

Everyday Compound or Poison?

All elements found on the periodic table have certain distinct properties. Elements are single types of atoms, while atoms are the fundamental building blocks of all matter. Gold, for instance, is a soft, naturally occurring metal known for being beautiful and desired. Gold is malleable, and while it is found naturally in the environment, it is often reworked and incorporated into fine jewelry. Oxygen is a necessary and naturally occurring element. It's an invisible, odorless gas that's a crucial part of the air we breathe and necessary for our bodies to function properly. Often, elements like those noted are combined in varying ways to create new chemical substances.

Chemical substances react in certain ways and also have certain discernible properties. For instance, when an oxygen atom and two hydrogen atoms come together they form water, which is essential to life. When the atoms of a specific substance are regrouped, a new substance is formed with often vastly different properties from the original substance. Occasionally something completely harmless, or even necessary, can become dangerous or lethal when its molecules (a grouping of two or more atoms) are regrouped.

The components of table salt are a good example of how different substances can look when their atoms are rearranged. Common table salt, also known as sodium chloride, is an interesting chemical compound because, while it is commonly consumed by humans, when you separate its elements—sodium and chlorine—you are left with something quite different from the edible seasoning known as salt.

The components of salt are sodium and chlorine, both of which are harmful for human consumption and even contact. Sodium requires great care when being handled. If it comes into contact with water, the reaction can be flammable, while powdered sodium has the potential to be combustible (explosive) in oxygen or air. Chlorine, meanwhile, is an extremely caustic and dangerous substance.

Chlorine is used primarily as a cleaning agent; it is commonly used in swimming pools to render them sanitary, but is mixed with other chemicals and diluted for these purposes. This is what makes it safe for people to swim in swimming pools.

Chlorine has also had other, more dangerous uses in the past. Chlorine is a toxic gas that is extremely harmful to the respiratory system and may also react with certain flammable materials. When chlorine reacts with the mucous of the lungs, it can create a potentially lethal compound known as hydrochloric acid. During World War I, chlorine gas was used by Germany as a chemical weapon. It only takes a few deep breaths of the gas, at a certain potency, to cause death. Hydrochloric acid, a clear solution of hydrogen and chlorine in water, has other uses, however, including household cleaning and food processing. It's also found naturally in the body's gastric acid.

Hydrochloric acid is found in food-grade purification levels in products such as aspartame, fructose and citric acid, as well as in gelatin production.

Another, perhaps more familiar, example of atoms being regrouped to form a different compound is carbon monoxide and carbon dioxide. These gases are mentioned often and frequently mistaken for one another, but each serves very different purposes. The scientific difference between the two compounds is the number of oxygen atoms bonded with the carbon atom. But the general difference—the one we notice as humans—is quite significant.

Both carbon monoxide and carbon dioxide are colorless, odorless gases. Carbon monoxide occurs naturally in animal metabolism, plant photosynthesis, volcano eruption, forest fires and other combustion. It also comes from manmade processes like operating a stove. When carbon monoxide accumulates in a contained area, it can become lethal to humans. People who directly inhale enough carbon monoxide will lose consciousness and eventually die.

Carbon dioxide, on the other hand, occurs naturally in the atmosphere. One way carbon dioxide is produced is through the breathing processes of humans and animals. Carbon dioxide is also emitted in the burning of fossil fuels. Additionally, carbon dioxide can be found in lakes and at the bottom of the ocean.

While carbon dioxide occurs naturally and is not known to be as harmful as carbon monoxide, it can still be dangerous to humans when inhaled in certain quantities.

Slight chemical changes can radically modify the characteristics of a compound, and we don't have to look to radically different elements to find enormous differences. Sometimes only a small difference in chemical composition results in a very important alteration.

SKILL: Sequencing Information

1. What is this passage mainly about?

- a) Germany's use of chlorine in World War I as a chemical weapon
- b) hydrochloric acid, aspartame, fructose, citric acid, and gelatin production
- c) the similarities and differences between carbon dioxide and carbon monoxide
- d) changes in chemical compounds and the effects of those changes

2. What happens when the atoms of a substance are regrouped?

- a) gold becomes malleable
- b) the atoms break apart and disappear
- c) a new substance is formed
- d) the substance stays the same

3. The creation of carbon monoxide is an effect. What is one cause?

- a) the regrouping of the atoms in table salt
- b) the burning of fossil fuels
- c) cleaning swimming pools
- d) operating a stove

4. *Table salt can be separated into sodium and chlorine. Sodium is explosive. Chlorine is a gas that can kill people. What can be concluded from the statements above?*

- a) A harmful compound can become harmless when its elements are separated.
- b) A harmless compound can become harmful when its elements are separated.
- c) Breaking a compound into its separate elements has no noticeable effects.
- d) Breaking a compound into its separate elements can create carbon dioxide.

5. *Based on the information in the passage, what is true of gases?*

- a) Some, but not all, gases are harmful to humans.
- b) Any gas with carbon in it is not harmful to humans.
- c) All gases are harmful to humans.
- d) No gases are harmful to humans.

6. *Read the following sentences: "When the atoms of a specific substance are regrouped, a new substance is formed with often vastly different properties from the original substance. Occasionally something completely harmless, or even necessary, can become dangerous or lethal when its molecules (a grouping of two or more atoms) are regrouped."*

What does the word "properties" mean above?

- a) extremely large amounts
- b) places where experiments are done
- c) qualities or characteristics
- d) elements or compounds

7. *What is hydrochloric acid?*

8. What is hydrochloric acid used for?

9. Choose the answer that best completes the sentence below.

Oxygen by itself is not harmful; _____, it can become harmful when combined with carbon.

- a) however
- b) for instance
- c) in summary
- d) namely

GRAMMAR

Most pieces of formal writing are organized in a similar way: introduction; development of main ideas or arguments; conclusion. Linking words and phrases join clauses, sentences and paragraphs together. A piece of writing or text may include the following: one idea is linked to another an alternative is presented an objection is made



Let's practice

Below are sentences with misused transition words. Cross out the incorrect transition words and write a better one

- a. Tim earned an A on the test; even so, Justin also received an A. _____
- b. The book was interesting; as a result, it was hard to read. _____
- c. Gordon finished his chores early; meanwhile, he had time to play football. _____
- d. Sarah's horse is beautiful; instead, it is well-bred. _____
- e. The sailors prepared the ship to sail; otherwise, the dock workers loaded the cargo. _____
- f. Her sister had a cold; however, Julie's family canceled the trip. _____
- g. Oranges are good for you; nevertheless, they are full of vitamin C. _____
- h. Two seats were left on the bus; similarly, most of the group had to wait for the next one. _____

Read each sentence below and choose the correct transition word.

1. _____ I met my former boyfriend, I never really understood the meaning of the word unreliable.

Transition words:	<i>Where</i>	<i>before</i>	<i>First of all</i>
The transition indicates:	time	addition	contrast

2. One reason people have dogs is for companionship; _____ is for protection

Transition words:	<i>once</i>	<i>frequently</i>	<i>another</i>
The transition indicates:	illustration	addition	conclusion

3. _____ Candy crush is a new game; it has quickly become very popular.

Transition words:	<i>Although</i>	<i>When</i>	<i>In the same way</i>
The transition indicates:	contrast	cause and effect	time

4. There's no room in your mouth for your wisdom teeth, _____ they will have to be removed.

Transition words:	<i>for example</i>	<i>so</i>	<i>but</i>
The transition indicates:	contrast	cause and effect	illustration

5. Turtles stay in their shells when they are frightened. _____ dogs put their tails between their legs in frightening situations.

Transition words:	<i>After</i>	<i>similarly</i>	<i>therefore</i>
The transition indicates:	cause and effect	comparison	time

6. _____ the invention of television, people probably spent more of their leisure time reading.

Transition words:	<i>Nevertheless</i>	<i>Because</i>	<i>Before</i>
The transition indicates:	addition	cause and effect	time

7. If you're having company for dinner, try to get as much done in advance as possible. _____, set the table the day before.

Transition words:	<i>For instance</i>	<i>In contrast</i>	<i>Similarly</i>
The transition indicates:	illustration/example	comparison	contrast

8. _____ I'm very allergic to flowers, my boyfriend bought a bouquet of roses.

<i>Transition words:</i>	<i>Until</i>	<i>Because</i>	<i>Even though</i>
The transition indicates:	time	contrast	addition

9. My grandfather loves to say, "You're as nervous _____ a long-tailed cat in a roomful of rocking chairs."

<i>Transition words:</i>	<i>after</i>	<i>as</i>	<i>as a result</i>
The transition indicates:	cause and effect	time	comparison

10. _____ Manny's car stereo was on full blast, I could see his lips moving, but I had no idea what he was saying.

<i>Transition words:</i>	<i>Moreover</i>	<i>Because</i>	<i>Just as</i>
The transition indicates:	comparison	addition	cause and effect

Answer the following questions and underline the transition words that helped you make your decision.

1. If you can't get rid of a cold, the flu, or a nagging sore throat, the reason may be your toothbrush. 2. Studies at the University of Oklahoma Dental School have shown that your old toothbrush may carry the germs that are causing your illness. 3. The studies have found that people who change their toothbrushes about every two weeks recover from common winter ills faster than people who use their toothbrushes for a month or more. 4. Old toothbrushes can culture the germs that can cause colds, influenza, pneumonia, strep throat, diarrhea, and sinus disease. 5. Another study found that disease germs can live in an unused toothbrush for as long as a week. 6. They can start to thrive again every time you brush your teeth.

1. The relationship between the two parts of sentence 1 is one of

- a. time.
- b. addition.
- c. cause and effect.
- d. contrast.

2. The relationship of sentence 5 to the previous sentence is one of

- a. addition.
- b. comparison.
- c. time.
- d. contrast.

1. Vietnamese and American cultures are sharply different. 2. In Vietnam, two men or two women often show affection in public, but open affection between the sexes is not considered acceptable. 3. Also, Vietnamese are often surprised by American family relations. 4. Americans may live far from their parents and grandparents. 5. Even if they're in the same city, they rarely live in the same house. 6.

However, three or four generations generally live together in one Vietnamese household, with elderly people cared for by their children and grandchildren.

1. The relationship between the two parts of sentence 3 is one of

- a. time.
- b. addition.
- c. contrast.
- d. cause and effect.

2. The relationship of sentence 6 to sentence 5 is one of

- a. contrast.
- b. addition
- c. cause and effect
- d. comparison

Here is a word bank with transition words. Use the words in the bank to connect the clauses below. You should only use a transition word or phrase once.

Word Bank

*in addition
otherwise
although
therefore
in fact
furthermore
similarly
consequently
actually
so
however
nevertheless
yet
instead
moreover
particularly*

1. The girls wanted an ice cream cone, _____ they left the park early.
2. Mother didn't have time to go to the store; _____, there was no milk in the refrigerator.
3. There is no homework tonight; _____, there has been no homework this week.
4. James and his team didn't finish the project; _____, they did work hard.
5. You can come with us if you are ready; _____, you will have to ride the bus.
6. It is important to complete your homework; _____, it should be turned in on time.
7. Mrs. Simpson can be grumpy some times; _____, we should help her whenever we can.
8. Students should be quiet during the play; _____, applause at the end is allowed.
9. The Johnson children get an allowance every week; _____, they earn money for completing chores.
10. The rhino in Africa is threatened with extinction; _____, many species of gorilla are also endangered.