Names on the Labels

Use formulas and naming rules to identify compounds.

CHE.5.3 "Generate names of ionic and covalent compounds from their formulas. Name binary compounds, binary acids, stock compounds, ternary compounds, and ternary acids."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Circle each chemical formula in the passage. Underline the naming rule or example that helps you name each type of compound.

The Water Plant Records

1. At a water-treatment plant, labels on storage containers must distinguish compounds that look alike. A formula gives clues about a compound's name. For a binary ionic compound, name the metal first, then change the nonmetal ending to *ide*. For example, MgO is magnesium oxide, while LiCl is lithium chloride. Some metals form ions with different charges; their names need a Roman numeral. In CoO, oxygen has a 2^- charge, so cobalt must be 2^+ and the name is cobalt(II) oxide. Each chloride ion has a 1^- charge. Two labels in the plant's records read NaCl and $FeCl_3$.

2. Other containers hold binary covalent 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 usually omits *mono*; the second takes a prefix and ends in *ide*. Thus CO is carbon monoxide, and SF_6 is sulfur hexafluoride. An acid label needs another check: (aq) means the substance is dissolved in water. A binary acid has hydrogen and one nonmetal; its name begins *hydro* and ends in *ic acid*. For example, H_2S(aq) is hydrosulfuric acid. Two more labels read PCl_3 and HBr(aq).

3. Polyatomic ions add another layer to the plant's paperwork. A ternary ionic compound can contain three elements because a metal joins a charged group of atoms. The nitrate ion is NO_3^-; the sulfate ion is SO_4^{2-}. Keep each group's name unchanged when naming the compound. For instance, K_2CO_3 is potassium carbonate. A ternary acid contains hydrogen, oxygen, and another element. Its name depends on its ion: an *ate* ending becomes *ic acid*, while an *ite* ending becomes *ous acid*. H_3PO_4(aq) is phosphoric acid, from phosphate. The remaining records show $Ca(NO_3)_2$ and H_2SO_4(aq).

2 ANSWER WITH EVIDENCE

Use the passage

1. Name the two unlabeled ionic compounds in the first paragraph: NaCl and $FeCl_3$.

2. What is the name of PCl_3? Use the prefixes described in the passage.

3. What is the acid name of HBr(aq)?

4. Name both compounds at the end of the passage: $Ca(NO_3)_2$ and H_2SO_4(aq).

3 YOUR TURN

Your own words

A lab has six new labels: $MgCl_2$, $CoCl_2$, CF_4, HF(aq), $LiNO_3$, and H_2CO_3(aq). Write each compound's name, then explain how you found the Roman numeral for $CoCl_2$.

Names on the Labels

PART 1 · READ AND MARK

Circle each chemical formula in the passage. Underline the naming rule or example that helps you name each type of compound. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Name the two unlabeled ionic compounds in the first paragraph: NaCl and $FeCl_3$.	**NaCl: sodium chloride. $FeCl_3$: iron(III) chloride.**
2	What is the name of PCl_3? Use the prefixes described in the passage.	**Phosphorus trichloride.**
3	What is the acid name of HBr(aq)?	**Hydrobromic acid.**
4	Name both compounds at the end of the passage: $Ca(NO_3)_2$ and H_2SO_4(aq).	**$Ca(NO_3)_2$: calcium nitrate. H_2SO_4(aq): sulfuric acid.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

$MgCl_2$: magnesium chloride
$CoCl_2$: cobalt(II) chloride
CF_4: carbon tetrafluoride
HF(aq): hydrofluoric acid
$LiNO_3$: lithium nitrate
H_2CO_3(aq): carbonic acid
Each chloride ion has a 1^- charge. Two chloride ions require cobalt to have a 2^+ charge, so its name uses (II).

For $CoCl_2$, accept any explanation showing that two chloride ions give a total charge of 2^-, so cobalt is 2^+. Accept names with or without a space before (aq) when students copy formulas.