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Why do Onions make You Cry?

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Introduction/Objective

When someone is cooking with onions, a suffering -like irritation in the eye occurs immediately. Although the irritation happens every time when someone cuts an onion, most people do not know what exactly happens. It is the everyday question: **why does an onion make you cry.**

Why Do

Onions

Make

Methods to avoid Crying when you cut an Onion

You

Cry?

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S

Science

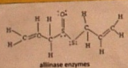
in class

The answer to the question closely associates with sulfur atoms within an onion. Associating with other atoms to form different compounds throughout the process, a sulfur atom finally becomes the lachrymatory factor known as **eye-irritating S-oxide** - the main reason for why an onion makes people cry.

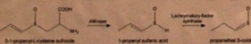
Steps from Cutting an Onion to Crying like a Baby

1. When an onion is cut, the cells and other matter within the onion scatter out into the air.

2. These matters include water, alliinase enzymes, and S-1-propenyl-L-cysteine sulfoxide (otherwise known as amino acid sulfoxide), which contribute to the irritation.



2. The released enzyme alliinase and water react with the amino acid sulfoxide to form a mixture of products.



3. One of the products that leads to an irritation in the eye is called **1-propenyl sulfenic acid**.

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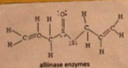
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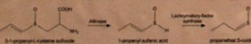
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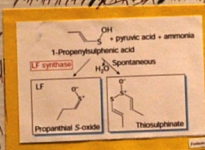
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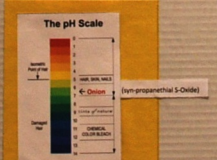
3. The sulfenic acid forms into two products: either **thiosulfinate** or **eye-irritating S-oxide** - A lachrymatory factor (an irritant that causes the eyes to fill with tears without damaging them).

4. The sulfenic acid spontaneously rearrange into thiosulfinate with water.
 4. L-F synthase enzyme (the enzymes in the onion triggers the atoms to make the reaction) convert the acid into **eye-irritating S-oxide**.



4. Since the eye-irritating S-oxide has an acidic pH level, when it reaches an eye through air, the cornea - the first part of an eye - automatically orders the brain to dilute the substance and the irritation.

This process takes about 30 seconds after cutting an onion.



Chemistry 101: Dr. Mullen By Richard Sumitro

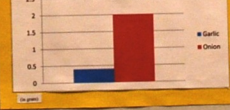
What about other kinds of Onions?

An onion is known as one of the Allium species. Many other plants share similarities of an onion. Garlic is one of many popular examples. Within garlic, there is also a sulfur atom in a form of amino acid sulfoxide. However, when people eat garlic, no crying can be seen.



This phenomenon is due to its **limited amount of sulfur within a plant**. Although garlic, one of allium species, contains amino acid sulfoxide, the amount of the compound in garlic is incomparable to the amount of the compound in a regular onion. Due to its great amount of sulfur, an onion makes people cry, but not garlic.

The Amount of Amino Acid Sulfoxide of a Plant (1kg)



Get as far as you can when you are cutting an onion.
 The acid will eventually leak away from the air.
 More distance creates more time; therefore, the acid is less likely to reach an eye to cause an irritation.
 Turn a fan on.
 By blowing across the onions and away from you, the gas floats away from you.
 Wear goggles!
 It seems foolish; however, it is the simplest way to avoid an irritation.

DUH!!

Refrigerate the onion at least 30 minutes before cutting.
 By cooling the onion, you will slow the enzyme/sulfoxide reaction rate, and minimize the eye-irritating S-oxide production.
 Run water over the onions as you cut them.
 The eye-irritating S-oxide that causes the eye irritation is water soluble, so it can simply be washed away before having a chance to get in the air.
 Cook onions often.
 Research has shown that the more you cut onions up, the less the sulfuric compounds will affect your eyes.

WOW!!

Conclusion

Through chemical changes associating with sulfur atoms, an onion makes people cry when they cut it. The reaction takes only about 30 seconds. Throughout the time, a sulfur atom changes into different compounds - some acidic, and some not. Although the reaction occurs every time someone cuts an onion, many people do not know the cause of the irritation in the sulfur atom.

The food scientists now study about the onions and other allium species, such as garlic, for human health improvement and nutrient analysis. Not only the irritation that the sulfur atoms in an onion cause, but it can be used as a healthy ingredients for human development. Interestingly enough, the sulfur atom in an onion creates suffering for those that cook and health for those that eat.

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