Decode the Label

Use charges and prefixes to name binary compounds.

PHS.3.3 "Using naming conventions for binary compounds, write the compound name from the formula, and write balanced formulas from the name (e.g., carbon dioxide - CO2, sodium chloride - NaCl, iron III oxide- Fe2O3, and calcium bromide - CaBr2)."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each ion and its charge in the passage, and circle each prefix with the atom count it means. Use your marks to help name compounds and write formulas.

What a Formula Tells You

1. A label on a materials lab jar may list an ionic compound, a substance built from positively and negatively charged ions. Its formula must have a total charge of zero, and the smallest whole-number ratio gives its subscripts. A positive metal ion comes first. A negative nonmetal ion follows, and its name ends in -ide. For example, magnesium is Mg^{2+} and fluoride is F^{1-}, so magnesium fluoride is MgF_2. In other compounds, barium forms Ba^{2+}, sulfide forms S^{2-}, and nitride forms N^{3-}. A subscript of one is never written.

2. Some metal ions can have more than one charge. Copper can form Cu^{1+} or Cu^{2+}, while chloride is Cl^{1-}. A Roman numeral in an ionic compound's name identifies the metal ion's charge, not the number of metal atoms. For example, copper(I) oxide contains Cu^{1+} and O^{2-}, giving Cu_2O. When a formula is given instead of a name, use the negative ion's charge and the subscripts to find the metal ion's charge. For a metal such as copper, include that charge as a Roman numeral in its name. Change the nonmetal ending to -ide.

3. Other jars hold molecular compounds made from two nonmetals. Their names use prefixes to show atom counts: mono means one, di means two, tri means three, and tetra means four. The first element keeps its name and usually drops mono. The second ends in -ide and keeps its prefix. An awkward vowel is sometimes dropped: tetra plus oxide becomes tetroxide. Carbon monoxide, CO, has one carbon and one oxygen. For the formulas in this section, nitrogen is N, oxygen is O, phosphorus is P, and chlorine is Cl. Unlike ionic formulas, molecular subscripts record the number of atoms named by prefixes, not a charge balance.

2 ANSWER WITH EVIDENCE

Use the passage

1. Write the balanced formula for barium sulfide.

2. Name $CuCl_2$. Include a Roman numeral.

3. Name N_2O_4 using prefixes.

4. Write the formula for phosphorus trichloride.

3 YOUR TURN

Your own words

Add two entries to a compound index: one for the ionic pair barium and nitride, and one for a molecule with one nitrogen atom and two oxygen atoms. Write each name and formula, then explain how you determined one subscript in each formula.

Decode the Label

PART 1 · READ AND MARK

Underline each ion and its charge in the passage, and circle each prefix with the atom count it means. Use your marks to help name compounds and write formulas. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Write the balanced formula for barium sulfide.	**BaS**
2	Name $CuCl_2$. Include a Roman numeral.	**Copper(II) chloride**
3	Name N_2O_4 using prefixes.	**Dinitrogen tetroxide**
4	Write the formula for phosphorus trichloride.	**PCl_3**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Barium nitride is Ba_3N_2; three Ba^{2+} ions and two N^{3-} ions balance charges. Nitrogen dioxide is NO_2; di means two oxygen atoms.

Accept equivalent explanations that balance the ionic charges and use the molecular prefix correctly. Subscripts of one should not be written.