

Lesson Plan: CHEMISTRY IN A KITCHEN

Information

School: ZŠ a MŠ Ostrava-Zábřeh, Kosmonautů 15, příspěvková organizace

Students: Michael Čep, Adam Holuša, Vojtěch Pinkava, Natálie Bakošová, Markéta Štefková, Zuzana Zieczowská

Subject: Science (elementary school, grade 1 - 3)

Goals (targets, results):

To raise interest in chemical reactions

To introduce chemical reaction between an alkali and an acid

To teach following procedures

To explain the results of the reaction which is gas CO₂

To teach key words for description of the reaction: alkali, base, acid, gas, foam, carbon dioxide



Means:

Student worksheets, evaluation worksheets, crayons, pencils,

For each group: at least 1 plastic cup (for the mixture), 1 spoon (for measuring flour, baking powder)

optional: 1 cup for flour (half full), 1 cup for vinegar (full),

1 cup for washing liquid (1 spoon)

1 stirring stick

Ingredients for each group: vinegar (2 dcl, use one half for experiment 1, and leave a little on the bottom for experiment 3), flour (3 spoons or ¼ of a cup), washing liquid (on the bottom 1 - 2 spoons), a bag with baking powder (use ½ for experiment 1, leave a bit for experiment 3)



Baking soda has a stronger reaction so you need less for the experiments, we bought 1 bag for each teacher and it was enough for both lessons. We used less than 1.5 litre of vinegar per lesson with 6 groups. The vinegar concentration used in the Czech Republic was 8%, in Ireland it was only 6% concentration so the reaction was not so strong so we added more baking soda to have the planned fun with desks messed with foam. We used very little of flour and washing liquid.

Description

Begin:

1° activity: Students introduce themselves, the project ideas and topic of the lesson 5'

The first activity was introduction of our team and Erasmus+ project aims. Then our team shortly introduced our country and the topic of the lesson based on reaction of acid (vinegar) and alkali (baking powder) with a visible reaction - foam filled with CO₂ bubbles.

“Hi, we are team from Ostrava. Ostrava is in the Czech Republic. It is a small country near Poland, Germany and Austria. We are in grade 7, we are 13 years old. My name is Natali and these are my friends Vojta, Adam, Michal, Marketa and Susan. We are very happy to be here. We like your country. **We will talk about Science**, specifically Chemistry in kitchen. **Do you like experiments?** I do. But first we will tell you a story. We hope that you will like it.”

2° activity: Motivation - story „The Magic Pot“

To catch attention of children we chose story about the Magic Pot. We wrote our script with two characters, a little girl acted out Susan and Natali was her mother. They memorized their roles, and learnt to exaggerate the actions to make it funny. They used a wooden spoon and an old mug. Pupils could follow the story in their worksheets with illustrations.

5'



When the story finished, Adam asked:

“Do you think that it is possible? OK, to cook porridge with no ingredients sounds like a miracle. But we can try to make the porridge grow and grow.”

3° activity: Science Show - experiment 1 (Adam talks, Marketa performs) 5'

While Adam was talking, Markéta prepared ingredients for her Science show 1: flour, baking soda, vinegar, a cup and a spoon. Adam introduced and then he was describing her actions:

“This is my assistant Marketa. She will show you how to do it. You will need vinegar, flour, baking powder, spoon and a cup. First pour vinegar into the cup. A half of the cup, it is one decilitre. Next, add some flour and stir. Now we have dough. Finally, add baking powder. One spoon. Watch the reaction. What can you see? Yes, the foam. What is in it? Yes, bubbles. When the reaction stops, you can start it again by adding more vinegar and baking powder into the mixture but the dough will be thinner. Would you like to try it? Let´s make 6 groups.”

4° activity: Experiment 1

10´

We made groups; we had six because there were six Czech students. Then the groups cleared their tables and brought the necessary ingredients, cups and spoons. Czech students distributed the roles in their groups; they wanted each member to have a task. To manage this part, guide Irish pupils through the experiment and summarize it, they were saying:

“Hello, my name is Michal. What is your name? Nice to meet you! Did you like the story? Now we will do the first experiment. Do you remember how to do it? (Irish pupils described the experiment.) We need a person who will measure the ingredients. Who? OK, you will measure vinegar and flour. Somebody will stir/ mix. Who? OK, you will stir. Someone will add baking soda. Who? OK, you will add baking soda. Who will measure the time of the reaction? (Who will measure how long the reaction last?) Who will write down the results? I will make the photos. Let´s start. First, take the little cup. Pour the vinegar. How much? One decilitre. Next, add flour. How much? We need 2 teaspoons. Mix everything. Make a mixture/ a dough. Prepare to measure the time of the reaction. Then pour vinegar. How much? 2 teaspoons. What happens? What can you see? What can you hear? What is the foam doing? Yes, it is growing. Measure how long the reaction lasts. Mix the dough. Write it in the table in your worksheet. I think that the reaction is over. How long did it last? 50 seconds. Write it down. Now let´s do some experiments. Add more vinegar and mix. Now add more baking soda. Can you see all the bubbles? Do you know what is inside? This gas is called carbon dioxide. It is the result of this reaction.”



5° activity: Science Show - experiment 2 (Michal talks, Marketa performs)

5´

Markéta prepared ingredients: washing liquid, baking soda, a cup, and a spoon. Michal said:

“Have you all finished? Did you enjoy the experiment? Would you like to see another experiment? I will ask my assistant Marketa to help me. You will need vinegar, washing detergent, baking powder, spoon and a cup. First pour the washing detergent into the cup. How much? Just a little. Only two tea spoons. Next, add some baking powder. Don´t mix it. Finally, add vinegar. Two spoons. Watch the reaction. What can you see? Yes, the foam. What is in it? Yes, bubbles. When the reaction stops, you can start it again by adding more vinegar.”

6° activity: Experiment 2

10'

Pupils changed the roles and performed the second experiment. They used vinegar which they already brought in one cup for the first experiment; they had enough baking soda in the bag too. One pupil fetched a little of washing liquid. Some groups measured how long the reaction lasted; some groups forgot to do it. Then more baking soda or vinegar was added to re-start the reaction. The groups left a little of the ingredients for the last task. Groups which finished earlier started to describe the experiments in the worksheets.

7° activity: Conclusions - what is same, different, reacts, explanations

5'

After finishing the second experiment and cleaning the desks, each group was talking about the procedures and results. Pupils were given time to describe the experiments in their worksheets. Then the experiments were compared and conclusions drawn. The Czech students were leading the discussion, Irish pupils were able to make the conclusions themselves:

“Now, how long did the first reaction last? How long did the second reaction last?
Compare both experiments. Can you tell me what was different? (flour, washing detergent)
What was the same in both experiments? (vinegar, baking powder).”

8° activity: Proof - Experiment 3, revision and checking understanding

5'

Then the groups suggested the last experiment to proof what really reacted in the experiments. Czech students said:

“Let’s see what will happen if we mix only vinegar and baking powder. Put some powder in the cup and pour little vinegar. Be very quiet. Can you hear the sound? What makes it? Many little bubbles. Do you remember what is in them? It is gas called carbon dioxide (CO_2). Bubbles with carbon dioxide do not disappear as fast as bubbles with normal air. That’s why we use baking powder in the kitchen.

What happened? Baking soda is an alkali and vinegar is an acid. They react together and neutralize each other. One of side products of this reaction is gas called carbon dioxide. This gas is very common. Carbon dioxide is present in the air and also we breathe it out. Carbon dioxide makes little bubbles in our dough and makes it grow. Those little bubbles you can also see in all pastry and bread.”

9° activity: Finishing worksheets, writing feedback, cleaning

5'

Then Irish pupils finished their worksheets, some drew the experiments most wrote down the procedures which they did. Czech students cleaned the desks in meanwhile and then asked:

“Which ingredient is an acid? Which ingredient is an alkali? What is the side product of the reaction? What happens during the reactions?”



Experience

Try-out: 2015-26-04, Kells

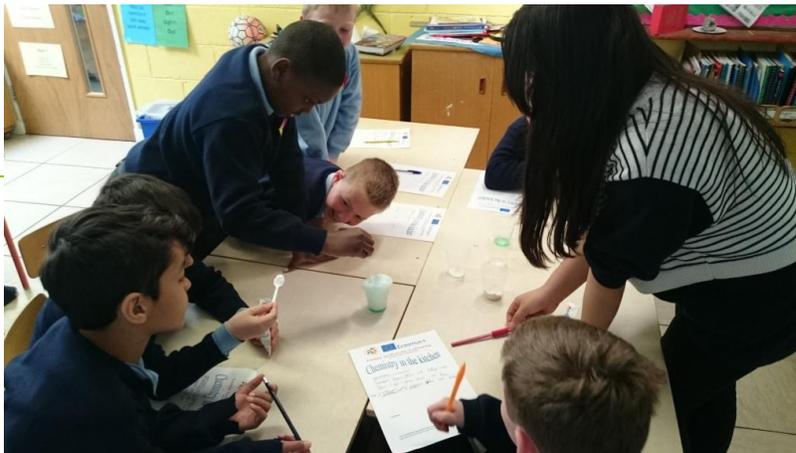
Lesson 1: class 3 from Irish primary school St. Colmcilles B.N.S., 9 year old pupils

Lesson 2: class 2 from Irish primary school St. Colmcilles B.N.S., 8 years old pupils

Evaluation

Czech students:

I enjoyed teaching these children.
I would like to do it again.
I need to learn English.
It was fun. Now I am exhausted.



Teachers:

Czech teacher: It was great fun to work on this lesson in all phases. I think Czech students did a great work and they taught something the Irish pupils. And all enjoyed doing the experiments and mess.

Irish 2nd grade teacher David Hannify wrote: The lesson on acids and bases fitted perfectly with our 2nd class curriculum. We recently studied volcanoes. The chemical reaction and the „explosion“ was a great way for the students to see science in action.

Irish pupils:

For the first time we remembered to prepare an evaluation form for our Irish pupils. Here you can read some of our questions. All pupils were boys, it was a boy school.

What do you think about the lesson? Was it fun? / Did you like the experiments? / Did you learn anything? What was it? What was the best part? Did you understand your „teacher“? / Did you have a task? How did you feel about it? / Did your group worked as a team? / Did you feel well in your group? / Do you have any other comments or recommendations?
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We got back 48 forms; here you can read some of their responses:

I liked it. It was awesome. It was great. It was brilliant. Ten out of 10. It was fantastic. It was really fun. It was very, very good. It was cool, thank you Adam. I very, very loved it. It was nice and cool. They were well organized. I liked the experiments. I think they did a great job spending all that time for us. I absolutely loved it, It was like are vinegar volcano. They have done very well trying to speak English. Thank you very much for coming. I enjoyed it very much.

Czech pupils from class 3. A gave us 14 letters after our rehearsal on 14 April 2016:

They all loved the experiments and were looking forward to another lesson.