

Name: _____ Period: _____ Date: _____

Naming Ionic Compounds

Learning goal

I can name binary ionic compounds using IUPAC rules, and write the formula from the name.

Part 1 · Notes

Fill in each blank using the word bank for that section.

Section A · Naming the Ions

Word bank

magnesium oxide · nitrogen · aluminide · nitrogenide · oxide magnesium
· aluminum · magnesium oxygen · nitride

- Chemists around the world follow the same naming rules, set by **IUPAC** (the International Union of Pure and Applied Chemistry). A system of names is called **nomenclature**.
- The positive ion keeps the element's name.** Na^+ is the sodium ion, Ca^{2+} is the calcium ion, and Al^{3+} is the _____ ion.
- The negative ion gets a new ending.** Take the element's root and add **-ide**: chlorine → **chloride**, oxygen → **oxide**. The N^{3-} ion is called _____.

Element	Ion	Ion name
fluorine	F^-	fluoride
chlorine	Cl^-	chloride
bromine	Br^-	bromide
iodine	I^-	iodide
oxygen	O^{2-}	oxide
nitrogen	N^{3-}	nitride

- The compound's name is the positive ion, then the negative ion.** NaCl is sodium chloride. MgO is _____.

Section B · No Prefixes, and Back to Formulas

Word bank

CaF₂ · never use · always use · Ca₂F · sometimes use · CaF

- The name doesn't show the subscripts. CaCl₂ is calcium chloride, not "calcium dichloride." Calcium always forms Ca²⁺ and chlorine always forms Cl⁻, so the charges already decide that there are two chloride ions. Ionic names _____ prefixes like di- or tri-.

Remember

Prefixes (mono-, di-, tri-) are for **covalent** compounds, like carbon **dioxide**. You'll meet those in C7.08.

Remember

From a name back to a formula (C7.04)

- The name tells you the two ions.
- Find each ion's charge from its group.
- Balance the charges and write the smallest ratio.

- Worked example: aluminum oxide.** Aluminum → Al³⁺. Oxide → O²⁻. Two Al³⁺ (+6) and three O²⁻ (-6): **Al₂O₃**.
- The formula for calcium fluoride is _____.

Section C · Name That Compound

Word bank

-ogen · -ide · -ine · -ium

- Now mix it up. Some cards show a formula and ask for the name; others show a name and ask for the formula.

Remember

Formula → name: positive ion, then the -ide ion, no prefixes. Name → formula: find the charges, balance them, reduce.

- A name like "sodium chlorine" is wrong because the negative ion's name must end in _____.

Part 2 · Name That Compound

Card 1 · Formula → name (do this after Section A)

Name each ion, then put them together: positive ion first, then the -ide ion. No prefixes. The first row is done for you.

Formula	Positive ion (name)	Negative ion (-ide name)	Compound name
<i>Ex: KI</i>	<i>potassium</i>	<i>iodide</i>	<i>potassium iodide</i>
NaCl			
MgO			
CaCl ₂			
K ₂ O			
AlF ₃			
Li ₃ N			

CaCl₂ has two chloride ions, but its name is just “calcium chloride.” Why doesn't the name say “di”?

Sentence stem: “The name doesn't say di because calcium always forms ____ and chlorine forms ____, so ____.”

Card 2 · Name → formula (do this after Section B)

Write each ion with its charge, decide how many of each balance the charges, then write the formula. Stuck? Use C7.04's puzzle pieces. The first row is done for you.

Name	Ions (with charges)	How many of each?	Formula
<i>Ex: barium chloride</i>	Ba ²⁺ and Cl ⁻	1 Ba ²⁺ , 2 Cl ⁻	BaCl ₂
magnesium chloride			
sodium oxide			
aluminum fluoride			
lithium nitride			
calcium oxide			

The name “lithium nitride” doesn't show any numbers. How did you know the formula is Li₃N?

Sentence stem: “Lithium forms ____ and nitride is _____. To balance the charges, _____.”

Card 3 · Mixed race with a partner (do this in Section C)

Cut out the 8 cards on the next page and fold each one on the dotted line. Shuffle. Your partner holds up a card's FRONT; you answer; your partner checks the BACK. A wrong card goes to the bottom of the pile. Then switch. The example row shows how to record a card.

Card	My answer	Right? (partner checks)	Card	My answer	Right?
<i>Ex</i>	<i>NaBr → sodium bromide</i>	<i>✓ matches the back</i>	<i>Ex</i>	<i>lithium chloride → LiCl</i>	<i>✓ matches the back</i>
1			5		
2			6		
3			7		
4			8		

Which direction was harder for you, formula → name or name → formula? What step do you use to check yourself?

Sentence stem: “____ was harder because _____. To check myself, I _____.”

Race cards · cut along the dashed lines, fold on the dotted line

Front: the question. Back: the answer. Fold so the back faces away from the player.

KF FRONT · name it	potassium fluoride BACK · answer
CaO FRONT · name it	calcium oxide BACK · answer
Na₃N FRONT · name it	sodium nitride BACK · answer
MgF₂ FRONT · name it	magnesium fluoride BACK · answer
potassium oxide FRONT · write the formula	K₂O BACK · answer
calcium nitride FRONT · write the formula	Ca₃N₂ BACK · answer
aluminum oxide FRONT · write the formula	Al₂O₃ BACK · answer
lithium fluoride FRONT · write the formula	LiF BACK · answer

Part 3 · Checkpoints

How to use this section

1. Answer the ▲ main questions for each checkpoint.
2. Check your answers with your teacher.
3. Your teacher may give you a ● or ■ page for that checkpoint. Finish it before you move on.

Checkpoint 1 · Formula → name

▲ Main questions

T1.1. Name CaCl_2 .

- A. calcium chloride
- B. chloride calcium
- C. calcium chlorine
- D. calcium dichloride

T1.2. Name Li_3N .

- A. nitride lithium
- B. lithium nitride
- C. trilithium nitride
- D. lithium nitrogen

T1.3. Name AlF_3 .

- A. aluminum fluorine
- B. fluoride aluminum
- C. aluminum fluoride
- D. aluminum trifluoride

T1.4. Which name is written correctly?

- A. potassium dibromide
- B. potassium bromine
- C. bromide potassium
- D. potassium bromide

Checkpoint 2 · Name → formula**▲ Main questions**

T2.1. What is the formula for sodium oxide?

- A. NaO
- B. Na₂O
- C. NaO₂
- D. Na₃O

T2.2. What is the formula for calcium nitride?

- A. CaN
- B. Ca₂N₃
- C. Ca₃N₂
- D. Ca₃N

T2.3. What is the formula for aluminum oxide?

- A. Al₃O₂
- B. AlO
- C. AlO₃
- D. Al₂O₃

T2.4. What is the formula for lithium bromide?

- A. LiBr
- B. Li₂Br₂
- C. Li₂Br
- D. LiBr₂

Part 4 · Claim, Evidence, Reasoning

Question: A student named three compounds. Correct each name and explain which rule it broke.

Formula	Student's name
CaCl_2	calcium dichloride
Na_2O	sodium oxygen
AlF_3	fluoride aluminum

Sentence stems (use them if you need them)

The correct names are ____, ____, and ____.

“Calcium dichloride” is wrong because _____. “Sodium oxygen” is wrong because _____. “Fluoride aluminum” is wrong because _____.

These rules matter because _____.

Evidence bank: positive ion first · negative ion: root + -ide · no prefixes in ionic names · the charges set the ratio · Ca^{2+} and Cl^- · Na^+ and O^{2-} · Al^{3+} and F^-

Claim:

Evidence:

Reasoning:

■ Take it further

Someone says “calcium dichloride” is better because it tells you the formula. Respond.

Glossary · Glosario · Bảng thuật ngữ

English	Español	Tiếng Việt
IUPAC: the International Union of Pure and Applied Chemistry, which sets the rules for naming chemicals	IUPAC: la Unión Internacional de Química Pura y Aplicada, que establece las reglas para nombrar sustancias químicas	IUPAC: Liên minh Quốc tế về Hóa học Thuần túy và Ứng dụng, tổ chức đặt ra quy tắc gọi tên các chất hóa học
nomenclature: a system of names, such as the rules for naming compounds	nomenclatura: un sistema de nombres, como las reglas para nombrar compuestos	danh pháp: hệ thống tên gọi, như các quy tắc gọi tên hợp chất
-ide: the ending added to an element's root to name its negative ion, as in chloride and oxide	-uro / -ido: la terminación que se añade a la raíz de un elemento para nombrar su ion negativo, como en cloruro y óxido	-ua / -it: phần đuôi thêm vào gốc tên nguyên tố để gọi tên ion âm của nó, như clorua và oxit

Key directions · Instrucciones · Hướng dẫn

English	Español	Tiếng Việt
Build the name: positive ion first, then the -ide ion.	Forma el nombre: primero el ion positivo, luego el ion negativo.	Ghép tên: ion dương trước, rồi đến ion âm.
Write the formula from the name.	Escribe la fórmula a partir del nombre.	Viết công thức từ tên gọi.
Turn on the clock if you want to beat your time.	Activa el reloj si quieres superar tu tiempo.	Bật đồng hồ nếu em muốn vượt thời gian của mình.
Write a claim, evidence, and reasoning.	Escribe una afirmación, evidencia y razonamiento.	Viết nhận định, bằng chứng và lập luận.

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Checkpoint 1 · Formula → name

- Your teacher gave you this page. Finish it before you move on to the next section.

• Need a boost?

-ide names: fluorine → fluoride · chlorine → chloride · bromine → bromide · iodine → iodide · oxygen → oxide · nitrogen → nitride

S1.1. What is the name of the Cl^- ion?

- A. chlorinide
- B. chloride
- C. chlorine

S1.2. Name NaCl.

- A. chloride sodium
- B. sodium chlorine
- C. sodium chloride

S1.3. Name MgO.

- A. magnesium oxide
- B. magnesium oxygen
- C. oxide magnesium

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Checkpoint 2 · Name → formula

- Your teacher gave you this page. Finish it before you move on to the next section.

• Need a boost?

S2.1. Potassium chloride is made of K^+ and Cl^- . What is the formula?

- A. KCl_2
- B. KCl
- C. K_2Cl

S2.2. Calcium fluoride is made of Ca^{2+} and F^- . What is the formula?

- A. CaF
- B. Ca_2F
- C. CaF_2

S2.3. Which ion does “oxide” name?

- A. O^{2-}
- B. O_2
- C. O^{2+}

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Checkpoint 1 · Formula → name

■ Your teacher gave you this page. Try these after your main questions.

■ Take it furtherH1.1. Why is CaCl_2 named “calcium chloride” and not “calcium dichloride”?

- A. “Dichloride” means two calcium ions
- B. Prefixes are only used for metals
- C. The 2 is too small to include
- D. Calcium always forms Ca^{2+} and chlorine always forms Cl^- , so the charges already fix the 1 : 2 ratio

H1.2. Name Ba_3N_2 .

- A. barium nitride
- B. tribarium dinitride
- C. barium dinitride
- D. barium nitrogen

H1.3. Explain how the name “sodium oxide” tells you which ions are in Na_2O .

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Checkpoint 2 · Name → formula

■ Your teacher gave you this page. Try these after your main questions.

■ Take it furtherH2.1. A label reads “K₂O · potassium dioxide.” What's wrong?

- A. The name should be potassium oxide; ionic names don't use prefixes
- B. Nothing is wrong
- C. It should be “dipotassium oxide”
- D. The formula should be KO

H2.2. Which name and formula match?

- A. calcium bromide, CaBr
- B. barium fluoride, BaF₂
- C. lithium oxide, LiO
- D. potassium nitride, K₂N

H2.3. Write the formula for lithium oxide and explain how you got the subscripts.
