

Micro Unit-Concept: Chopping Onions

Step 1: Definition of the problem-context

Presumably every person knows the terrifying feeling when you have to cry whilst chopping onions into small, similar cubes, or rings. It is not only extremely annoying to wipe away the tears but it is also dangerous as well because the tears might blur your vision, and in consequence you will cut yourself. Therefore, this Micro Unit provides you with the theoretical explanation of why we have to cry when chopping onions, and how this can be avoided as well. Additionally, a technique will be showcased that teaches you to cut onions into perfectly similar cubes without having to cry. Theory and practice will be brought together.

Step 2: Description of the target-group

This Micro Unit addresses all cooking-enthusiasts that would like to learn how they can avoid crying when chopping onions. No previous knowledge is required. The resource will be designed so that the transfer into practice can take place immediately.

Fields of interest:	Cooking, common knowledge, biology
Experiences:	The learners be able to handle a sharp chef-knife safely.
Learning style:	Physical; practically oriented
Miscellaneous:	The learners should have a sharp chef-knife and an anti-slip chopping board. Furthermore, at least two onions will be required for practicing purposes. Please note that this Micro Unit can only be recommended to learners that are able to handle sharp knives safely by their physical condition.

Step 3: Description of learning objectives

Theoretical knowledge:

After the completion of the Micro Units the learners will have acquired the following theoretical knowledge:

- The learners will know about the general structure of onions and their cells.
- The learners will be familiar with the basic information about amino-acid Isoalliin and the enzyme Alliinase.
- The learners will know that Alliinase breaks down Isoalliin, and that this process creates a gas (propanthial-s-oxide) that makes people cry as it gets in contact with their eyes.

Practical skills:

After the completion of the Micro Units the learners will master the following things:

- The learners will be able to operate and use a chef-knife correctly and safely.
- The learners will be able to chop an onion into small, similar cubes by applying the technique examined within the Micro Unit.

Step 4: Bibliographic and resource information

Metadata	Description
Unique Identification	<i>Will be generated by the system.</i>
Title	Chopping onions made easy.
Short description	The learners will become familiar with the reasons why chopping onions cause people to cry, and they will learn cutting techniques to avoid this.
Key words	Kitchen, Chef, Cooking, Vegetables, Food
Language	English, German
Responsibility	Mr. Matthias Teine
Author	Mr. Matthias Teine.
License	CC BY-ND
Target group	This Micro Unit addresses all cooking-enthusiasts that would like to learn how they can avoid crying when chopping onions. No previous knowledge is required, but you need to know how to handle a chef-knife safely.
Funding	Erasmus+ project OPALESCE (2014-1-PT1-KA204-1044).

Step 5: Choose the elements or resource template

Element:	Purpose/ reason:
Audio	(Element 1) The activating beginning will be design das an audio element. Here, the author will introduce himself, he will outline the learning objectives, and the structure of the contents will be explained. (Element 7) An short audio element will be used to provide the learners with a closing reflection.

Simple Graphics	<p>(Element 2) Simple graphics will be used to visualize the cells of the onion and its components as they allow to have a schematic view on them. The following pictures/ scratches will be used:</p> <ul style="list-style-type: none"> • Schema of a cut-in-half-onion and its layers. • Visualization of the cell-structure of the onions with a focus on the inside of the cell and its outer cell-layer to localize the amino-acids and enzymes.
Video	<p><u>(Element 4) Video 1:</u></p> <p>A first video is used to visualize the cell schema of the chemical process when the Alliinase breaks down the Isoalliin. Therefore, the animation should show the following things:</p> <ul style="list-style-type: none"> • The nuclear-structure of the acid Isoalliin. • The nuclear-structure of the enzyme Alliinase. • The process of reaction (with indicating arrows). • The way how the gas that makes people cry is built. <p>The animation will be supported with a spoken explanations of the different steps that are visualized in the animation.</p> <p><u>(Element 5) Video 2:</u></p> <p>A second video will visualize the chopping technique as it is necessary to be accurate here. The learners will see how it is done correctly and they will have the opportunity to repeat the video as often as they want to, to focus on details etc. The following views shall be realized via videos:</p> <ul style="list-style-type: none"> • Showing how to place the fingers on the onions correctly and how to operate a chef-knife correctly to avoid cutting oneself (max. 30 sec.) • Showing the chopping process from different angles and perspectives and showcasing the result (max. 45 sec.)
Text	<ul style="list-style-type: none"> • (Element 3) Explanation text-elements will be used to showcase different ways of how crying can be avoided. Here one Explanation-element per way will be used. • (Element 6) The exercise will be a short written statement.

Step 6: Preparation of the learning content

Audio:

Element 1

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Element 7

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Simple graphics:

Element 2

In this view it is planned to have a schematic and simplified view on the structure of one single cell of the peel of an onion. The learner will see the overall elements of a cell like, e.g., the inner and outer cell wall with the middle lamella, the localization of the nucleus and the cytoplasm, the plasma membrane and the cell sap. Additionally, the localization of the Isoalliin and Alliinase will be visualized. It is planned to show only the very basic elements of the cell structure. We have planned to have this as a stand-alone view besides the schema of the cut-in-half onion to adhere the Segmenting Principle.

The view will be structured as follows:

In the middle of the view there is the schematic and simplified view of the structure of the cell. The different names of the parts of the cell will be written near to the corresponding part and linked to it with an arrow (Spatial Contiguity Principle). There will be no voice in the off that repeats the names (Redundancy Principle). Thus, extraneous overload will be reduced. The combination of words and the picture was chosen to avoid Generative underutilization.

Video:

Element 4

In this view the learner will be made familiar with the nuclear-structure of the amino-acid Isoalliin and the enzyme Alliinase. Therefore, graphics that visualize the structural formula will be shown. Additionally, the structural formula of the products Propionaldehyd and Dipropyl-disulfid will be shown. In the animation, these simple graphics will be displayed one after another on the view so that the content will be presented step-by-step. Due to the learning support function of the animation, the learner will have the opportunity to focus on each of the steps as often as he wants to. There will be no extra text given to explain the graphics.

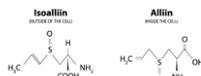
The view will be structured as follows:

- At first the structural formula of Isoalliin will fade on the view and the learner will get an audio-explanation of this amino-acid (e.g. that it is an amino-acid based on sulfur, etc.).



“Isoalliin is a sulfurous chemical compound based on the amino-acid alliin that can be found in onions and garlic. It is estimated to be antiseptic and health-enhancing. Furthermore, it causes the smell of onions, and garlic. Alliin and Isoalliin can be found inside the cell.”

- After that the structural formula of Alliin will fade in to be placed besides the structural formula of Isoalliin and the learner will get an information about some general aspects of enzymes and their role for breaking Isoalliin down.

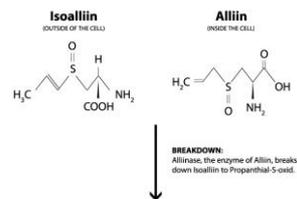


Kommentiert [MT1]: Noch ändern, und Alliin durch Alliinase ersetzen und nur ein Enzyme versinnbildlichen.

“Alliinase is an enzyme that can be found between the cells. Alliinase is an enzyme of the lyase-class, and it that causes the breakdown of molecules in two different products.”

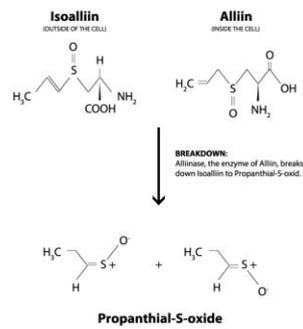
- The third graphic that will fade into the view, and will be placed below the structural formulas. In-between the graphics of the amino-acids and the enzymes an arrow will indicate that the Alliinase has broken down the Isoalliin now. Via the audio part, the

learners will be informed about how the chemical process of breaking down the amino-acid works.



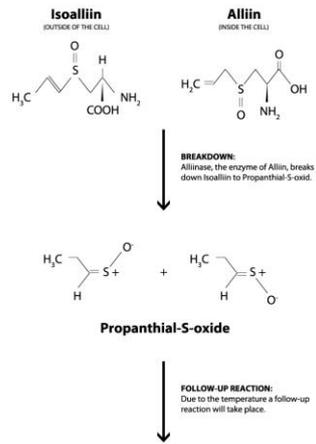
“When the cell-structure gets damaged the isoalliin and the alliinase have the opportunity to react, and the alliinase starts to break down the isoalliin. This break down results in a product that causes us to cry, and therefore, this effect is enhanced by the amount of damage brought to the cell-structures. This product is called propanthial-s-oxide.”

- The fourth graphic fades in, and shows the structural formulas of propanthial-s-oxide, and it will be explained that this is the result of the breakdown process.



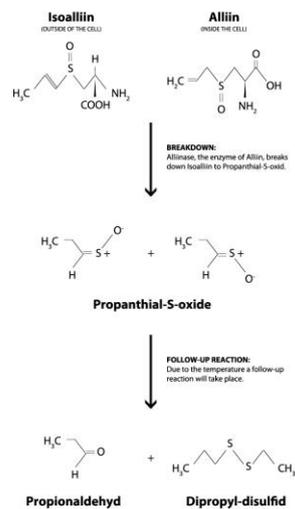
“In the break down process the amino acid Alanin is split from the Isoalliin, and hydrogen connects with the rest. Thus, Propanthial-S-oxide is created, a very reactive isomer.”

- The fifth graphic shows the follow-up breakdown arrow, and indicates that there is another reaction that has Propionaldehyd and Dipropyl-disulfid as a result.



“Propanthial-S-oxide is very reactive to temperature. Therefore follow-up reactions take place. The results can be very different but two possible results are Propionaldehyd and Dipropyl-disulfid.”

- The structural formulas of Propionaldehyd and Dipropyl-disulfid will fade in, and they will be explained shortly.



“Propionaldehyd is a degenerated alcohol that can cause narcotic states. Dipropyl-disulfid is a sulfur based color-less liquid that has a strong smell and that can be washed off hardly. Therefore, the Dipropyl-disulfid is the main reason for the strong odor of onions, and the Propanthial-S-oxide is the chemical bound that causes people to cry. All alliums have developed this mechanism to prevent being munched.”

Element 5

The idea here is to show the learners how they can place their fingers and finger-tips on a cut-in-half onion safely so that they will not cut themselves when chopping the onion fast. Furthermore, the chopping process itself will be shown out of different perspectives. The videos will follow a step-by-step approach. The different steps will be shown one after another and the explanation of the different steps will be given right in time. As it might be necessary sometimes to show a single cut from different perspectives, some cuts might be shown repeatedly. The explanation will not be repeated again but maybe some additional information will be given that states something that can only be seen from this special angle, for example. Due to the learning support function of the video, the learner will have the opportunity to tap on the screen to see the explanation written down.

#Video put into here

Text:

Element 3

Freeze your onions: Putting your onions into the freezer for about five to ten minutes before you are going to cut them will help to reduce the amount of enzymes released to the air.

Use a sharp knife: The enzymes that cause you to cry are unleashed by damaging the onion's cells. A sharp knife will help you not to damage too much cells, because you need less pressure.

Vinegar method: Put some vinegar on your chopping board, it will denaturalize the enzymes.

Element 6

Task 1: Please cut an onion in half, and exercise the presented technique. Repeat this with at least three onions in whole to get routine. If you already feel safe in practicing the technique you can use less onions. If not, cut one or two onions more.

Task 2: Practice the technique on three tomatoes. It will help you to enhance your technique, due to their consistency. But be careful, and start slowly first.

Task 3: Please cut three apples into half, and then exercise the technique. The roughness of the apple will help you to become faster in chopping.

Step 7: Think about exercises and assessment

Exercises:

- Examine the chopping technique on at least three more onions. Therefore, cut them in half first. This will help you to get the routine.
- Examine the chopping technique on at least three tomatoes. This will help you to get a feeling of your knife and due to the consistency of tomatoes it will require you to apply the technique carefully. This helps you to enhance your technique.
- Examine the chopping technique on at least three apples. The roughness of the apples will help you to learn to handle your knife and the cuts very fast.

The exercises are represented by Element 6.

Assessment:

Due to the extensive exercise and practicing part mentioned we will focus on the assessment of the theoretical knowledge and background information provided.

In this case we have decided to create a "Catch the fake"-task. We decided to provide the learners with the following statements that can either be true or false:

Statement	True	False
The enzyme Alliinase is located in the outer layer of the cells. (Correct answer: The enzyme Aliinase is located in the inner layer of the cells. The amino-acid Iso-Aliin is located in the outer layer of the cells.)		X
The amino-acid Iso-Alliin is located in the outer layer of the cells.	X	
Alliinase breaks down Iso-Alliin.	X	
When Alliinase breaks down Iso-Alliin a gas comes up which irritates the eyes – We have to cry.	X	
The reason why we are crying is to wash out the gas-particles from the eye.	X	