

Welcome!

This is a lesson presenting a Review Quiz covering all the Chemical Nomenclature topics we have covered in this chapter.

I will be asking you many questions in this Quiz.

Each time I ask a question, you should attempt to answer the question on your own before you scroll down to view my answer.

This is a lesson in the chapter “Atoms, Molecules, and Compounds”, which is part of the series “Chemistry, Explained Step by Step”.

This lesson builds on the material covered in previous lessons:

Distinguishing Ionic and Covalent Compounds

Naming covalent and ionic compounds

Writing formulas for covalent and ionic compounds

Writing Formulas for Ionic Compounds with Transition Metals

Naming Ionic Compounds with Transition Metals

Naming Ionic Compounds with Oxyanions

Names and Formulas Involving Other Polyatomic Ions

You should complete those lessons before attempting this lesson.

This lesson was written by Freelance-Teacher.

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Here's a Review Quiz covering all the chemical nomenclature topics that we have covered in this chapter.

CHEMICAL NOMENCLATURE REVIEW QUIZ

1. From memory, write down the names and formulas, including net charges, for *all* the polyatomic cations and polyatomic anions (including oxyanions) that we have covered in these lessons.

Here's what you should have written down:

Table of Oxyanions

Formula	Name	Formula	Name	Formula	Name	Formula	Name	Formula	Name
ClO_4^-	perchlorate	—	—	—	—	—	—	—	—
ClO_3^-	chlorate	NO_3^-	nitrate	CO_3^{2-}	carbonate	SO_4^{2-}	sulfate	PO_4^{3-}	phosphate
ClO_2^-	chlorite	NO_2^-	nitrite	—	—	SO_3^{2-}	sulfite	—	—
ClO^-	hypochlorite	—	—	—	—	—	—	—	—

Other polyatomic anions:

hydroxide, HO^- or OH^-

cyanide, CN^-

Polyatomic cation:

ammonium, NH_4^+

Your professor may require you to be familiar with other polyatomic ions as well.

The Nomenclature Review Quiz continues on the next page.

NOMENCLATURE REVIEW QUIZ, continued

2. What is the name of SnCl_2 ?

Answer: The name of SnCl_2 is tin(II) chloride.

Analysis:

SnCl_2 contains

a metal (tin) and

a nonmetal (chlorine),

so SnCl_2 is an ionic compound.

You should have memorized that tin cations take two possible charges,
so we have to figure out the charge on the tin cation before we can name it.

We use the following notation to figure out
what the charge on each individual tin cation would have to be
in order for the compound to have zero net charge.

group charges	+2	-2
	Sn_1	Cl_2
individual charges	?	-1

Each individual tin cation must have a charge of +2.

Therefore, the correct name for SnCl_2 is tin(II) chloride.

3. What is the chemical formula for phosphorus pentabromide?

Answer: The chemical formula for phosphorus pentabromide is PBr_5 .

Analysis:

Phosphorus pentabromide contains
two nonmetals (phosphorus and bromine).

Therefore, phosphorus pentabromide is a covalent compound.

The elements appear in the same order in the name as in the formula.

"Penta-" means 5 bromine atoms.

Since there is no prefix on phosphorus, one atom is implied.

Therefore, the correct formula for phosphorus pentabromide is PBr_5 .

4. What is the chemical formula for aluminum cyanide?

Answer: The chemical formula for aluminum cyanide is $\text{Al}(\text{CN})_3$.

Analysis:

Aluminum cyanide contains
a metal (aluminum) and
two nonmetals (carbon and nitrogen).

Therefore, aluminum cyanide is an ionic compound.

When writing formulas for ionic compounds, it is your job to determine the subscripts.

We choose subscripts that will result in a net charge of zero.

The following notation demonstrates that subscripts of ₁ for Al^{3+} and ₃ for CN^- will result in a net charge of zero.

group charges	+3	-3
	Al_1	$(\text{CN})_3$
individual charges	+3	-1

Therefore, the correct formula for aluminum cyanide is $\text{Al}(\text{CN})_3$.

5. What is the chemical formula for dinitrogen tetrafluoride?

Answer: The chemical formula for dinitrogen tetrafluoride is N_2F_4 .

Analysis:

Dinitrogen tetrafluoride contains
two nonmetals (nitrogen and fluorine).

Therefore, dinitrogen tetrafluoride is a covalent compound.

The elements appear in the same order in the name as in the formula.

"Di-" means two nitrogen atoms.

"Tetra-" means four fluorine atoms.

Therefore, the correct formula for dinitrogen tetrafluoride is N_2F_4 .

6. What is the name of $\text{Fe}_2(\text{SO}_4)_3$?

Answer: The name of $\text{Fe}_2(\text{SO}_4)_3$ is iron(III) sulfate.

Analysis:

$\text{Fe}_2(\text{SO}_4)_3$ contains

a metal (iron) and

two nonmetals (sulfur and oxygen).

Therefore, $\text{Fe}_2(\text{SO}_4)_3$ is an ionic compound.

Iron is a transition metal whose cation takes two possible charges,
so we have to figure out the charge on the iron cation before we can name it.

We use the following notation to figure out
what the charge on the iron cation would have to be
in order for the compound to have zero net charge.

group charges	+6	-6
	Fe_2	$(\text{SO}_4)_3$
individual charges	?	-2

Each iron cation must have a charge of +3.

Therefore, the correct name for $\text{Fe}_2(\text{SO}_4)_3$ is iron(III) sulfate.

7. What is the name of P_2S_3 ?

Answer: The name of P_2S_3 is diphosphorus trisulfide.

Analysis:

P_2S_3 contains

two nonmetals (phosphorus and sulfur).

So, P_2S_3 is a covalent compound.

The elements appear in the same order in the name as in the formula.

There are two phosphorus atoms, so we use the prefix di-.

There are three sulfur atoms, so we use the prefix tri-.

Therefore, the correct name for P_2S_3 is diphosphorus trisulfide.

8. What is the chemical formula for zinc nitrate?

Answer: The chemical formula for zinc nitrate is $\text{Zn}(\text{NO}_3)_2$.

Analysis:

Zinc nitrate contains

a metal (zinc) and

two nonmetals (nitrogen and oxygen).

Therefore, zinc nitrate is an ionic compound.

When writing formulas for ionic compounds, it is your job to determine the subscripts.

We choose subscripts that will result in a net charge of zero.

You should have memorized that nitrate has formula and charge NO_3^- .

You should have memorized that, although it is a transition metal, zinc cations commonly take only one charge, namely, +2.

The following notation demonstrates that subscripts of ₁ for the zinc cation and ₂ for the nitrate anion will result in a net charge of zero.

group charges	+2	-2
	Zn_1	$(\text{NO}_3)_2$
individual charges	+2	-1

Therefore, the correct formula for zinc nitrate is $\text{Zn}(\text{NO}_3)_2$.

9. What is the name of $(\text{NH}_4)_2\text{CO}_3$?

Answer: The name of $(\text{NH}_4)_2\text{CO}_3$ is ammonium carbonate.

Analysis:

We learned in a previous lesson that compounds containing an NH_4 group are ionic, even though they contain nonmetals only.

Therefore, $(\text{NH}_4)_2\text{CO}_3$ is an ionic compound.

We name the cation first (ammonium),
and the anion second (carbonate).

Names for ionic compounds do not use Greek prefixes.

Therefore, the correct name for $(\text{NH}_4)_2\text{CO}_3$ is ammonium carbonate.

10. What is the chemical formula for diphosphorus pentasulfide?

Answer: The chemical formula for diphosphorus pentasulfide is P_2S_5 .

Analysis:

Diphosphorus pentasulfide contains two nonmetals (phosphorus and sulfur). Therefore, it is a covalent compound.

The elements appear in the same order in the name as in the formula.

“Di-” means two phosphorus atoms.

“Penta-” means five sulfur atoms.

Therefore, the correct formula for diphosphorus pentasulfide is P_2S_5 .

11. What is the chemical formula for chlorine trifluoride?

Answer: The chemical formula for chlorine trifluoride is ClF_3 .

Analysis:

First, check whether chlorine trifluoride is ionic or covalent.

Chlorine trifluoride contains two nonmetals (chlorine and fluorine). So chlorine trifluoride is a covalent compound.

The elements appear in the same order in the formula as in the name.

The prefix "tri-" means three fluorine atoms.

No prefix on chlorine means one atom.

Therefore, the correct formula for chlorine trifluoride is ClF_3 .

12. What is the name of PCl_5 ?

Answer: The name of PCl_5 is phosphorus pentachloride.

Analysis:

PCl_5 contains

two nonmetals (phosphorus and chlorine).

Therefore, PCl_5 is a covalent compound.

The elements appear in the same order in the name as in the formula.

No prefix is used for the first element “phosphorus,” because the prefix mono- is omitted for the *first element in the name*.

The second element in the name is referred to with the suffix -ide.

Therefore, the correct name for PCl_5 is phosphorus pentachloride.

13. What is the chemical formula for calcium carbonate?

Answer: The chemical formula for calcium carbonate is CaCO_3 .

Analysis:

Calcium carbonate contains
a metal (calcium) and
two nonmetals (carbon and oxygen),
so calcium carbonate is an ionic compound.

When writing formulas for ionic compounds, it is your job to determine the subscripts.
We choose subscripts that will result in a net charge of zero.

You should have memorized that the formula and charge for carbonate ion is CO_3^{2-} .

The following notation demonstrates that subscripts of $_1$ for Ca^{2+} and $_1$ for CO_3^{2-} will result in a net charge of zero.

group charges	+2	-2
	Ca_1	$(\text{CO}_3)_1$
individual charges	+2	-2

Therefore, the correct formula for calcium carbonate is CaCO_3 .

14. What is the name of AgClO_3 ?

Answer: The name of AgClO_3 is silver chlorate.

Analysis:

AgClO_3 contains
a metal (silver) and
two nonmetals (chlorine and oxygen).
So AgClO_3 is an ionic compound.

The cation is named first (silver).

You should have memorized that, although it's a transition metal, silver cations commonly take only one charge (+1), so no roman numeral is necessary in the name.

The anion is named second (chlorate).

Names for ionic compounds do not use Greek prefixes.

Therefore, the correct name for AgClO_3 is silver chlorate.

15. What is the chemical formula for tin(II) chloride?

Answer: The chemical formula for tin(II) chloride is SnCl_2 .

Analysis:

Tin(II) chloride contains

a metal (tin) and

a nonmetal (chlorine),

so tin(II) chloride is an ionic compound.

When writing formulas for ionic compounds, it is your job to determine the subscripts.

We choose subscripts that will result in a net charge of zero.

Tin(II) means the tin has a +2 charge.

The following notation demonstrates that subscripts of ₁ for Sn^{2+} and ₂ for Cl^- will result in a net charge of zero.

group charges	+2	-2
	Sn_1	Cl_2
individual charges	+2	-1

Therefore, the correct formula is SnCl_2 .

16. What is the chemical formula for chromium(III) oxide?

Answer: The chemical formula for chromium(III) oxide is Cr_2O_3 .

Analysis:

Chromium(III) oxide contains

a metal (chromium) and

a nonmetal (oxygen),

so chromium(III) oxide is an ionic compound.

When writing formulas for ionic compounds, it is your job to determine the subscripts.

We choose subscripts that will result in a net charge of zero.

Chromium(III) means the chromium has a +3 charge.

The following notation demonstrates that subscripts of ₂ for Cr^{3+} and ₃ for O^{2-} will result in a net charge of zero.

group charges	+6	-6
	Cr_2	O_3
individual charges	+3	-2

Therefore, the correct formula for chromium(III) oxide is Cr_2O_3 .

17. What is the name of NO?

Answer: The name of NO is nitrogen monoxide.

Analysis:

NO contains

two nonmetals (nitrogen and oxygen).

So, NO is a covalent compound.

The elements appear in the same order in the name as in the formula.

There is one nitrogen atom, but the prefix mono- is omitted for the *first_ element*.

There is one oxygen atom, so we use the prefix mono- for the second element.

Therefore, the correct name for NO is nitrogen monoxide.

Remember:

When naming covalent compounds,

the prefix mono- should *not* be used for the first element in the name,

but the prefix mono- *should* be used (when appropriate) for the second element in the name.

18. What is the name of ClF_3 ?

Answer: The name of ClF_3 is chlorine trifluoride.

Analysis:

ClF_3 contains

two nonmetals (chlorine and fluorine).

So ClF_3 is a covalent compound.

The elements appear in the same order in the name as in the formula.

There is one chlorine atom, but the prefix mono- is usually omitted for the first element.

There are three fluorine atoms, so we use the prefix tri-.

Therefore, the correct name for ClF_3 is chlorine trifluoride.

19. What is the chemical formula for phosphorus pentachloride?

Answer: The chemical formula for phosphorus pentachloride is PCl_5 .

Analysis:

Phosphorus pentachloride contains

two nonmetals (phosphorus and chlorine),

so phosphorus pentachloride is a covalent compound.

No prefix on "phosphorus" means one phosphorus atom.

"Pentachloride" means five chlorine atoms.

Therefore, the correct formula for phosphorus pentachloride is PCl_5 .

20. What is the name of $\text{Cd}(\text{OH})_2$?

Answer: The name of $\text{Cd}(\text{OH})_2$ is cadmium hydroxide.

Analysis:

$\text{Cd}(\text{OH})_2$ contains

one cadmium cation and two hydroxide anions.

So $\text{Cd}(\text{OH})_2$ is an ionic compound.

We do not use Greek prefixes in the name for ionic compounds.

Cadmium is a transition metal, but you should have memorized that cadmium typically takes only one form, Cd^{2+} , so there is no need to use a roman numeral in the name.

Therefore, the correct name for $\text{Cd}(\text{OH})_2$ is cadmium hydroxide.

21. What is the chemical formula for lead(IV) oxide?

Answer: The chemical formula for lead(IV) oxide is PbO_2 .

Analysis:

Lead(IV) oxide contains

a metal (lead) and

a nonmetal (oxygen),

so lead(IV) oxide is an ionic compound.

When writing formulas for ionic compounds, it is your job to determine the subscripts.

We choose subscripts that will result in a net charge of zero.

Lead(IV) means the lead has a +4 charge.

The following notation demonstrates that subscripts of ₁ for Pb^{4+} and ₂ for O^{2-} will result in a net charge of zero.

group charges	+4	-4
	Pb_1	O_2
individual charges	+4	-2

Therefore, the correct formula is PbO_2 .

You have reached the end of the chemical nomenclature review quiz.

You are ready now for the next lesson,
which contains a Cumulative Review Quiz
covering the material we've learned in the last two chapters on numbers, units, atoms, and compound.