
Part A: Naming Type I ionic compounds
(when the metal only forms one type of ion)

Look at Table 5.3 of Type I ions on page 137 of your textbook.

1. The charges of most of the ions in Table 5.3 can be predicted by the location of its corresponding metal on the periodic table. Give a specific example of such a metal and how you could figure out its charge from the periodic table.

2. For which metals in Table 5.3 is it not possible to predict the charge by looking at the periodic table? Check to make sure all of your PAL team came up with the same ions. These are really important exceptions, so see if you can also come up with a simple way to memorize which ones they are.

To help us understand how to name Type I ionic compounds, let's work backwards to derive the underlying rules. Being able to do this is really useful, because if you ever forget the rules, you will have learned how to figure them out. Use the following examples of Type I ionic compounds as a guide to answer questions 3-8.



3. Where is the metal cation positioned in these chemical names? **First** **Last**
4. What did we do to the name of the cation when it went from being a pure element to being part of a compound?
5. Where is the anion positioned in these chemical names? **First** **Last**
6. What did we do to the name of the monatomic anion when it went from being a pure element to being part of a compound?
7. What did we do to the name of the polyatomic anion when it became part of a compound?
8. When are parentheses used in writing the formulas of ionic compounds?

Part B: Naming Type II ionic compounds
(when the metal forms more than one type of ion)

Use the following examples of Type II ionic compounds as a guide to answer questions 9 and 10.

$\text{Cu}(\text{NO}_2)_3 = \text{copper(III) nitrite}$	$\text{Sn}(\text{HPO}_4)_2 = \text{tin(IV) hydrogen phosphate}$
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9. What are the cation charges in these two examples? Explain how you figured out each charge based only on the formulas.

charge on Cu = **explanation:**

charge on Sn = **explanation:**

10. How are the charges in question 9 specified in the chemical names?

Part C: Check your current knowledge

11. Fill in the names of the ionic compounds in the table below. These are the same compounds that we saw on your last PAL worksheet.

Product	Formula of ingredient	Name of Ionic Compound
shampoo	MgSO_4	
hair coloring	Li_2CO_3	
body wash	NH_4Cl	
sunscreen	ZnO	
baking soda	NaHCO_3	
hand soap	FeO	
toothpaste	SnCl_2	
conditioner	$\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$	

Part D: The Ultimate Naming Game

- Break up into PAL teams. Each team will need one set of “The Ultimate Naming Game” game boards. Take turns rolling the die. If you don’t have die, you could write the numbers 1-6 on post-it notes and put them in a hat for students to draw. Each student rolls the die three times:
 1. The first roll indicates which set of game boards that student will play with for that turn. The first page of game boards should be used when an EVEN number is rolled; the second page of game boards is used when an ODD number is rolled.
 2. The second roll of the die indicates how many spaces to move the place marker on the first game board (CATIONS).
 3. The die is then rolled a third time indicating how many spaces to move on the second board (ANIONS). After each person’s turn, write the name and formula rolled in the table below.
- When playing with the *EVEN-number boards*, **each student** should write down the name and formula for the resulting ionic compound that is formed. Compare answers with the others in your group.
- When playing with the *ODD-number boards*, **each student** should write down the name and formula of the resulting ionic compound. When naming compounds, remember to consider when roman numerals are needed. Compare answers with the others in your group.
- Students should only check their “*Important elements/ions to know for CHM 4*” handout if no one in their group knows the name or formula of a given ion.

The Ultimate Naming Game: Use these boards when the first roll of the die is **EVEN**.

<u>START</u> → tin(IV)	silver	iron(II)	lead(II)
calcium	CATIONS		aluminum
rubidium			lead(IV)
copper(II)			tin(II)
magnesium			copper(I)
ammonium			zinc
iron(III)	strontium	potassium	sodium

<u>START</u> → borate	chloride	sulfite	perchlorate
hydrogen carbonate	ANIONS		oxide
acetate			nitride
phosphate			hydroxide
hypobromite			arsenate
carbonate			dichromate
iodite	cyanide	nitrate	sulfate

The Ultimate Naming Game: Use these boards when the first roll of the die is **ODD**.

START → Ca^{2+}	Li^+	Fe^{2+}	Cu^+
Pb^{2+}	CATIONS		Sr^{2+}
Mg^{2+}			Al^{3+}
Ba^{2+}			Pb^{4+}
Zn^{2+}			NH_4^+
K^+			Fe^{3+}
Na^+	Ag^+	Cu^{2+}	Sn^{2+}

START → BrO^-	F^-	H_2PO_4^-	NO_3^-
$\text{S}_2\text{O}_3^{2-}$	ANIONS		$\text{C}_2\text{O}_4^{2-}$
CN^-			N^{3-}
OH^-			ClO_4^-
Br^-			S^{2-}
$\text{C}_2\text{H}_3\text{O}_2^-$			MnO_4^-
SO_4^{2-}	CO_3^{2-}	PO_3^{3-}	HCO_3^-