

Formula Code Files

Read chemical formulas as atom-count codes.

6.5.e "compounds may be represented by chemical formulas;"

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Circle each chemical formula, underline every subscript, and write a small 1 above any element symbol with no subscript to show the number of atoms it represents.

A Code for Compounds

- ① Chemists use chemical formulas as short, exact representations of compounds. A compound contains two or more different elements chemically joined. Each element has a symbol, such as H for hydrogen and O for oxygen. Water is a compound with the formula H_2O . The small 2, written low after H, is a subscript. It tells that one water molecule has two hydrogen atoms. No subscript after O means one oxygen atom. The formula shows which elements are in the compound and how many atoms of each are present.
- ② Calcium chloride is another compound. Its formula, CaCl_2 , includes calcium, Ca, and chlorine, Cl. The subscript 2 follows Cl, so it applies to chlorine only. One formula unit of calcium chloride has one calcium atom and two chlorine atoms. Because Ca has no subscript, it represents one calcium atom. The formula does not mean two calcium atoms and two chlorine atoms. Subscripts are important because changing a subscript changes the number of atoms shown. Chemists can quickly compare what different compound formulas represent.
- ③ Carbon dioxide has the formula CO_2 . It contains carbon, C, and oxygen, O. The missing subscript after C means one carbon atom, while the 2 after O means two oxygen atoms. Together, one molecule has three atoms total. A formula is not a drawing of the compound. It is a code that identifies the element symbols and the number of each kind of atom. When you read a formula, look carefully at each subscript and connect it to the symbol immediately before it.

2 ANSWER WITH EVIDENCE Use the passage

1 Which formula represents a compound with two hydrogen atoms and one oxygen atom?

2 What does the subscript 2 tell you in H_2O ?

3 In CaCl_2 , which element does the subscript 2 describe, and how many atoms of that element are shown?

4 How many atoms total are represented by one molecule of CO_2 ? Explain using the formula.

3 YOUR TURN Your own words

Choose ammonia, NH_3 , methane, CH_4 , or sulfur dioxide, SO_2 . Write its formula in your first sentence. In your second sentence, name each element and tell how many atoms of each the formula represents.

PART 1 • READ AND MARK

Circle each chemical formula, underline every subscript, and write a small 1 above any element symbol with no subscript to show the number of atoms it represents. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Which formula represents a compound with two hydrogen atoms and one oxygen atom?	H₂O, water.
2	What does the subscript 2 tell you in H ₂ O?	It tells that there are two hydrogen atoms.
3	In CaCl ₂ , which element does the subscript 2 describe, and how many atoms of that element are shown?	It describes chlorine, Cl, and shows two chlorine atoms.
4	How many atoms total are represented by one molecule of CO ₂ ? Explain using the formula.	Three atoms total, one carbon atom and two oxygen atoms.

PART 3 • YOUR TURN (SAMPLE ANSWER)

The formula for ammonia is NH₃. It has one nitrogen atom and three hydrogen atoms.

Accept either listed compound with its correct formula and atom counts. For ammonia, accept one nitrogen and three hydrogen atoms. For methane, accept one carbon and four hydrogen atoms. For sulfur dioxide, accept one sulfur and two oxygen atoms.