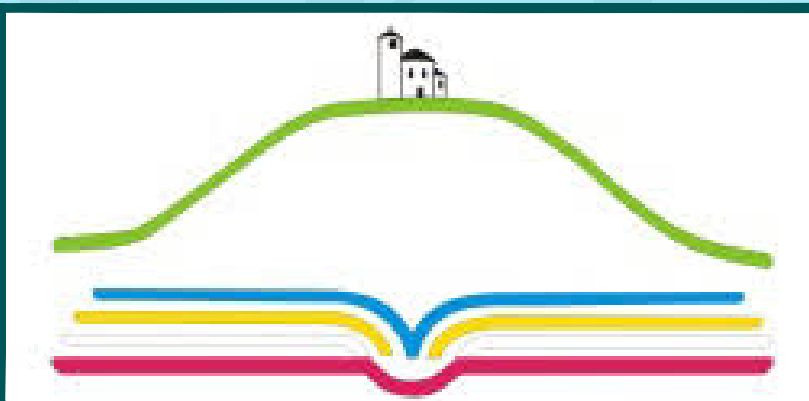


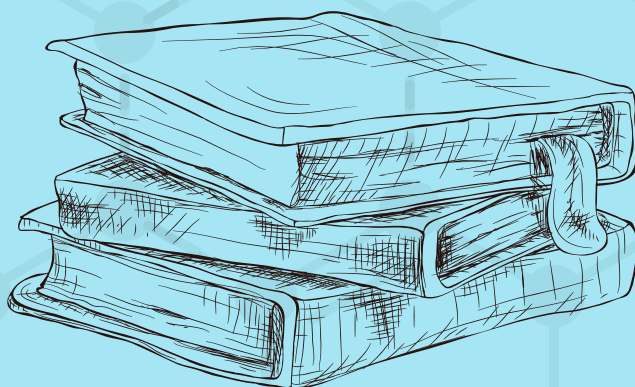
# CHEMISTRY

# E-BOOK



**ZÁKLADNÍ ŠKOLA**

**Roudnice nad Labem, Karla Jeřábka 941,  
okres Litoměřice**



**Funded by  
the European Union**

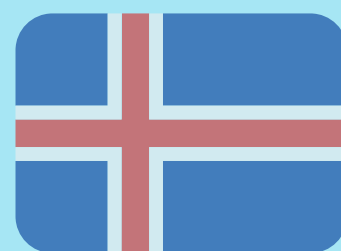
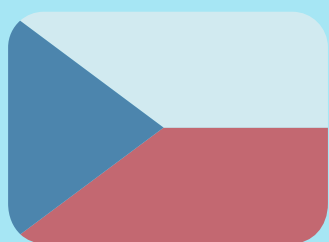
**ERASMUS+ IS AN EU PROGRAM TO SUPPORT EDUCATION, TRAINING, YOUTH AND SPORT IN EUROPE.**

**This project could be realized because of Erasmus and also Dzs, big thanks to them.**



## **Why are we doing this?**

**We had decided to do 6 different chemical experiments. We wrote them down step by step and taken several photos. Then we shared them with our partner school in Iceland. Because of our work the Icelandic students will try to do the same experiments. Then we can compare our ways and results.**



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The Ph of different solutions

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26. Page - picture of results

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27. Page - Conclusion of all chemical experiments



# 1

# FIRST EXPERIMENT



## SCIENCE JOURNAL



**Scientist's names:** Julie Hrubá, Zuzana Šidláková, Tereza Boháčová, Zuzana Mašková

**Type of experiment:** Secret solution mixed with different ingredients

### **What materials will I need?**

red cabbage broth(our secret solution), salt, soda, chlorine bleach, vinegar, lemon juice, dish machine tablets, washing machine tablets, coca cola, water, distilled water, hydrochloric acid, sodium hydroxide(our twelve given ingredients), test tubes, beakers, glass sticks, pipettes, pH papers

### **What is my hypothesis?**

I think that solution will change color of our mixture water with different ingredients (except for distilled water, if we mixed this ingredient, it may not change the color as we would like).

### **Our work method:**

We put all the ingredients in beakers and poured water into them, then we added the mixture to the test tubes with a pipette and wrote on them with a marker what was in them. Then we added the solution and it changed most of the original colors of the liquids to different ones according to the pH value contained in the liquids. We checked the results by dipping a pH paper into each liquid.

### **Something I like about this experiment:**

That the solution changed the clear liquid into a dark pink or green color.

### **What are my results?**

After adding the solution to the ingredients diluted with water, the mixture will be separated into three groups by color: alkaline liquids, neutral liquids and acids

### **What have I learned?**

Red cabbage broth can react the same as pH paper.



Our first experiment was about measuring acidity and alkalinity of solutions made by different ingredients.

## HOW WE DID IT?

### STEP ONE

At first we put all our ingredients (11) in beakers:



**chlorine bleach**  
(we haven't put it in yet)

**soda**

**distilled water**

**salt**

**lemon juice**

**coca cola**

**washing machine tablets**

**disch machine tablets**

**vinegar**

**hydrochloric acid**

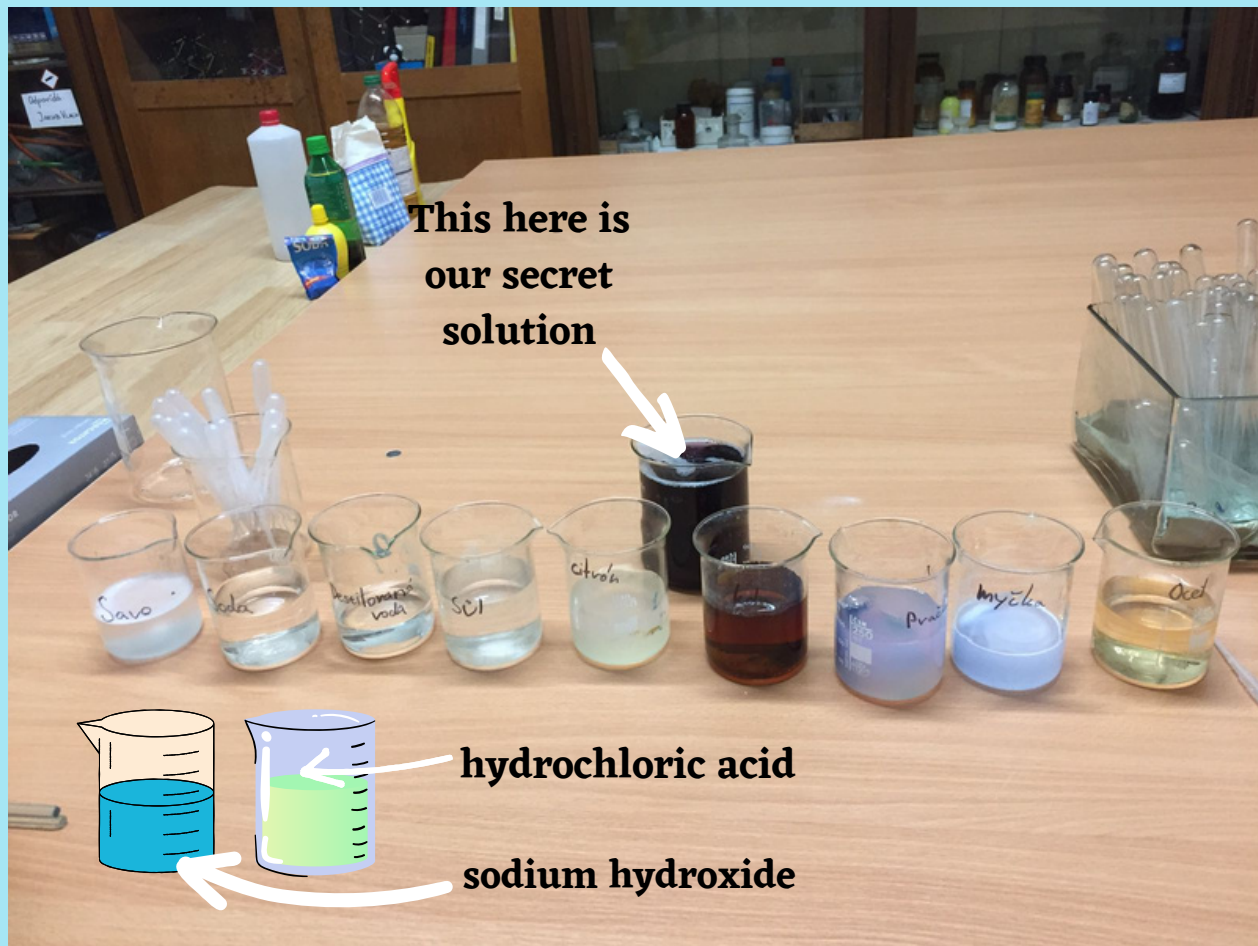
**sodium hydroxide**

(we forgot to take a picture of them)

### STEP TWO

We added water in all beakers with ingredients. We were stirring it slowly and than we wait a while until everything dissolved.

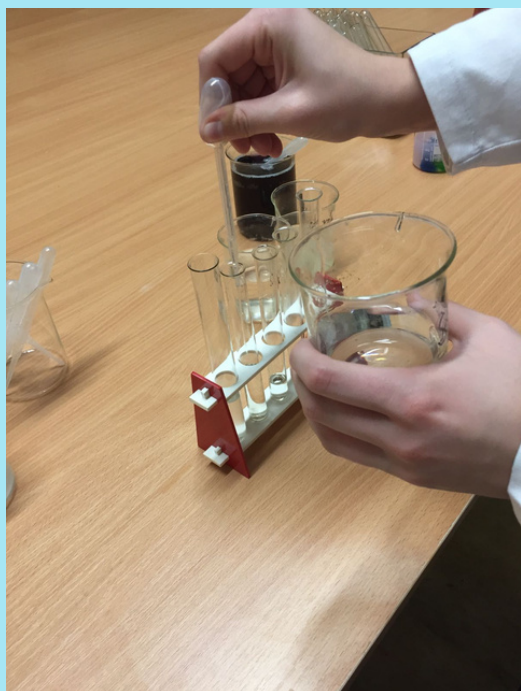




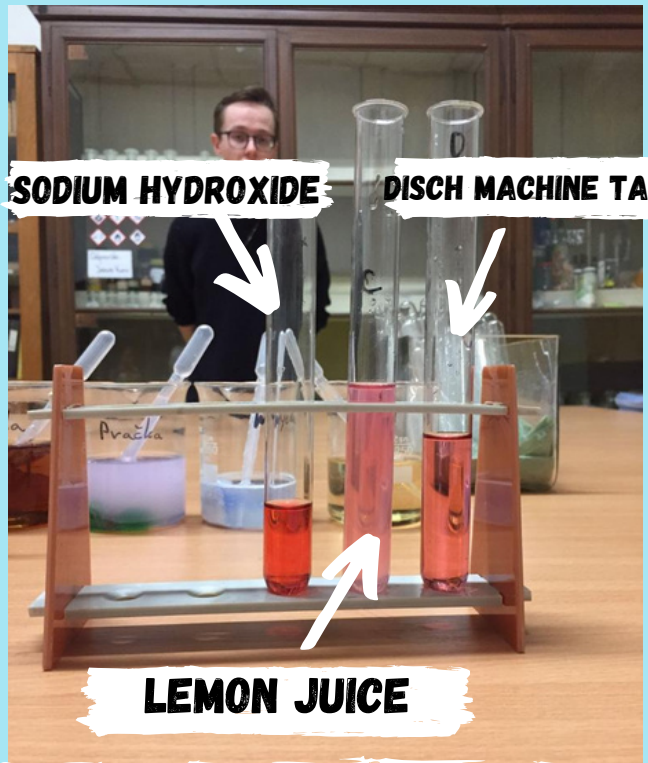
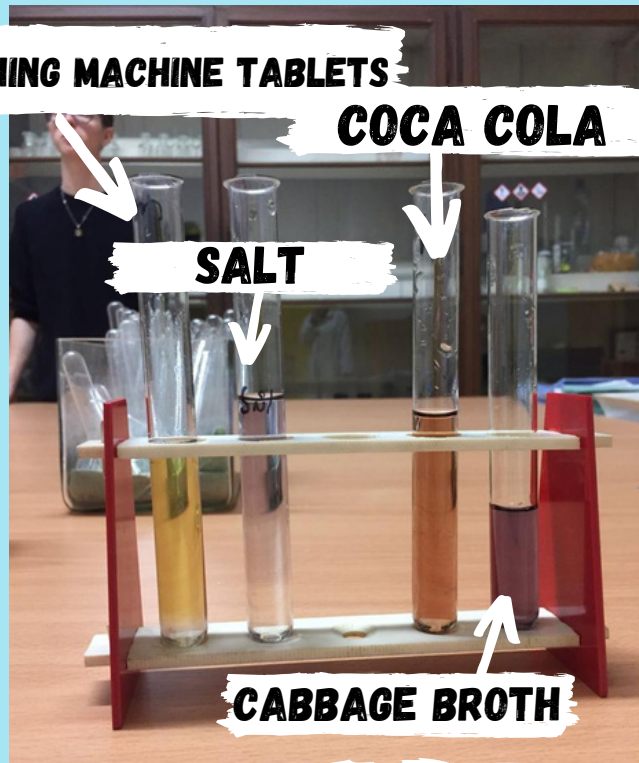
## INGREDIENTS WITH WATER

### STEP THREE

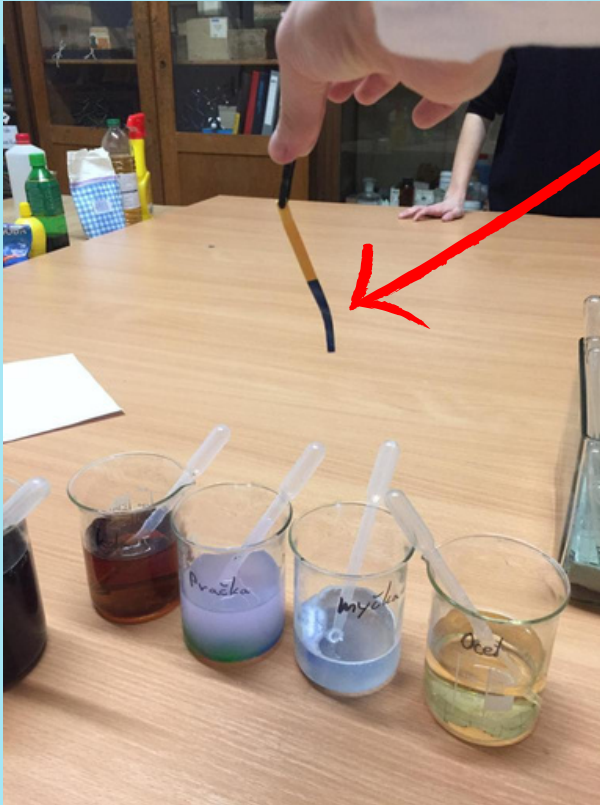
We put all our solutions into the test tubes by pipetts.



Then we added our secret solution. After a while everything changed color and we could see the ph.







We measured the pH by **ph papers**. Then our chemist teacher told us, what was the secret solution - it was red cabbage broth. Thanks to this substance we could see the acidity and alkalinity of our solutions.

On page 7 you can see that we also measured the pH of cabbage broth.

**THIS EXPERIMENT WAS VERY INTERESTING**



## SCIENCE JOURNAL



**Scientist's names:**

**Lucie Durychová, Eliška Hniličková, Vanesa Volná, Šimon Justa**

**Type of experiment:**

**developing photos**

**What materials will I need?**

**Stand, Burner, beaker, graduated cylinder, spoon, pipette, filter paper, lighter, Glass rod, funnel, filter ring, Weight, hour Glass, UV lamp, Silver nitrate, Sodium chloride, distilled water, Spirit (alcohol), magnesium and tweezers**

**What is my hypothesis?**

**I think that after adding aluminum foil, the surroundings will become darker.**

**Our work method:**

1. We measure 20 millimeters from each solution and mix them together.  
After mixing, we get a dense mass.
2. We will prepare things for filtration.  
Rinse the filter paper with distilled water and we filter the thick mass. We spread what remains in the paper on another paper and let it dry on a heater.  
Cut out any image from the aluminum
3. foil and place it on the dried material. We irradiate with UV light and then remove the aluminum foil.

**Something I like about this experiment:**

**I enjoyed the UV light irradiation during the experiment.**

**What are my results?**

**The area around the foil darkened and it remained light under the foil. We managed to develop a photo.**

**What have I learned?**

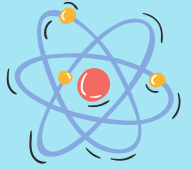
**When we mix solutions of sodium chloride and silver nitrate, something like photo paper is created.**



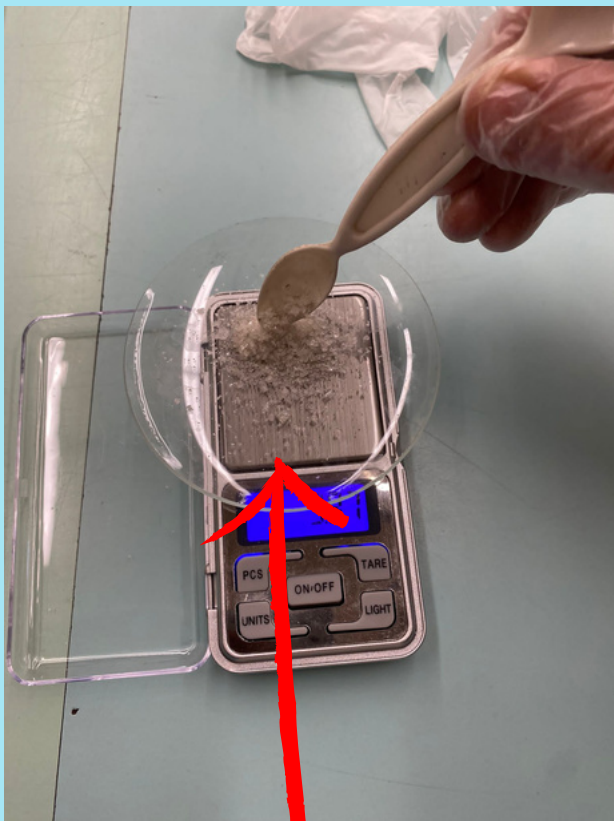
# Our second experiment was about developing photos

## HOW WE DID IT?

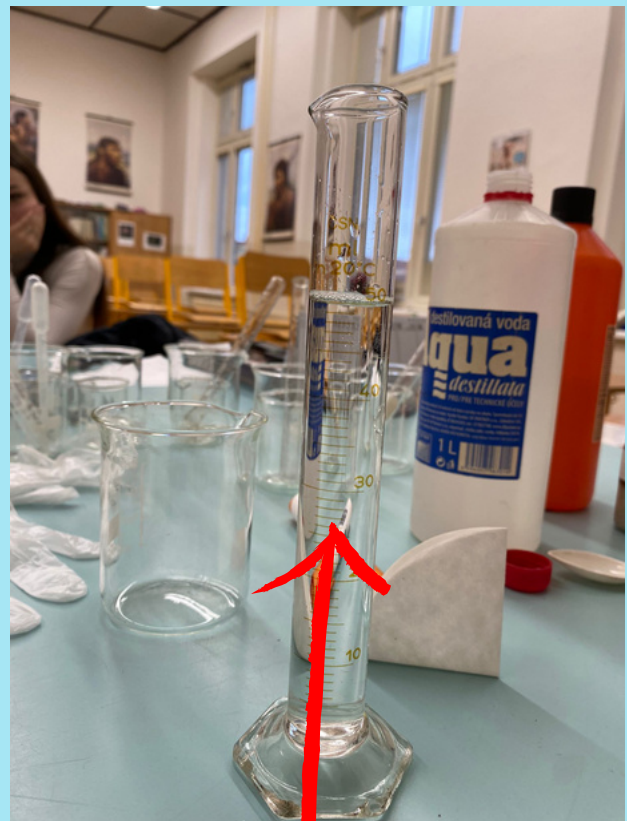
### STEP ONE



The First thing we did was make solutions of sodium chloride and silver nitrate.



**Silver nitrate**



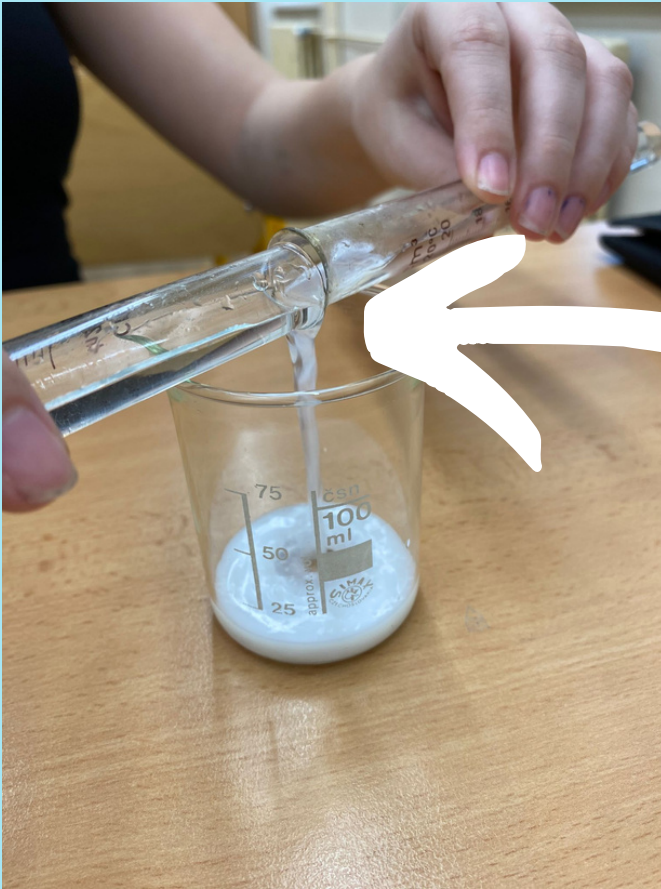
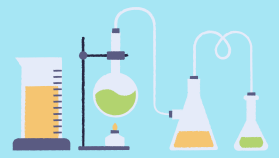
**Distilled water**

### STEP TWO

We mixed the solutions.



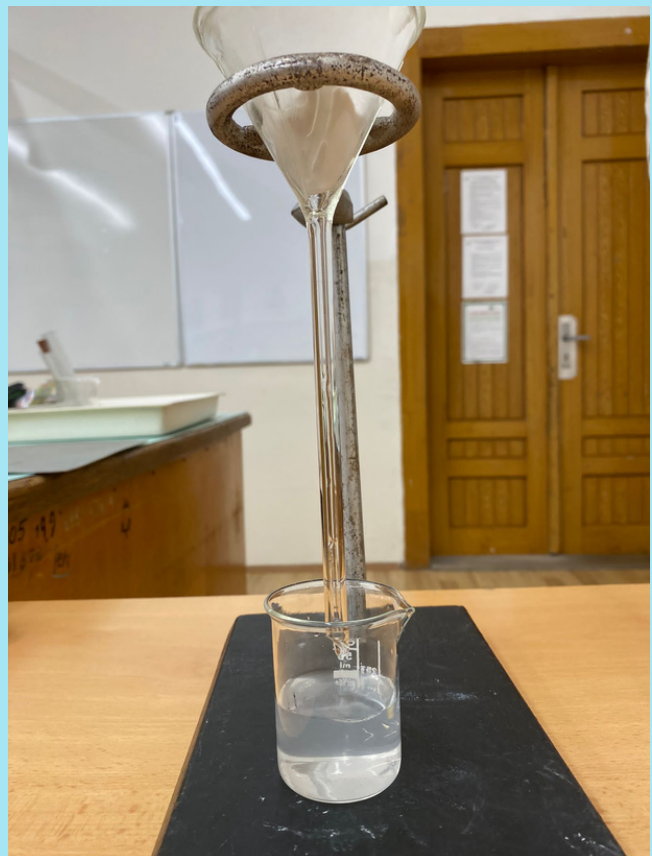




# Solutions

## STEP THREE

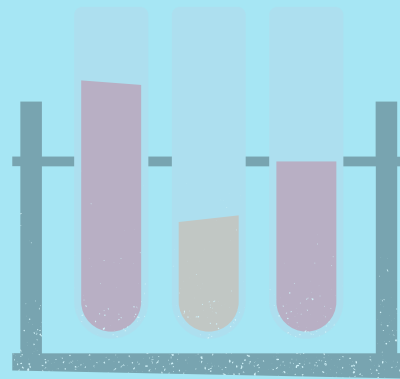
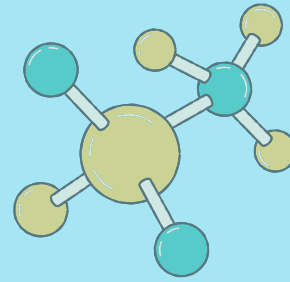
We filter the dense mass.





## STEP FOUR

We spread the thick mass on the filter paper.



## STEP FIVE

We cut out the picture from the aluminum foil and placed it on the dried material. Then we started irradiating with UV light.



# 3

# THIRD EXPERIMENT



## SCIENCE JOURNAL



**Scientist's names:**

Šimon Justa, Ondřej Ladnar, Markéta Hrstková, Vanesa Volná  
Bára Sahulová

**Type of experiment:**

Fingerprints

**What materials will I need?**

Charcoal, tape, filter paper, burner, Erlenmeyer flask, brush, flask, iodine crystals

**What is my hypothesis?**

My hypothesis is that finger print will appear on flask

**Our work method:**

First we press our fingers on filter paper. Then we put our filtrate paper with fingerprints in Erlenmeyer flask and add iodine crystals. Next we put burner underneath it and lite it. The iodine crystals will turn into gas, and fingerprints will appear.

**Something I like about this experiment:**

I like the simplicity of this experiment

**What are my results?**

The fingerprints appeared on the Erlenmeyer flask.

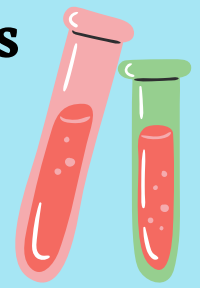
**What have I learned?**

I learned how to get someones fingerprints using iodine.





# Our third experiment was about Fingerprints



## HOW WE DID IT?

### STEP ONE

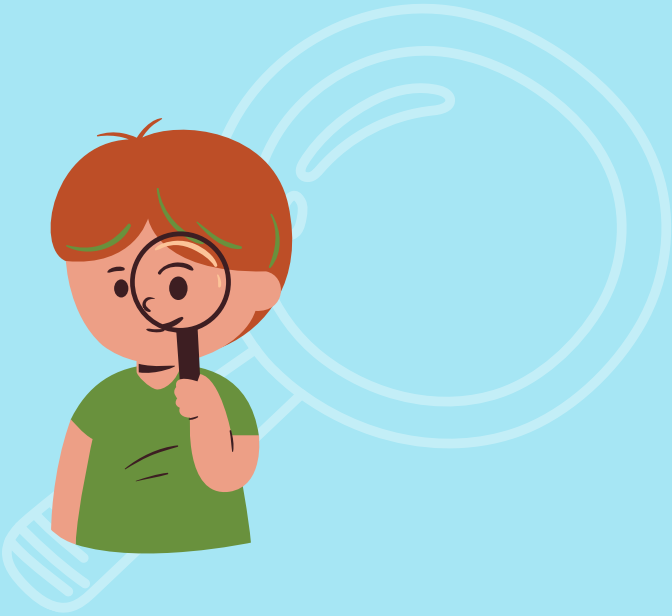
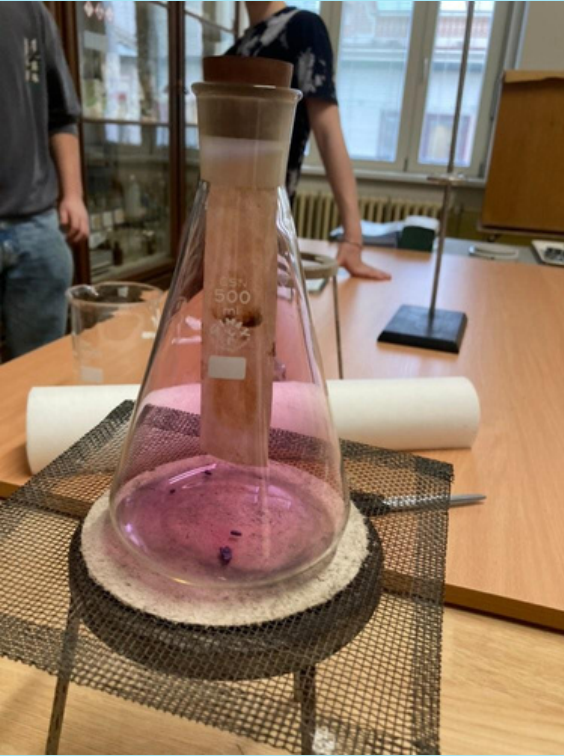
We print our fingers on the filter paper



### STEP TWO

We put filtrate paper in flask, add iodine crystals and heat.

# iodine crystals







## SCIENCE JOURNAL



Scientist's names: Jamil Rana, Marij Kodler, Lucana Marhova,  
Simon Jaska

Type of experiment: FIRE EXTINGUISHER

What materials will I need?

plastic tube, bottle, soap, vinegar,  
straw, duck tape, container.

What is my hypothesis?

I think it will leak, but it will not  
extinguish it properly.

Our work method:

We took a bottle, heated heated the glass with a gas cylinder, then we made  
a hole with scissors, into which we put a straw or plastic tube.  
Tightly sealed with duck tape and inside the bottle we poured first  
baking soda and then soap, at the end we poured vinegar into the container.

Something I like about this  
experiment:

It was mixing by itself and it wasn't complicated.

What are my results?

Great success.

What have I learned?

How a fire extinguisher works and how to make it  
yourself at home from only three ingredients.



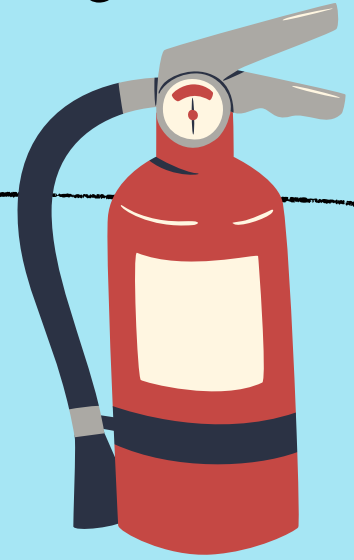
**In fourth experiment we made a fire extinguisher**

## **HOW WE DID IT?**

### **STEP ONE**

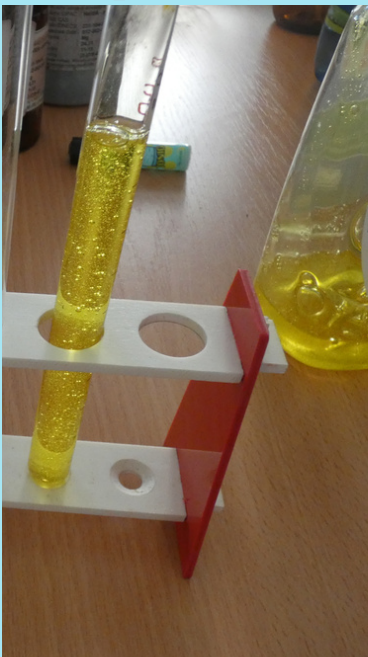
**We needed only three ingredients**

- 1. Vinegar**
- 2. Baking soda**
- 3. Spring**



**Than we prepared plastic bottles, rubber bands, some straws and balloons (you can also use plastic gloves as we did)**

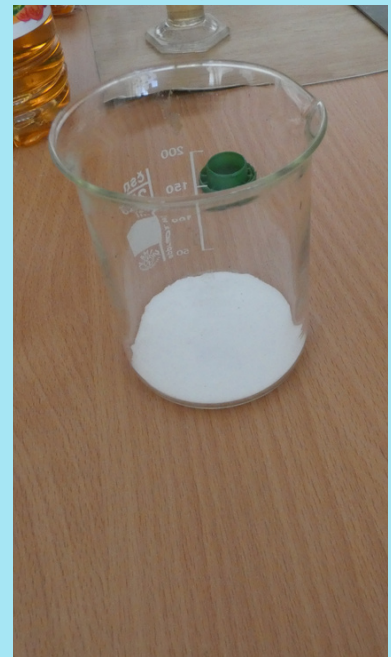
### **Spring**



### **Vinegar**



### **Baking soda**



### **STEP TWO**

**In this part we made vessel of fire extinguisher. We created many different vessels, but I show you only one, which was the most successful.**



## How to make it

1. take a sharp metal object (knife, scissors) and keep it over the flame for a while. Then make a hole in to the bottle.



2. Put a straw in the hole and consolidate it with tape or plasticine.



### STEP THREE

## Content of the bottle

We have three ingredients, that means we should mix two of them. The third will be used as an activator, so we should put it separately. Thanks to this we can use our fire extinguisher at the moment when we need it.



It doesn't matter which substance will be used as the activator.

### STEP THREE

---

We put the activator into a balloon/glove. Then we carefully and very properly fix it with rubber band on the bottle.



### STEP FOUR

---

**Just turn the glove upside down and watch!**





# 5

# FIFTH EXPERIMENT



## SCIENCE JOURNAL



**Scientist's names:** Julie Hrubá, Zuzana Šidláková, Vojtěch Gargula

**Type of experiment:** Test for the presence of caffeine

**What materials will I need?**

Friction bowl with pestle, coffee beans, measuring cups, distilled water, black tea, burner, three beakers, three-legged holder, tin foil, hourglass, round bottom flask, asbestos sieve

**What is my hypothesis?**

Before, I thought that we would detect the presence of caffeine with the help of some dye, but then we found out from the textbook that we would do it by sublimation

**Our work method:**

We need to isolate caffeine from coffee and black tea. By rubbing coffee and black tea, we will create a powder and we will have a better chance of finding caffeine in them. We put asbestos netting on the three-legged stand. We used three methods (2x coffee, 1x black tea), divided the ingredients into three beakers, placed a round-bottomed flask on the first beaker and poured distilled water into it, covered the second beaker with aluminum foil and we placed an hourglass on the top of the third beaker. And we placed all the beakers above the burner

**Something I like about this experiment:**

That the caffeine in coffee and tea has turned into gray pieces.

**What are my results?**

We didn't do it the best because it burned us, so we had to do it differently, but otherwise we succeeded because we had proof that the caffeine was really there.

**What have I learned?**

There is really caffeine in black tea and coffee. And we can prove it by sublimation.



**Our fifth experiment was test for the presence of caffeine in coffee and black tea.**

**We will find out by using sublimation.**

## **HOW WE DID IT?**

### **STEP ONE**

---

**At first as always we prepared all our ingredients. Than we started rubbing coffee and black tea.**



**COFFEE**



**BLACK TEA**



**Now there is bigger chance to see caffeine in the results.**

## STEP TWO

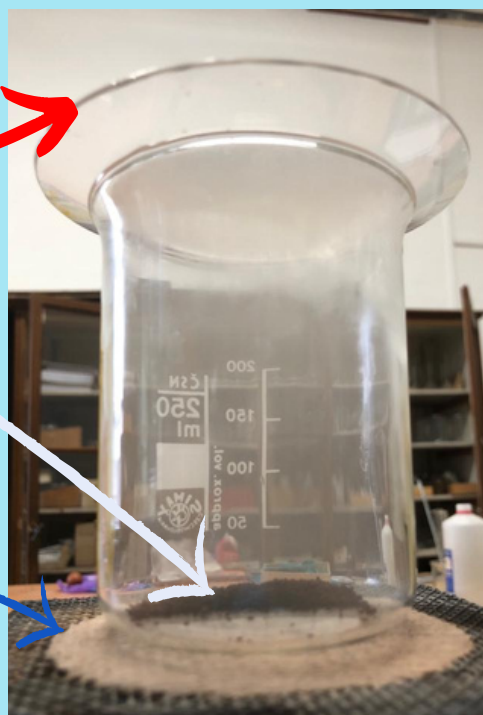
Our task is to confirm (by sublimation) that there is caffeine in coffee and black tea. So in this part we should prepare stand with vessels, where sublimation will take a place. At first there are two methods of caffeine sublimation from coffee.

# 1

**ROUND-BOTTOMED FLASK**

**COFFEE**

**ASBESTOS NETTING**

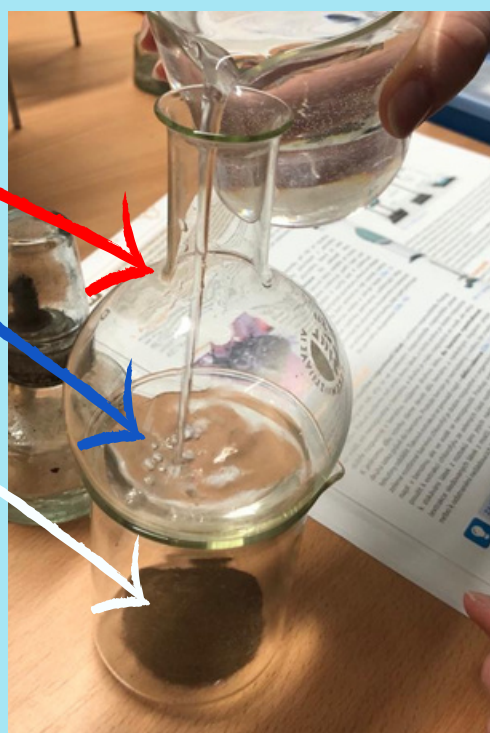


# 2

**HOURGLASS**

**DISTILLED WATER**

**COFFEE**



Then we put burner under this vessels and sublimation could start.





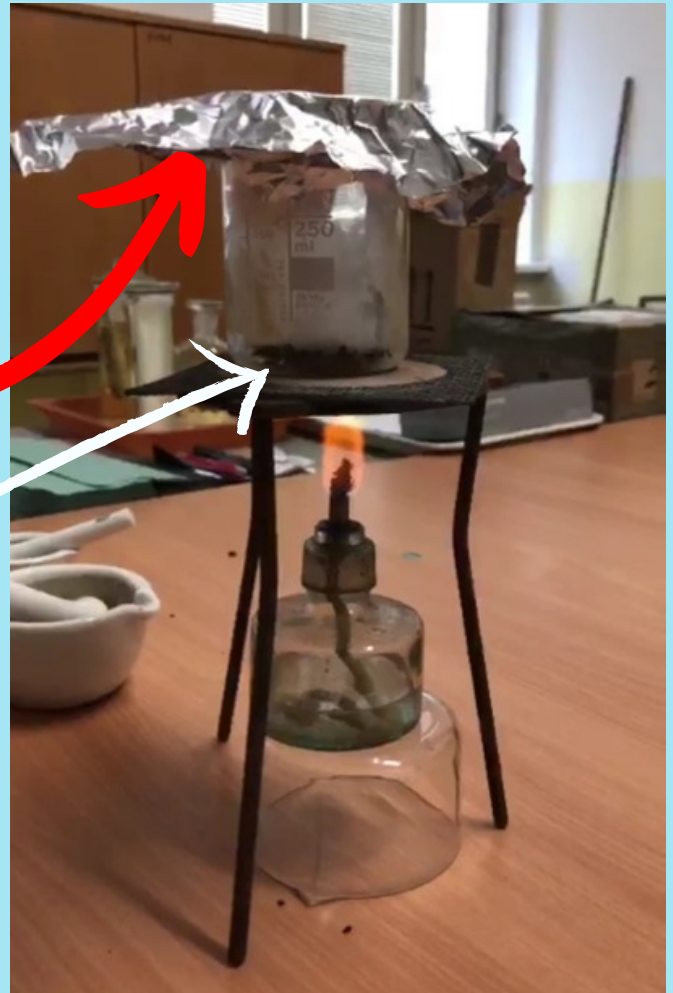
# 3

There is one method of caffeine sublimation from black tea.



**ALUMINIUM FOIL**

**BLACK TEA**

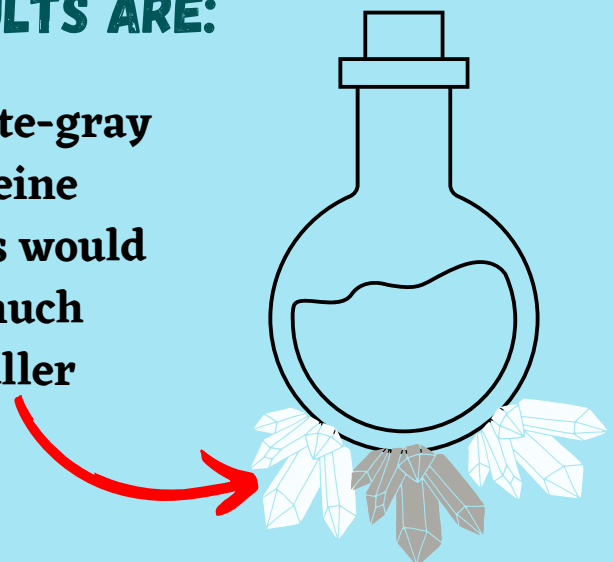


You have to be really careful when it's heating up. We weren't that much careful. We've been heating it up for too long. So we haven't got any photos of good results.

## **BUT IF YOU DID IT RIGHT, THE RESULTS ARE:**

Caffeine sublimates and rises. Then it desublimates from the gaseous state - gray/white crystals are formed on the upper part of the Petri dish.

the white-gray caffeine crystals would be much smaller



# 6

# SIXTH EXPERIMENT



## SCIENCE JOURNAL



**Scientist's names:** Julie Hrubá, Zuzana Šidláková, Vojtěch Gargula

**Type of experiment:** Test for the presence of vitamin C

**What materials will I need?**

ferric chloride (black and glittering but orange in water) 5% solution which is 5g in 100ml, distilled water, multivitamin effervescent tablet, test tubes, red blood salt (green) 5% solution which is 5g in 100ml, carrot, onion, grape, apple, potato.

**What is my hypothesis?**

We thought it was only in multivitamin effervescent tablet, apple and grape.

**Our work method:**

We mixed 2 ml of multivitamin with distilled water with 2 ml of ferric chloride with 2 ml of red blood salt in a test tube. And the same with others ingrediens. All the colors changed to dark green and that is the proof that there is vitamin C

**Something I like about this experiment:**

It changed colors beautifully.

**What are my results?**

That we can prove whether vitamin C is contained in food with just two solutions.

**What have I learned?**

In onion, carrot and potato is vitamin C.

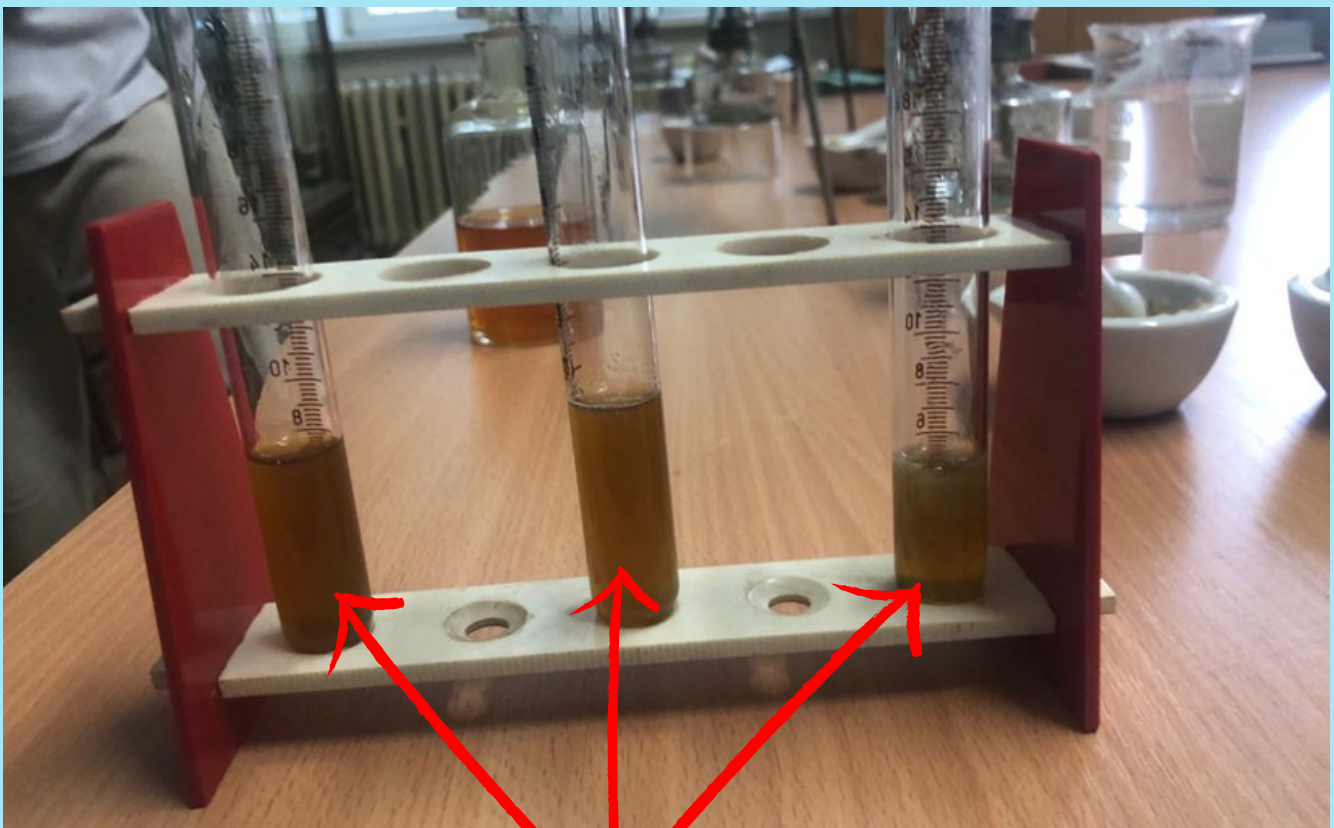


Similar to how we tested the presence of caffeine in the previous experiment, we will now test the presence of vitamin C.

### **HOW WE DID IT?**

---

This experiment was so easy, we only mixed the substances mentioned above in the protocol. If the color change to dark green (or light brown), that will mean that there is vitamin C.



**dark green- light brown  
color**

You can see that all solutions turned their colors into dark green. This confirms the presence of vitamin C.



# THE END

## EVALUATION

We all had fun trying it out. Some experiments were successful on the first try, but sometimes it took us a while to get the results. Surely each of us learned something new. We are very happy that we could be part of this project.

### WE RATE THESE EXPERIMENTS AS SUCCESSFUL

students who took part in the experiments

Julie Hrubá

Zuzana Mašková

Lucie Durychová

Zuzana Šidláková

Šimon Justa

Vojtěch Gargula

Eliška Hniličková

Markéta Hrstková

Eliška Rottová

Tereza Boháčová

Kamil Razák

Matěj Kadlec

Barbora Sahulová

Vanesa Volná

Ondřej Ladnar

OUR CHEMISTRY TEACHER: Jakub Vlach

THANK YOU FOR READING THIS BOOK!