

3 • Molecules & Compounds

Writing Formulas and Naming Compounds

Introduction

Writing formulas and naming compounds can be confusing because there are different types of compounds that follow different rules. Additionally, some compounds (H₂O, NH₃, CH₄, etc.) simply have **common names** that must be memorized.

The two types of compounds we will focus on first are **ionic compounds** (formed from positive and negative ions) and **binary nonmetal compounds** (molecular compounds). Later we will add **acids**. So... you must recognize the **type** of compound before you try to name it. [Note: + ion = “cation” and – ion = “anion”.]

	Ionic	Binary Nonmetal
Formula	+ ion before – ion ex: NaCl (NH ₄) ₂ SO ₄ Al ₂ S ₃	usually the less electronegative atom is first ex: CO CO ₂ N ₂ O
Naming	Name of cation + name of anion sodium chloride ammonium sulfate aluminum sulfide	Indicate the number (mono, di, tri, and kind of atoms. First element is simply name of element. Second element name ends with “ide” carbon monoxide carbon dioxide dinitrogen monoxide

I. Writing Ionic Formulas

	Cl ⁻	NO ₃ ⁻	S ²⁻	CO ₃ ²⁻	N ³⁻	PO ₄ ³⁻	OH ⁻
Na ⁺							
NH ₄ ⁺							
Sn ²⁺							
Hg ₂ ²⁺							
Al ³⁺							
Sn ⁴⁺							

II. Naming Ionic Compounds

Cation	Anion	Formula	Name
Cu ²⁺	OH ⁻		
Ba ²⁺	SO ₄ ²⁻		
NH ₄ ⁺	Cr ₂ O ₇ ²⁻		
Ag ⁺	C ₂ H ₃ O ₂ ⁻		
Fe ³⁺	S ²⁻		

mono	di	tri	tetra	penta	hexa	hepta	octa	nona	deca
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III. Writing Formulas of Binary Nonmetal Compounds

Name	Formula	Name	Formula
nitrogen trifluoride		phosphorus trichloride	
nitrogen monoxide		phosphorus pentachloride	
nitrogen dioxide		sulfur hexafluoride	
dinitrogen tetroxide		disulfur decafluoride	
dinitrogen monoxide		xenon tetrafluoride	

IV. Naming Binary Nonmetal Compounds

Name	Formula	Name	Formula
	CCl ₄		HBr
	P ₄ O ₁₀		N ₂ F ₄
	ClF ₃		XeF ₃
	BCl ₃		PI ₃
	SF ₄		SCl ₂

V. Practice for Both Types of Compounds

Formula	Name
HCl	
PCl ₅	
K ₂ S	
NiSO ₄	
ClF ₃	
OF ₂	
Al(OH) ₃	
NCl ₃	
(NH ₄) ₃ PO ₄	
S ₂ Cl ₂	

Formula	Name
	carbon dioxide
	ammonium carbonate
	sulfur dichloride
	calcium iodide
	boron trifluoride
	phosphorus triiodide
	magnesium perchlorate
	potassium permanganate
	aluminum phosphate
	dioxygen difluoride