

Matter Code Clues

Use symbols and formulas to compare elements and compounds.

7.6.A "compare and contrast elements and compounds in terms of atoms and molecules, chemical symbols, and chemical formulas;"

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Circle each chemical formula and underline each standalone chemical symbol. Write E or C beside every circled or underlined item to show whether it represents an element or a compound.

Reading Matter's Codes

- ① Scientists use names, symbols, and formulas to describe matter clearly. An element is a pure substance made of only one kind of atom. Its chemical symbol uses one capital letter, sometimes followed by a lowercase letter, such as He for helium. A compound is a pure substance whose particles contain atoms of two or more different elements chemically bonded together. A chemical formula tells which element symbols are present and how many atoms of each are in one particle or formula unit.
- ② At a swimming pool, copper pipes may carry water. Copper is an element represented by Cu. A sample of copper contains copper atoms, not molecules made from different elements. Oxygen gas is also an element. Its formula, O₂, shows a molecule with two oxygen atoms bonded together. Water is a compound with the formula H₂O. Each water molecule has two hydrogen atoms and one oxygen atom. Thus, water molecules contain more than one kind of atom.
- ③ Compare the particles before deciding whether a sample is an element or compound. Cu names one type of atom, so it is an element, but it does not show a two-atom molecule. O₂ is an element because both atoms are oxygen, even though they form a molecule. H₂O is a compound because its formula has hydrogen and oxygen symbols. Subscripts apply only to the symbol just before them. No subscript means one atom of that element in each molecule.

2 ANSWER WITH EVIDENCE Use the passage

1 Compare Cu and O₂. How are both substances elements, and how are their particles different?

2 Why is O₂ an element but H₂O a compound? Use the element symbols in each formula as evidence.

3 What does the subscript 2 mean in O₂? What does the missing subscript after O mean in H₂O?

4 Explain why Cu is written as a chemical symbol, while H₂O is written as a chemical formula.

3 YOUR TURN Your own words

Choose one element that forms molecules and one compound. Write each formula, identify it as an element or compound, and explain how the atoms shown in each formula support your label.

PART 1 • READ AND MARK

Circle each chemical formula and underline each standalone chemical symbol. Write E or C beside every circled or underlined item to show whether it represents an element or a compound. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Compare Cu and O ₂ . How are both substances elements, and how are their particles different?	Both contain only one kind of atom. Cu represents copper atoms, while O₂ represents molecules made of two bonded oxygen atoms.
2	Why is O ₂ an element but H ₂ O a compound? Use the element symbols in each formula as evidence.	O₂ has only the oxygen symbol, so it has one kind of atom. H₂O has hydrogen and oxygen symbols, so it has two different kinds of atoms.
3	What does the subscript 2 mean in O ₂ ? What does the missing subscript after O mean in H ₂ O?	The 2 in O₂ means two oxygen atoms. No subscript after O in H₂O means one oxygen atom.
4	Explain why Cu is written as a chemical symbol, while H ₂ O is written as a chemical formula.	Cu is a symbol for one element, copper. H₂O is a formula because it shows two elements and the number of atoms of each in a molecule.

PART 3 • YOUR TURN (SAMPLE ANSWER)

N₂ is an element. Its molecule has two nitrogen atoms, so it has one kind of atom. CO₂ is a compound. Each molecule has one carbon atom and two oxygen atoms, so it has two kinds of atoms.

Accept any accurate element molecular formula and any accurate compound formula with a correct explanation of the kinds and numbers of atoms. Students should distinguish an element with same-kind atoms from a compound with atoms of different elements.