofluoride	C
copper(II) hydrogen sulfate	I
titanium(III) phosphide	I
phosphorus dichloride	C
sodium bisulfite	I

Topic II: Name and write formulas of elements. List the diatomic elements.

4) Name the following elements:
   a. As – arsenic
   b. H_2 – hydrogen
   c. Pd – palladium
   d. Au – gold
   e. Ca – calcium
   f. He – helium
   g. Kr – krypton

5) Write the formulas of the following elements. Remember your diatomic elements.
   h. Magnesium - Mg
   i. Manganese - Mn
   j. Copper – Cu
   k. Bromine – Br_2
   l. Iridium - Ir
   m. Oxygen – O_2
   n. Iron - Fe
   o. Mercury – Hg

6) What are the 7 diatomic elements? List their names and their *correct* elemental formulas in diatomic form.
   Hydrogen (H_2), iodine (I_2), bromine (Br_2) , oxygen (O_2) , nitrogen (N_2) , chlorine (Cl_2) , fluorine (F_2)

Topic III: Know the "-ide" endings of the most common non-metal elements.

7) Write the ‘ide’ form of the following:
    k. Nitrogen – nitride
    l. Oxygen – oxide
    m. Fluorine – fluoride
    n. Phosphorus – phosphide
    o. Sulfur – sulfide
    p. Chlorine – chloride
    q. Bromine – bromide
    r. Iodine – iodide
    s. Selenium – selenide
    t. Hydrogen – hydride

8) When are these ‘ide’ forms of the non-metals used in naming? (good to be able to answer, but won’t be on test)

The -ide forms of non-metals are used in covalent compounds and ionic compounds.

In covalent compounds, the -ide form is used for the second element in the compound, before adding prefixes.

In ionic compounds, monovalent anions are always written in their -ide forms.

Topic IV: Name and write formulas of ionic compounds (including those with multivalent and polyatomic ions).

Name	**Formula**
zinc chloride	$ZnCl_2$
potassium iodide	KI
manganese(IV) sulfide	MnS_2
strontium oxide	SrO
iron(II) phosphide	Fe_3P_2
chromium(II) oxide	CrO
zirconium selenide	$ZrSe_2$
calcium nitride	Ca_3N_2
palladium(IV) nitride	Pd_3N_4
nickel(III) bromide	$NiBr_3$
iron(III) phosphide	FeP
calcium carbonate	$CaCO_3$
cobalt(II) hydroxide	$Co(OH)_2$
zinc bisulfite	$Zn(HSO_3)_2$
sodium nitrate	$NaNO_3$
cadmium cyanide	$Cd(CN)_2$
gallium hypochlorite	$Ga(ClO)_3$
technetium chlorate	$Tc(ClO_3)_7$
vanadium(IV) hydrogen sulfide	$V(HS)_4$
gold(III) chromate	$Au_2(CrO_4)_3$
tin(IV) permanganate	$Sn(MnO_4)_4$
chromium(III) bromide	$CrBr_3$
scandium oxide	Sc_2O_3
lithium nitride	Li_3N
molybdenum(II) dichromate	$MoCr_2O_7$
copper(I) sulfide	Cu_2S
silver nitrate	$AgNO_3$
lithium oxide	Li_2O
beryllium hydride	BeH_2
copper(II) sulfate	$CuSO_4$
titanium(III) acetate	$Ti(CH_3COO)_3$
mercury(II) bicarbonate	$Hg(HCO_3)_2$
calcium perchlorate	$Ca(ClO_4)_2$
platinum(IV) phosphite	$Pt_3(PO_3)_4$

Topic V: Name and write formulas of covalent compounds.

Name	Formula
dinitrogen tetraoxide	N_2O_4
carbon dioxide	CO_2
phosphorus trichloride	PCl_3
carbon tetrahydride (methane)	CH_4
nitrogen dioxide	NO_2
carbon monoxide	CO
phosphorus trichloride	PCl_3
carbon monosulfide	CS
chlorine pentafluoride	ClF_5
silicon disulfide	SiS_2
phosphorus triiodide	PI_3
iodine heptafluoride	IF_7
nitrogen trichloride	NCl_3
dinitrogen monoxide	N_2O
tetraarsenic decaoxide	As_4O_{10}
dichlorine heptaoxide	Cl_2O_7
disulfur dichloride	S_2Cl_2
boron trihydride	BH_3
tetraphosphorus octaoxide	P_4O_8
sulfur hexafluoride	SF_6
dinitrogen pentaoxide	N_2O_5
sulfur tetrafluoride	SF_4
iodine monochloride	ICl

Topic VI (Ext): Given a 'mixed' list of elements, ionic compounds, and covalent compounds, successfully identify them and write their names/formulas.

See the lists of compounds and elements provided in Topic 1. Name and write the formulas where applicable.

Formula	Name
$BeCl_2$	beryllium chloride
Br_2	bromine
SO_3	sulfur trioxide
CaF_2	calcium fluoride
Ti	titanium
CO_2	carbon dioxide
$Co(CH_3COO)_3$	cobalt(III) acetate
Ne	neon
AlP	aluminum phosphide
H_2O_2 (hydrogen is a non-metal here)	dihydrogen dioxide (note: common name 'hydrogen peroxide')
Ni_3N_2	nickel(II) nitride
Cl_2	chlorine
$FeCr_2O_7$	iron(II) dichromate
XeF_6	xenon hexafluoride
$Mg(OH)_2$	magnesium hydroxide
CCl_4	carbon tetrachloride
F_2	fluorine
CaH_2 (hydrogen is a non-metal here)	calcium hydride
N_2O	dinitrogen monoxide
$(NH_4)_2SO_4$	ammonium sulfate
SiO_2	silicon dioxide

$MnCrO_4$	manganese(II) chromate

Name	**Formula**
potassium chloride	KCl
niobium(V) oxide	Nb_2O_5
nitrogen	N_2
manganese(IV) sulfate	$Mn(SO_4)_2$
dinitrogen heptaoxide	N_2O_7
zinc hypochlorite	$Zn(ClO)_2$
chromium(II) iodide	CrI_2
chlorine	Cl_2
trisulfur monoxide	S_3O
molybdenum (II) sulfite	$MbSO_3$
ammonium nitride	$(NH_4)_3N$
dicarbon trifluoride	C_2F_3
silver sulfide	Ag_2S
nickel	Ni
trinitrogen dioxide	N_3O_2
yttrium	Y
germanium cyanide	$Ge(CN)_4$
oxygen monofluoride	OF
copper(II) hydrogen sulfate	$Cu(HSO_4)_2$
titanium(III) phosphide	TiP
phosphorus dichloride	PCl_2
sodium bisulfite	$NaHSO_3$