

Lesson
Question

Lesson Goals

Differentiate between and compounds.

Describe .

Use to
represent compounds.

Demonstrate how chemical
 can be used
to describe a compound.

W
2k**Words to Know**

Write the letter of the definition next to the matching word as you work through the lesson. You may use the glossary to help you.

- | | |
|------------------------|---|
| _____ coefficient | A. to contrast or to show how two or more things are different from each other |
| _____ differentiate | B. a letter, number, or symbol that is smaller and just below normal line of type |
| _____ subscript | C. a number that indicates how many times to multiply a variable |
| _____ compound | D. a unit of two or more atoms |
| _____ chemical formula | E. a pure substance that is made up of atoms or ions of two or more different elements |
| _____ molecule | F. a representation of a compound; gives the number of atoms and types of atoms in a compound |

How are compounds different from elements?

Elements:

- are made of atoms with the same atomic .
- contain atoms with the same number of .
- are made of only one type of .
- are substances.
- cannot be broken down through means.
- cannot be broken down through ordinary means.
- can be represented by chemical .

Instruction | Compounds

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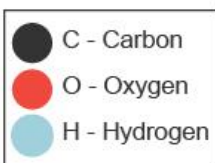
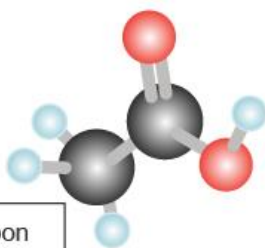
Compounds and Atoms

Elements can be very different from the compounds that they form.

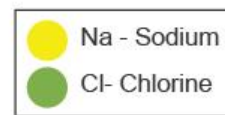
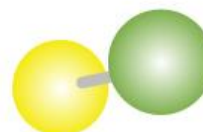
Atom	Elemental Form	Compound
Hydrogen	Highly flammable, colorless, and odorless <input type="text"/>	Water, a colorless, tasteless, odorless <input type="text"/>
	Reactive, colorless, and odorless gas	

Compounds: Structures

Acetic acid ($C_2H_4O_2$)



Sodium chloride (NaCl)



are made up of atoms or ions of or more different elements.

- Acetic acid is made up of three different kinds of atoms: carbon, , and hydrogen.
- Sodium chloride is made up of two different kinds of atoms: sodium and .

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Compounds: Properties

Compounds:

- are substances.
- can be into simpler pure substances by chemical means.
- have properties that are different from their component .
- may be represented by chemical .

A :

- is a representation of a compound
- gives the number of atoms and types of atoms in the compound

Different Properties of Elements and Compounds

- When elements combine, compounds that have properties from those of the uncombined elements are formed.
 - Sodium (a metal that reacts explosively with water) combines with chlorine (a poisonous gas) to form a white, crystalline that is used to flavor food.

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Molecules

- are units of two or more atoms.
- Molecules can be made up of of the same element or of different elements.
 - When two atoms of the same element combine, they form a molecule.
 - When atoms of different elements combine, they form a .
- Atoms to form molecules that can be made of two to thousands of atoms.

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Chemical Formulas: Symbols and Subscripts

The chemical formula of a compound gives two types of information:

- the of atoms
- the of each type of atom

Example: Sugar— $C_6H_{12}O_6$

Step 1: Find the type of atoms by looking at the chemical .

- C = carbon
- H =
- O = oxygen

Step 2: Find the number of each type of using the subscripts.

- 6 carbon atoms
- hydrogen atoms
- 6 oxygen atoms

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Chemical Formulas: Parentheses and Coefficients

Some chemical formulas include parentheses and coefficients. A is a number in front of the chemical formula.

Example 1: Aluminum nitrate— $\text{Al}(\text{NO}_3)_3$

Step 1: Find the of atoms by looking at the chemical symbols.

- Al = aluminum
- N =
- O = oxygen

Step 2: Find the of each type of atom. The subscripts outside the parentheses refers to all the elements inside the parentheses.

- 1 aluminum atom
- 3 x 1 nitrogen = nitrogen atoms
- 3 x 3 oxygen = oxygen atoms

Example 2: Potassium sulfate— $4\text{K}_2\text{SO}_4$

Step 1: Find the type of atoms by looking at the chemical .

- K = potassium
- S =
- O = oxygen

Step 2: Find the of each type of atom. The 4 in front of the chemical formula means that there are 4 molecules of K_2SO_4 .

- 4 x 2 potassium = 8 potassium atoms
- 4 x 1 sulfur = sulfur atoms
- 4 x 4 oxygen = oxygen atoms

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Models: Ball and Stick

The model shows the way the atoms in a compound are connected. In a ball and stick model:

- the types of atoms are represented by .
- the connections between atoms are represented by .

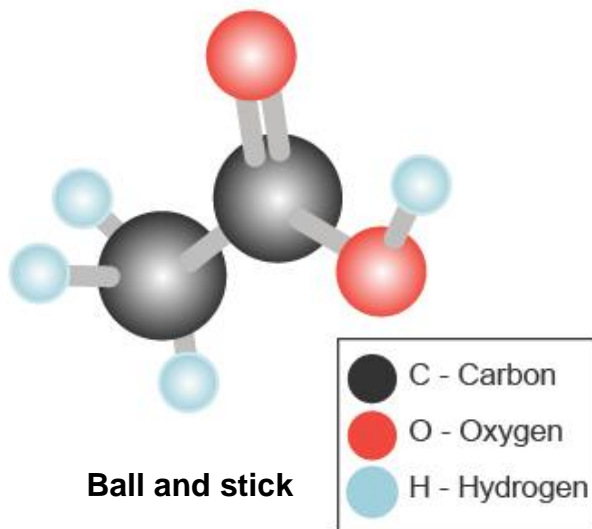
Types of atoms:

- (black)
- Hydrogen
- (red)

Number of atoms:

- Carbon:
- : 4
- Oxygen:

Acetic acid ($C_2H_4O_2$)



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Other Models: Space Filling and Structural Formula

These are some other types of models used to represent the chemical

of a compound.

- filling
- formula

No matter what representation is used, all models of a particular compound show the same types and of each type of atom in the compound.


**Lesson
Question**

How are compounds different from elements?


Answer

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Review: Key Concepts

Elements	Compounds
<ul style="list-style-type: none"> are <input type="text"/> substances. are made of one type of <input type="text"/>. cannot be separated into <input type="text"/> substances by physical or chemical means. are represented by chemical <input type="text"/>. 	<ul style="list-style-type: none"> are pure <input type="text"/>. are made of atoms or ions of two or more different <input type="text"/>. can be separated into simpler substances by <input type="text"/> means. are represented by chemical <input type="text"/> and models.

Summary

Compounds

Use this space to write any questions or thoughts about this lesson.