**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 |
| BeCl2 |  |
| Br2 |  |
| SO3 |  |
| CaF2 |  |
| Ti |  |
| CO2 |  |
| Co(CH3COO)3 |  |
| Ne |  |
| AlP |  |
| H2O2 (hydrogen is a non-metal here) |  |
| Ni3N2 |  |
| Cl2 |  |
| FeCr2O­7 |  |
| XeF6 |  |
| Mg(OH)2 |  |
| CCl4 |  |
| F2 |  |
| CaH2 (hydrogen is a non-metal here) |  |
| N2O |  |
| (NH4)2SO4 |  |
| SiO2 |  |
| MnCrO4 |  |

1. 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.***

1. Name the following elements:
   1. As
   2. H2
   3. Pd
   4. Au
   5. Ca
   6. He
   7. Kr
2. Write the formulas of the following elements. Remember your diatomic elements.
3. Magnesium
4. Manganese
5. Copper
6. Bromine
7. Iridium
8. Oxygen
9. Iron
10. Mercury
11. 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.***

1. Write the ‘ide’ form of the following:
   1. Nitrogen
   2. Oxygen
   3. Fluorine
   4. Phosphorus
   5. Sulfur
   6. Chlorine
   7. Bromine
   8. Iodine
   9. Selenium
   10. Hydrogen
2. 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(ClO3)7 |
|  | V(HS)4 |
|  | Au2(CrO4)3 |
|  | Sn(MnO4)4 |
|  | CrBr3 |
|  | Sc2O3 |
|  | Li3­N |
|  | MoCr2O­7 |
|  | Cu2S |
|  | AgNO3 |
|  | Li2O |
|  | BeH2 |
|  | CuSO4 |
|  | Ti(CH3COO)3 |
|  | Hg(HCO3)2 |
|  | Ca(ClO4)2 |
|  | Pt3(PO3)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 |  |
|  | PI3 |
|  | IF7 |
|  | NCl3 |
|  | N2O |
|  | As4O10 |
|  | Cl2O7 |
|  | S2Cl2 |
|  | BH3 |
|  | P4O8 |
|  | SF6 |
|  | N2O5 |
|  | SF4 |
|  | 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

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

|  |  |
| --- | --- |
| Formula | Identification |
| BeCl2 | I |
| Br2 | E |
| SO3 | C |
| CaF2 | I |
| Ti | E |
| CO2 | C |
| Co(CH3COO)3 | I |
| Ne | E |
| AlP | I |
| H2O2 (hydrogen is a non-metal here) | C |
| Ni3N2 | I |
| Cl2 | E |
| FeCr2O­7 | I |
| XeF6 | C |
| Mg(OH)2 | I |
| CCl4 | C |
| F2 | E |
| CaH2 (hydrogen is a non-metal here) | I |
| N2O | C |
| (NH4)2SO4 | I |
| SiO2 | C |
| MnCrO4 | I |

1. 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.***

1. Name the following elements:
2. As – arsenic
3. H2 – hydrogen
4. Pd – palladium
5. Au – gold
6. Ca – calcium
7. He – helium
8. Kr – krypton
9. Write the formulas of the following elements. Remember your diatomic elements.
10. Magnesium - Mg
11. Manganese - Mn
12. Copper – Cu
13. Bromine – Br2
14. Iridium - Ir
15. Oxygen – O2
16. Iron - Fe
17. Mercury – Hg
18. What are the 7 diatomic elements? List their names and their *correct* elemental formulas in diatomic form.

Hydrogen (H2), iodine (I2), bromine (Br2) , oxygen (O2) , nitrogen (N2) , chlorine (Cl2) , fluorine (F2)

***Topic III: Know the “-ide” endings of the most common non-metal elements.***

1. Write the ‘ide’ form of the following:
   1. Nitrogen – nitride
   2. Oxygen – oxide
   3. Fluorine – fluoride
   4. Phosphorus – phosphide
   5. Sulfur – sulfide
   6. Chlorine – chloride
   7. Bromine – bromide
   8. Iodine – iodide
   9. Selenium – selenide
   10. Hydrogen – hydride
2. 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 | ZnCl2 |
| potassium iodide | KI |
| manganese(IV) sulfide | MnS2 |
| strontium oxide | SrO |
| iron(II) phosphide | Fe3P2 |
| chromium(II) oxide | CrO |
| zirconium selenide | ZrSe2 |
| calcium nitride | Ca3N2 |
| palladium(IV) nitride | Pd3N4 |
| nickel(III) bromide | NiBr3 |
| iron(III) phosphide | FeP |
| calcium carbonate | CaCO3 |
| cobalt(II) hydroxide | Co(OH)2 |
| zinc bisulfite | Zn(HSO3)2 |
| sodium nitrate | NaNO3 |
| cadmium cyanide | Cd(CN)2 |
| gallium hypochlorite | Ga(ClO)3 |
| technetium chlorate | Tc(ClO3)7 |
| vanadium(IV) hydrogen sulfide | V(HS)4 |
| gold(III) chromate | Au2(CrO4)3 |
| tin(IV) permanganate | Sn(MnO4)4 |
| chromium(III) bromide | CrBr3 |
| scandium oxide | Sc2O3 |
| lithium nitride | Li3­N |
| molybdenum(II) dichromate | MoCr2O­7 |
| copper(I) sulfide | Cu2S |
| silver nitrate | AgNO3 |
| lithium oxide | Li2O |
| beryllium hydride | BeH2 |
| copper(II) sulfate | CuSO4 |
| titanium(III) acetate | Ti(CH3COO)3 |
| mercury(II) bicarbonate | Hg(HCO3)2 |
| calcium perchlorate | Ca(ClO4)2 |
| platinum(IV) phosphite | Pt3(PO3)4 |

***Topic V: Name and write formulas of covalent compounds.***

|  |  |
| --- | --- |
| Name | Formula |
| dinitrogen tetraoxide | N2O4 |
| carbon dioxide | CO2 |
| phosphorus trichloride | PCl3 |
| carbon tetrahydride (methane) | CH4 |
| nitrogen dioxide | NO2 |
| carbon monoxide | CO |
| phosphorus trichloride | PCl3 |
| carbon monosulfide | CS |
| chlorine pentafluoride | ClF5 |
| silicon disulfide | SiS2 |
| phosphorus triiodide | PI3 |
| iodine heptafluoride | IF7 |
| nitrogen trichloride | NCl3 |
| dinitrogen monoxide | N2O |
| tetraarsenic decaoxide | As4O10 |
| dichlorine heptaoxide | Cl2O7 |
| disulfur dichloride | S2Cl2 |
| boron trihydride | BH3 |
| tetraphosphorus octaoxide | P4O8 |
| sulfur hexafluoride | SF6 |
| dinitrogen pentaoxide | N2O5 |
| sulfur tetrafluoride | SF4 |
| 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 |
| BeCl2 | beryllium chloride |
| Br2 | bromine |
| SO3 | sulfur trioxide |
| CaF2 | calcium fluoride |
| Ti | titanium |
| CO2 | carbon dioxide |
| Co(CH3COO)3 | cobalt(III) acetate |
| Ne | neon |
| AlP | aluminum phosphide |
| H2O2 (hydrogen is a non-metal here) | dihydrogen dioxide (note: common name ‘hydrogen peroxide’) |
| Ni3N2 | nickel(II) nitride |
| Cl2 | chlorine |
| FeCr2O­7 | iron(II) dichromate |
| XeF6 | xenon hexafluoride |
| Mg(OH)2 | magnesium hydroxide |
| CCl4 | carbon tetrachloride |
| F2 | fluorine |
| CaH2 (hydrogen is a non-metal here) | calcium hydride |
| N2O | dinitrogen monoxide |
| (NH4)2SO4 | ammonium sulfate |
| SiO2 | silicon dioxide |
| MnCrO4 | manganese(II) chromate |

|  |  |
| --- | --- |
| Name | Formula |
| potassium chloride | KCl |
| niobium(V) oxide | Nb2O5 |
| nitrogen | N2 |
| manganese(IV) sulfate | Mn(SO4)2 |
| dinitrogen heptaoxide | N2O7 |
| zinc hypochlorite | Zn(ClO)2 |
| chromium(II) iodide | CrI2 |
| chlorine | Cl2 |
| trisulfur monoxide | S3O |
| molybdenum (II) sulfite | MoSO3 |
| ammonium nitride | (NH4)3N |
| dicarbon trifluoride | C2F3 |
| silver sulfide | Ag2S |
| nickel | Ni |
| trinitrogen dioxide | N3O2 |
| yttrium | Y |
| germanium cyanide | Ge(CN)4 |
| oxygen monofluoride | OF |
| copper(II) hydrogen sulfate | Cu(HSO4)2 |
| titanium(III) phosphide | TiP |
| phosphorus dichloride | PCl2 |
| sodium bisulfite | NaHSO3 |