

Today we use a lot of abbreviated language. Texting and instant messaging are quick ways to communicate that use as few letters and numbers as possible to get your message across. There is a shorthand method for communicating information about chemical compounds. This method uses chemical symbols and numbers to tell you which elements are in a compound and how much of each element is present.

Try your hand at using this shorthand method. Complete the activity below by matching up each compound's common name with its chemical name and chemical formula.

Line Matching Activity

Instructions

Match the following chemical formulas with their chemical names:

Chemical Formula	Chemical Name
Co	cobalt chloride
H ₂ O	baking soda
CO ₂	sulfuric acid
NaHCO ₃	water
Br ₂	cobalt
H ₂ SO ₄	carbon dioxide
CoCl ₂	bromine

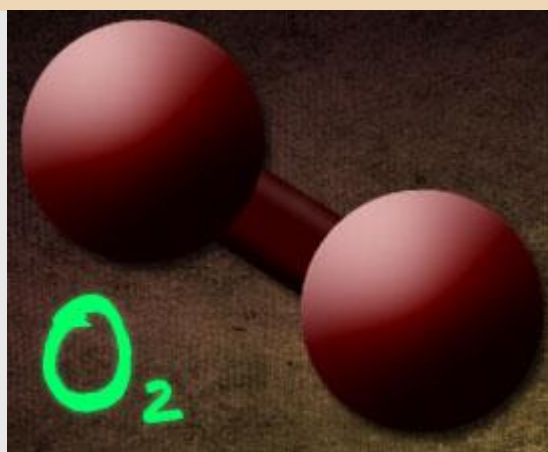
Chemical names can be very long. Fortunately, we have an abbreviated way to communicate them using symbols and numbers.

Chemical formulas have two parts:

- the symbol of each element in a molecule of the substance
- a number indicating how many atoms of each element are in each molecule of the substance

We will start with a simple example. The chemical formula for the oxygen gas we breathe is O_2 . There is only one element in oxygen gas: oxygen. O is the symbol for the element oxygen, and the subscript 2 means that each molecule of oxygen contains two atoms of oxygen. The atoms of oxygen are bonded together covalently by sharing pairs of electrons.

Subscripts Prefixes



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The same principle applies to molecules of compounds, which contain atoms of more than one element. For example, the compound carbon dioxide has the chemical formula CO_2 . We breathe out CO_2 when we exhale. The chemical formula for carbon dioxide shows that carbon dioxide contains atoms of carbon (C) and oxygen (O).

The subscript 2 on the O shows that there are two atoms of oxygen in each molecule of carbon dioxide. There is only one atom of carbon in each molecule of carbon dioxide. We do not write the number 1 as a subscript in chemical formulas. If an element has no subscript, assume there is one atom of the element represented.

You have probably noticed that the names of some of the elements in these compounds are slightly different from their regular element names. For example, the symbol O by itself represents the element oxygen, but when oxygen combines with carbon to form CO_2 , its name changes to oxide. This is a general rule for writing compound names. In a compound made up of two elements, the name of the first element stays the same. The ending of the second element changes to -ide.

Compound Formulas

View each formula and read information about its compound name, the elements in its compound, and the number of atoms of each element each compound contains.



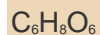
Name: Calcium Carbonate

Number of Elements: 3

1 atom of calcium (Ca)

1 atom of carbon (C)

3 atoms of oxygen (O)



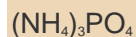
Name: Ascorbic Acid (Vitamin C)

Number of Elements: 3

6 atoms of carbon (C)

8 atoms of hydrogen (H)

6 atoms of oxygen (O)



Name: Ammonium Phosphate

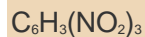
Number of Elements: 4

3 atoms of nitrogen (N)

12 atoms of hydrogen (H)

1 atom of phosphorus (P)

4 atoms of oxygen (O)



Name: Trinitrotoluene (TNT)

Number of Elements: 4

6 atoms of carbon (C)

3 atoms of hydrogen (H)

3 atoms of nitrogen (N)

6 atoms of oxygen (O)

Assessment

When you reach this point, you will be able to:

- identify the elements in a chemical formula
- calculate the number of atoms of each element in a chemical formula
- recognize the chemical formulas for water, carbon dioxide, and oxygen gas

Practice

Practice

Instructions

Identify the following elements in each formula below.

1. SiO_2
2. Ba(OH)_2
3. $\text{Ca}_3(\text{PO}_4)_2$
4. NaNO_3
5. KCl
6. NaHCO_3

7. (05.03 LC)

Which of the following is one part of a chemical formula?

8. **Choice 1**

- A number that shows the total atomic mass of the substance

9. **Message for those who choose Choice 1**

10. **Choice 2**

- The full name of each element shown

11. **Message for those who choose Choice 2**

12. **Choice 3**

- The symbol of each element in the substance

13. **Message for those who choose Choice 3**

14. **Choice 4**

- A number that shows the total number of chemical bonds

15. Which of the following is one part of a chemical formula for a molecule?

16. **Choice 1**

- A number showing the atomic masses of each element

17. **Message for those who choose Choice 1**

18. **Choice 2**

- A Lewis dot diagram for the molecule

19. **Message for those who choose Choice 2**

20. **Choice 3**

- A number that shows the total number of chemical bonds

21. **Message for those who choose Choice 3**

22. **Choice 4**

- Numbers that show how many atoms of each element are in the molecule

How many atoms of oxygen are there in one molecule of carbon dioxide, if the chemical formula is CO_2 ?

Choice 1

0

Message for those who choose Choice 1

Choice 2

1

Message for those who choose Choice 2

Choice 3

2

Message for those who choose Choice 3

Choice 4

3

Message for those who choose Choice 4

Calcium carbonate is a molecule that contains one atom of calcium, one atom of carbon, and three atoms of oxygen. Which of the following is the correct chemical formula for calcium carbonate?

Choice 1

CaCO_3

Message for those who choose Choice 1

Choice 2

Ca_3CO

Message for those who choose Choice 2

Choice 3

$(\text{CaC})_3\text{O}$

Message for those who choose Choice 3

Choice 4

$3(\text{CaCO})$

Ascorbic acid, also known as Vitamin C, is a molecule that contains six atoms of carbon, eight atoms of hydrogen, and six atoms of oxygen. Which of the following is the correct chemical formula for ascorbic acid?

Choice 1

$6C_8H_6O$

Message for those who choose Choice 1

Choice 2

$6(CH)O_8$

Message for those who choose Choice 2

Choice 3

$O_8(CH)_6$

Message for those who choose Choice 3

Choice 4

$C_6H_8O_6$

Message for those who choose Choice 4