Decode the Labels

Use periodic-table patterns to identify compounds

CHE.2.f "Analyze and interpret data from the periodic table to derive chemical formulas and names for ionic and covalent compounds."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the sentences that link periodic-table groups to ion charges or bond counts. Circle the rules that tell you how to balance a formula or name a compound.

Clues on the Supply Shelf

1. A lab technician finds several unlabeled supply jars and a list of elements they contain. The periodic table offers clues that can restore the labels. An element's group helps show its outer electrons, while its location shows whether it is a metal or nonmetal. Read the small data table as a pocket periodic table: it lists five possible ingredients.

PERIODIC-TABLE CLUES

Element	Group	Outer electrons	Type
Na	1	1	Metal
Mg	2	2	Metal
C	14	4	Nonmetal
O	16	6	Nonmetal
Cl	17	7	Nonmetal

2. When a metal meets a nonmetal, electrons usually transfer and ions form. Group 1 metals usually make 1+ ions, group 2 metals 2+ ions, group 16 nonmetals 2− ions, and group 17 nonmetals 1− ions in simple ionic compounds. The total charge of an ionic formula must be zero. For example, potassium and bromine form KBr, named potassium bromide.

3. Two nonmetals usually share electrons instead. Groups suggest how many bonds their atoms can make: group 14 atoms often make four bonds, group 16 atoms two, and group 17 atoms one. Match these bonds to find subscripts. Prefixes tell the number of atoms: mono means one, di means two, and tetra means four. The second element's name ends in -ide.

2 ANSWER WITH EVIDENCE

Use the passage

1. The technician finds a compound made from magnesium and chlorine. What are its formula and name? Explain how its charges balance.

2. What are the formula and name of the compound made from sodium and oxygen? Use the group clues to explain the subscripts.

3. Carbon and oxygen can form a molecule in which each carbon makes four bonds and each oxygen makes two. What are its formula and name?

4. Sodium and chlorine form a compound. Use the table to explain why it is ionic, then give its formula and name.

3 YOUR TURN

Your own words

Choose one metal-nonmetal pair and one nonmetal-nonmetal pair from the table that do not appear together in Questions 1 to 4. Write each compound's formula and name, then explain how the table supports each formula.

Decode the Labels

PART 1 · READ AND MARK

Underline the sentences that link periodic-table groups to ion charges or bond counts. Circle the rules that tell you how to balance a formula or name a compound. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	The technician finds a compound made from magnesium and chlorine. What are its formula and name? Explain how its charges balance.	**$MgCl_2$, magnesium chloride. One Mg^{2+} ion balances two Cl^{1-} ions.**
2	What are the formula and name of the compound made from sodium and oxygen? Use the group clues to explain the subscripts.	**Na_2O, sodium oxide. Two Na^{1+} ions balance one O^{2-} ion.**
3	Carbon and oxygen can form a molecule in which each carbon makes four bonds and each oxygen makes two. What are its formula and name?	**CO_2, carbon dioxide. One carbon bonds with two oxygen atoms.**
4	Sodium and chlorine form a compound. Use the table to explain why it is ionic, then give its formula and name.	**Sodium is a metal and chlorine is a nonmetal, so they form ions. The formula is NaCl, sodium chloride.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Magnesium and oxygen form MgO, magnesium oxide: Mg^{2+} and O^{2-} have charges that cancel. Carbon and chlorine form CCl_4, carbon tetrachloride: carbon makes four bonds, and each chlorine makes one.

Accept other pairs not used together in the questions if both formulas and names are correct and the explanations use charge balance or bond counts. For covalent compounds, check that prefixes match the subscripts.