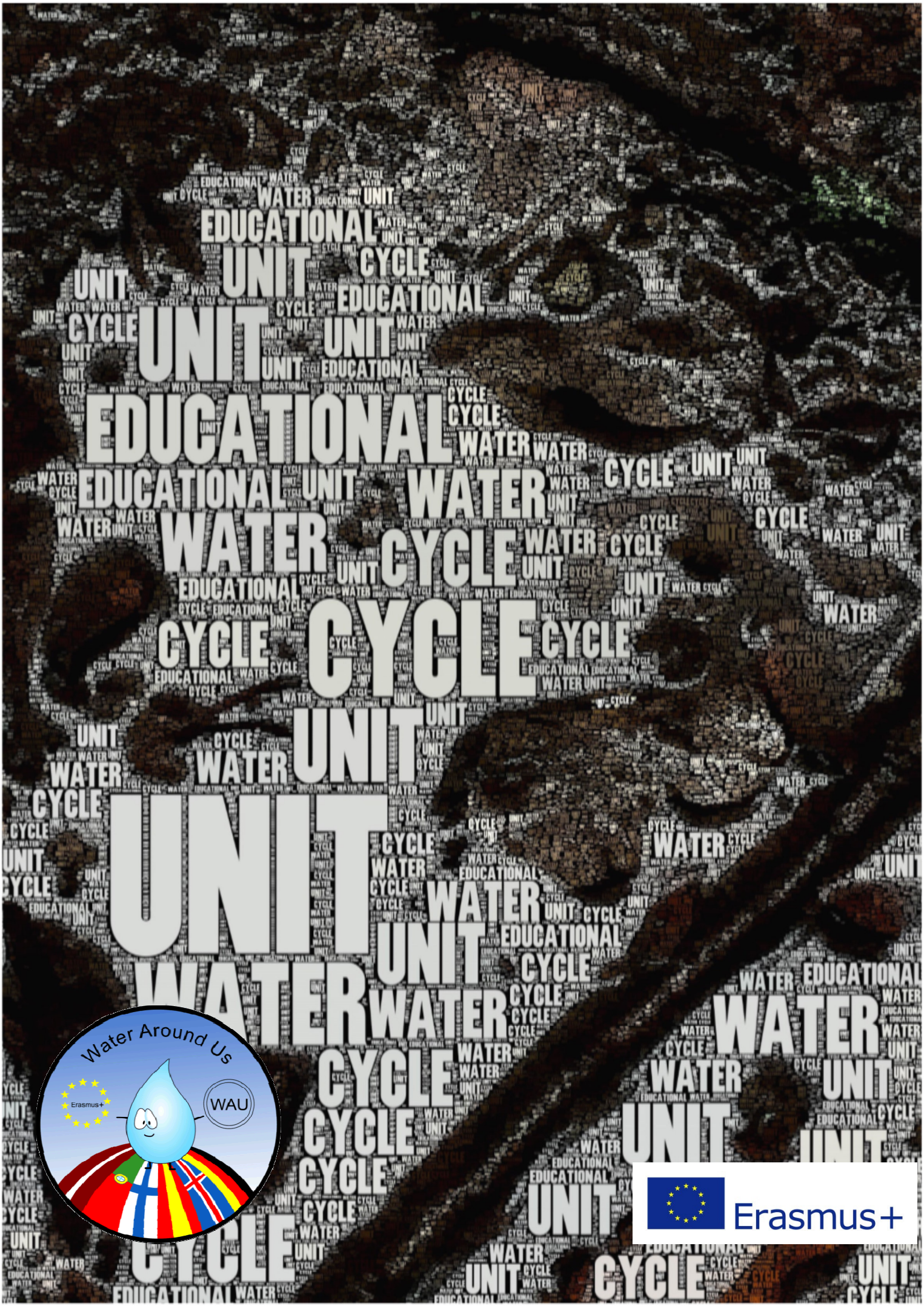
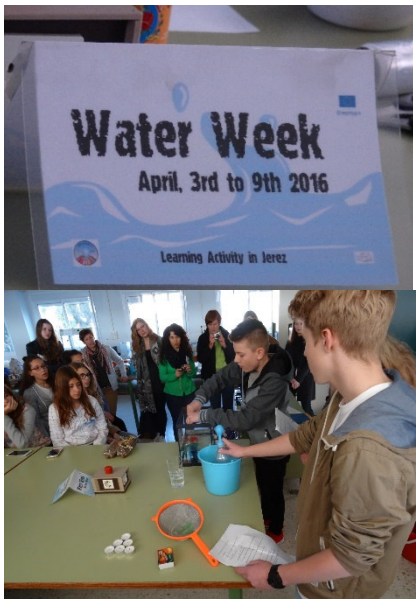

EDUCATIONAL
UNIT
CYCLE
WATER
Water Around Us
Erasmus+
WAU
Erasmus+

Contents



Introduction

In the Erasmus+ project WAU seven schools from six countries work together on the topic WATER which all six countries have in common in their curriculums. Among others the aims of the project are to improve the students' intrinsic motivation in school activities, to use new techniques of learning and teaching and to help students practice and develop new work skills. During the second year of our project, 2015/16, the main focus will be on the topic of the WATER CYCLE. Thus the educational unit which all seven schools develop together will deal with this topic.

During the Transnational Teachers' Meeting in Germany in October 2015 we started planning this Educational Unit and Mittelschule Holderhecke, Bergrheinfeld, Germany volunteered to be the coordinating school for this educational unit. We started collecting the different experiments for the booklet in late autumn 2015 and every school sent at least one topic to the coordinating school. The experiments were not only meant to be printed in the booklet but they also were to be presented by students travelling to the Learning Activity in Jerez-de-la-Frontera in April 2016 where the partners also celebrated the **International Water Day 2016**. As there were so many experiments the Spanish team decided to make it a WATER WEEK rather than just a day.

When choosing the experiments the teachers responsible for this had to make sure that the experiments could be presented by the students themselves, so that they should neither be too difficult nor too dangerous to carry out. Also, the students had to be able to explain the experiments in English which is not the mother tongue of any of the participating schools. Speaking English in front of a bigger crowd is a big challenge for some of our students because the command of the English language varies a lot among the partners' students. Every partner was to send their experiments by March 15th. We agreed to use common programmes, preferably Word or Publisher, and that the coordinator would put them all into the same shape.

Some of the experiments have similar names and almost the same topic but if you look at this booklet closer you will notice that they all differ. As nearly all experiments deal with the same subject, the water cycle, we came to the agreement to explain the background of the experiments only once, at the beginning of the booklet. When partners saw the necessity to give some more background information because their experiment dealt with a special part of the water cycle, this information was added and the format of the page was slightly changed.

General information about the water cycle

The earth has a limited amount of water. This water keeps going around and around in what we call the water cycle.

When the sun heats the water in the lakes, streams, oceans, etc. some of it turns to a gas (water vapor). This is called **evaporation**. This invisible water vapor is light and rises into the air.

When the water vapor hits the cold air high up in the atmosphere it turns back to water droplets and collects in clouds. This is called **condensation.**

When too many water droplets form in a cloud, the cloud gets heavy and the water falls back to the earth in the form of rain, hail, sleet, or snow. This is called **precipitation.**

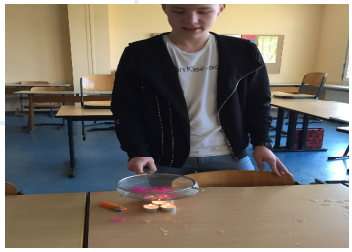
When the water falls back to the earth, it may fall back in the streams, lakes, ocean, etc. or it may fall on the land. This is called **collection**.

When it falls on the land, it either soaks into the earth for plants to drink or runs over the soil and back into the streams, lakes, oceans, etc. and the cycle begins all over again.

Mittelschule Holderhecke

Feathers over candles

- Phase of water cycle: EVAPORATION
- Involved disciplines: Physics, chemistry, biology, geography
- Age group 10—16
- School: Mittelschule Holderhecke Bergrheinfeld, Germany



What we need:

- Tea lights/ candles
- A strainer
- Some small feathers
- A lighter

What we do:

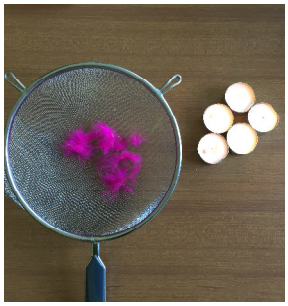
Light the candles.

Put the feathers onto the strainer.

Put the strainer over the candles. Be careful not to light the feathers.

What we see:

The feathers move upwards. They are flying.



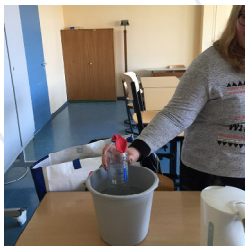
How does it work?

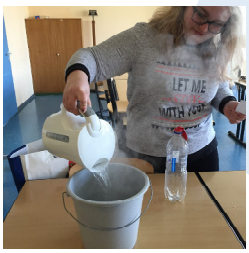
Warm air is less dense than cold air and it therefore expands over the fire and moves upwards. The warm air takes the feathers with it. Just the way the feathers are taken up into the air the little water drops are taken up during condensation. The air current caused by evaporation takes them with it.

Erasmus+

Mittelschule Holderhecke

Balloon on a bottle





- Phase of the water cycle: EVAPORATION
- Involved disciplines: Physics, chemistry, biology, geography
- Age group 10—16
- School: Mittelschule Holderhecke Bergrheinfeld, Germany

What we need:

- An empty plastic bottle
- A balloon
- A bucket
- Cold water
- Hot water

What we do:

Put cold water into the bucket.
Put the balloon onto the bottle.
Put the bottle into the bucket.
Watch what is happening.
Take the bottle out of the water.
Pour the cold water out of the bucket.
Put the hot water into the bucket.
Put the bottle with the balloon back in.

What we see:

When we put the bottle with balloon into the cold water nothing happens. We cannot see anything.

When we put the bottle into the hot water the balloon fills with air.

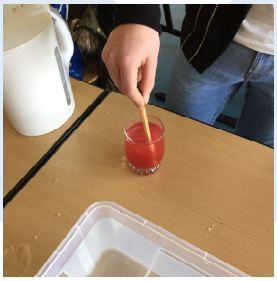
How does it work?

When we put the bottle into the hot water, the air inside the bottle heats up and becomes lighter. It therefore moves up and blows up the balloon.

Erasmus+

Mittelschule Holderhecke

Water in water



- Phase of the water cycle: EVAPORATION
- Involved disciplines: Physics, chemistry, biology, geography
- Age group 10—16
- School: Mittelschule Holderhecke Bergrheinfeld, Germany

What we need:

- An aquarium
- Two small beakers
- Red and blue food colouring
- Ice-cold water
- Very hot water (careful!)
- Water that is about 20°C (Room temperature)

What we do:

- Fill water into the aquarium.

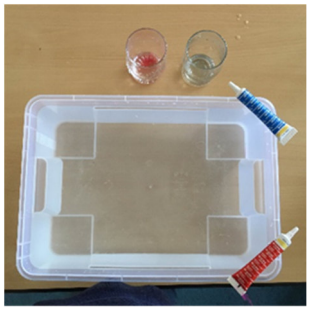
- Fill some very hot water into one beaker and add red food colouring.

- Fill some very cold water (Straight form the freezer) into the other beaker.

- Put both beakers into the aquarium at the same time.

What we see:

The red hot water moves up in the aquarium.
The cold blue water moves down to the bottom of the aquarium.



How does it work?

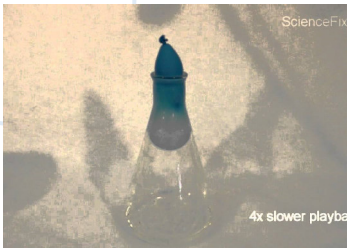
The red hot water is less dense than the 20°C warm water and therefore it moves to the top f the aquarium.

The ice-cold water is denser than the 20°C water and therefore it sinks in the aquarium.

This phenomenon also helps to explain why the small water drops are able to move up to the sky.

Grunnskollin I Borganesi

Balloon trick



- Phase of water cycle: CONDENSATION, EVAPORATION
- Involved disciplines: Physics, chemistry, biology, geography
- Age group 6 - 14
- School: Grunnskóllin I Borganesi, Iceland

What we need:

- A glass bottle
- A balloon
- Hot and cold water

What we do:

1. Boil water and put it into the glass bottle.
2. Put cold water into the balloon.
3. Put the balloon onto the neck of the-bottle.

What we see:

The steam of the hot water starts to collect on the bottom of the balloon. After a while the balloon is dragged into the bottle.

How does it work?

The hot water molecules are moving faster and with more space between them, when they move up to the cold the movement of the molecules slows down and collects on the bottom of the balloon (condensation).

After a while the condensation is massive and heavy so that it will drag the balloon into the bottle.

Grunnskollin I Borganesi

Condensation of water

- Phase of water cycle: CONDENSATION, EVAPORATION
- Involved disciplines: Physics, chemistry, biology, geography
- Age group 6 - 14
- School: Grunnskóllin I Borganesi, Iceland

What we need:

- Plastic bag
- Tape
- Hand of a student

What we do:

1.Wash the hand with warm water.

2. Put the hand into the plastic bag.

3. Tape the bag around the wrist.

4. Watch how the water starts to evaporate from the hand- and the water hazes from the plastic bag.

How does it work?

The water evaporates from the hand in to the plastic bag and because it can't get out of the bag it collects inside the bag and that is called condensation of water.

IES La Granja

Water cycle in the labaratory

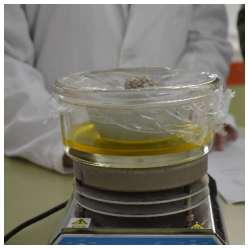
- Phase of the water cycle:
  EVAPORATION
  CONDENSATION
  PRECIPITATION
- Involved disciplines:
  Physics, chemistry, biology, geography
- Age group
  10—16
- School:
  IES La Granja, Spain

What we need:

- A bowl or pan that can be heated
- A beaker
- Transparent film
- A hot plate
- Water
- Food colouring
- A litte stone

What we do:

First of all we add water with colouring in the bowl or pan and we put a beaker inside. (The beaker must be shorter than the bowl)
Then we cover the bowl with transparent film avoiding that water vapor can run off through openings and we put a little stone on the film, just in the center of the beaker.
Then we put the bowl or pan on the hot plate and heat it to boiling and wait to see the evaporation, condensation and precipitation .



How does it work?

Firstly we will see the EVAPORATION: when we heat up water and turn it into vapour or steam.

Secondly we will see the CONDENSATION: When the water vapour in the air gets cold and changes back to liquid into tiny drops of water.

Thirdly we will see the PRECIPITATION: Occurs when so much water has condensed that the air cannot hold it anymore, then water falls back to the beaker.

Erasmus+

Lauritsalan koulu

Water cycle in a bag

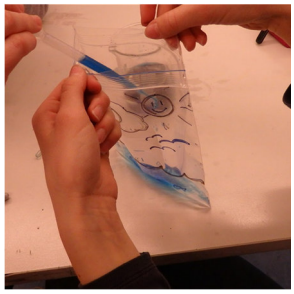
- Phase of the water cycle:
  EVAPORATION
  CONDENSATION
  PRECiPETATION
- Involved disciplines:
  Physics, chemistry, biology, geography
- Age group
  10—16
- School:
  Lauritsalan koulu, Finland

What we need:

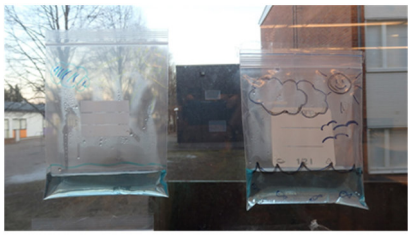
- A clear grip seal bag
- Markers
- Blue food colouring
- Sellotape
- Water

What we do:

1. Draw waves, clouds and the sun onto the plastic bag.
2. Colour about 1 dl of the water with blue food colouring.
3. Put the water carefully into the bag. Make sure that it won't touch the inner sides of the bag.
4. Seal the bag carefully.
5. Tape the bag onto the window with sellotape. Observe the water cycle in the bag for a few days .



How does it work?



The sun heats up the water in the bag, which first turns from a liquid into a gas, i.e. evaporates. When the gas hits the sides of the bag, it cools down and turns back into liquid water, i.e. condenses. When the droplets are heavy enough, they start to drip down on the sides of the bag. This is called rainfall. The rainwater that is created is clear because only the water evaporates and the blue colour remains at the bottom of the bag.

Erasmus+

Lauritsalan koulu

Water cycle in a bowl

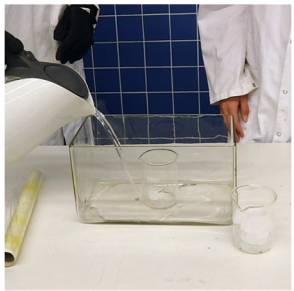
- Phase of the water cycle:
  EVAPORATION
  CONDENSATION
  PRECEPETATION
- Involved disciplines:
  Physics, chemistry, biology, geography
- Age group
  10—16
- School:
  Lauritsalan koulu, Finland

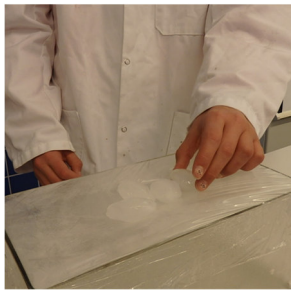
What we need:

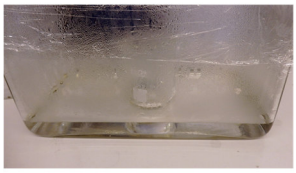
- A large, transparent bowla glass or a smaller, transparent bowl (about 2 dl)
- Clingfilm/plastic wrap
- A hot water kettle
- Ice cubes (roughly a handful)

What we do:

1. Bring about 0,5 - 1 l of water to a boil in the kettle.
2. Place the smaller bowl inside the bigger one.
3. Pour hot water into the bigger bowl.
4. Cover the big bowl tightly with the clingfilm.
5. Put the ice cubes carefully on the clingfilm.
6. Allow the water condense and fall down as rain. This will take a while. Then remove the clingfilm and the ice cubes carefully.
7. Observe the rainfall that has been collected at the bottom of the small bowl.







How does it work?

Hot water evaporates and when coming into contact with the cold clingfilm, the steam condenses into droplets and a cloud is formed. When there is enough condensed water, it falls down as rain into the small bowl.

Erasmus+

Rūjienas vidusskola

Cloud in the bottle

- Phase of the water cycle:
  EVAPORATION
  CONDENSATION
- Involved disciplines:
  Physics, chemistry, biology, geography
- Age group
  10—16
- School:
  Rujiena Secondary School, Latvia

What we need:

- Empty plastic bottle, 2L
- propanol or Rubbing alcohol, ~20mL
- warm water
- Duct tape
- Bicycle pump;
- Goggles.

What we do:

1. Pour some warm water in a bottle (so it covers the bottom of the bottle) and shake it fiercely.
2. Pour ~20mL propanol.
3. Swirl the bottle with the solution, so it evaporates as much as possible.
4. Put the duct tape over the bottle opening.
5. Carefully make a cut, so the pump can be attached.
6. Start pumping air – about 20 times.
7. Take the pump off and watch how a cloud is formed.

How does it work?

Clouds form in the earth's atmosphere when water vapor condenses. In order for the vapor to condense, it needs to cool off. There is a lot of dust in the air, even if we don't see it. The water condenses around these dust particles, making clouds. In our experiment rubbing alcohol vapor represents the dust particles.

The cloud is made by increasing and decreasing pressure in the bottle. When air is being pumped in the bottle, pressure increases and so does temperature. As soon as the cap of the bottle is taken off, the pressure decreases sharply and condensation occurs. And we see a cloud in the bottle.

Similar processes occur in the atmosphere.

Agrupamento de Escolas de Valongo

Water cycle in a bowl

- Phase of water cycle:
  CONDENSATION
  EVAPORATION
  PRECIPITATION
- Involved disciplines:
  Physics, chemistry, biology, geography;geology
- Age group:
  1"—18
- School:
  Agrupamento de Escolas de Valongo, Portugal

What we need:

- Artist's clay or plastic mountain model
- Crystallizing dish
- Adherent film
- Petri dish
- Lamp
- Hot Water
- Crushed ice

What we do:

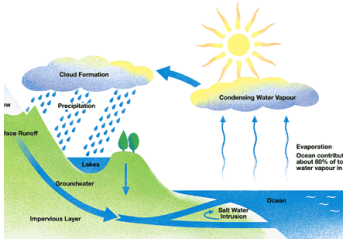
1. Using the clay, shape a mountain.
2. Place the mountain on one side of the crystallizing dish with the sloped side facing the interior of the box where the "ocean" will be.
3. Pour hot water into the "ocean" basin until about one-fourth of the mountain slope is covered.
4. Cover the crystallizing dish with adherent film.
5. Place crushed ice into a petri dish.
6. Place the petri dish on the adherent film over the mountain (as shown).
7. Position the lamp over the ocean. Turn on the lamp. CAUTION: THE LAMP WILL GET HOT. DO NOT TOUCH THE BULB:

What we see:

Steam moves up from the water and drops of water start gathering on the adhesive film.

They then start "raining" over the mountain.

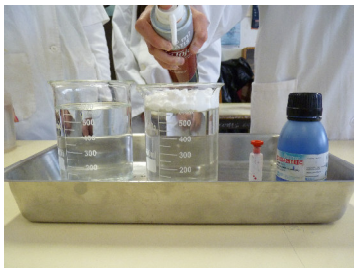
How does it work?



This experiment demonstrates the heat of the sun turning the water in the bowl to vapor (**evaporation**).
The vapor turning back to water droplets on the saran wrap (**condensation**), drops getting too heavy and falling back down (**precipitation**) to the water in the bowl or in the mug which represents mountains or land (**collection**).

Cloud of shaving cream

- Phase of water cycle:
  CONDENSATION
  EVAPORATION
- Involved disciplines:
  Physics, chemistry, biology, geography;geology
- Age group:
  4 –13
- School:
  Agrupamento de Escolas de Valongo, portugal



Background

What is a cloud?

Clouds are droplets of water and crystals of ice, the exact composition depends on the temperature.

Clouds form when warm air rises, expands and cools. Water molecules then attach to dust, pollution and smoke particles, when these molecules come together they form a cloud.

Clouds float because the water droplets forming them are warmed up by the heat from the sun and warm air rises.

What we need

- 1 beaker 600ml
- Water
- Shaving cream
- Food coloring
- Dropper or pipette

What we do:

1. Fill the jar about 3/4 full with water.
2. Cover with shaving cream to completely cover the surface of the water.
3. Drip water over the shaving foam using a pipette.
4. Drop food coloring over the shaving foam.

How does it work?

When a rain cloud reaches a certain mass the water needs to escape and so breaks through the cloud to fall as rain. As you drip the water over your shaving cream cloud the water starts to fall through the cloud.

Agrupamento de Escolas de Valongo

Cloud in a beaker

- Phase of water cycle:
  CONDENSATION
  EVAPORATION
- Involved disciplines:
  Physics, chemistry, biology, geography;geology
- Age group:
  4 –13
- School:
  Agrupamento de Escolas de Valongo, portugal

Background

Have you ever noticed that cloudy days feel cooler than sunny days, but that cloudy nights feel warmer than clear nights?
The reason has to do with how clouds absorb and reflect energy. During the day, some of the incoming sunlight bounces off of the top of the clouds and back into space. Normally this sunlight energy would have been absorbed by us and also by the Earth's surface, thereby increasing our energy and making us feel warmer. However, on a cloudy day, less sunlight reaches the surface where we are, less energy is absorbed, and we feel cooler. At night the situation is reversed because the sun is no longer a source of energy, but the Earth is.
On a clear night, the Earth's energy is radiated out to space as heat and is lost. But on a cloudy night, the clouds absorb some of this outward-radiated heat energy, trapping it at the surface and we feel warmer .

What we need:

- 1 beaker 600ml
- 1 Zip-lock bag
- Ice
- Warm water (not boiling water)
- hot plate
- Small plastic bag
- Matches
- Paper

What we do:

1. Fill the bottom of the beaker with of warm/ hot water
2. Fill a zip-lock sandwich bag with ice and place it on top of the beaker.
3. Shine the laser pointer through the beaker
4. Remove the bag of ice and place a lit match (or lighted piece of cardboard) inside the beaker and blow out the flame. After a second or two, drop the match into the water and replace the bag of ice.
5. Remove the bag of ice and place a lit match (or lighted piece of cardboard) inside the beaker and blow out the flame. After a second or two, drop the match into the water and replace the bag of ice.

How does it work?

- Clouds consist of tiny water droplets suspended in air, which form when humid air is cooled enough that some of the water vapor becomes a liquid.
- When the mixture of the two gases is cooled, some of the water vapor molecules condense into liquid droplets but all of the air molecules remain as a gas.

Mittelschule Holderhecke

Erosion

- Phase of water cycle: PRECIPITATION
- Involved disciplines: Physics, chemistry, biology, geography
- Age group 10—16
- School: Mittelschule Holderhecke Bergrheinfeld, Germany

What we need:

- Two plastic bottles with a part cut off
- Two bottoms of a plastic bottle
- String
- Soil
- Straw, mulch, dried leaves, ..
- Another bottle to let it rain

What we do:

Fill soil into the bottles.

Cover the soil with straw, leaves and other organic stuff.

Attach the bottoms of the bottles to the neck of the lying bottles with a piece of string.

Let the same amount of water “rain” onto the two bottles.

What we see:

Water is running from both bottles. In the bottle with the covered ground the water is quite clear, in the other bottle the water is really dirty, full of soil.

How does it work?

When the soil is not covered rains takes away a lot of soil, especially when it’s heavy rain. We call this erosion. When the ground is covered it is much more stable.

Addition to the experiment:

You can also do this experiment as a long term experiment. You need a third bottle, also with an open top. You seed grass or something like it and wait for it to grow. Then you let the rain fall on all three bottles. You will see that the water of the third bottle is even clearer .

Balthasar-Neumann-Mittelschule-Werneck

WATER EXPERIMENT 1: Filtering water (ready made kit & DIY)

WATER EXPERIMENT 2:

Water Rocket (We built our own rocket with just a bottle, water and an air pump.)

Using the Green Water Science Kit (worldwide distribution by e.g . Amazon.com)

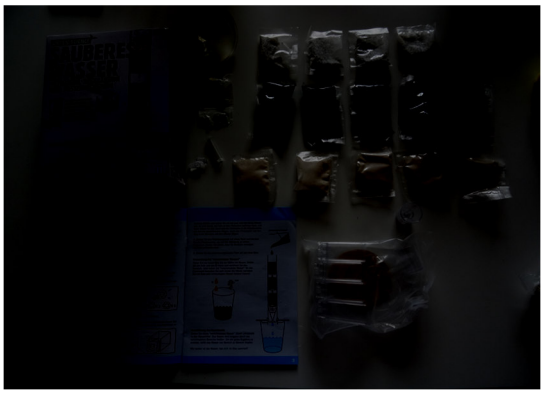
1. Gravel.
2. Sand.
3. Active carbon.
4. Filter paper.
5. Cup/container.
6. Filter sections.
7. Dirty water (half fill a small glass of water, add soil and oil to it and stir to make a brownish coloured mixture).

Warning:

The filter column is not intended as a filtering device for drinking water. Do not drink the water.

What we did:

In this experiment, you use the assembled filter column from a kit to purify water. The various filters in the column remove impurities from the water. We used the Green water science kit by Green Science, but you can easily build your own as described below. Marie, Nadine, Kevin and Daniel practised the experiment several times at home and their local school before doing it for the Erasmus+ audience in Spain.



You will need:

4 x filter sections, 4 x filter plugs, filter base, soft wax, bag of active carbon, bag of sand, bag of gravel, filter paper. (Remarks: you need only one unit of those filters for setting up the filter column. Leave the other two as spare supplies for future experiments.)
Also needed from home (not included in kit): some soil from a clean source (e.g. pot plant or flower-bed), cooking oil, a glass (any size) and a glass (preferably transparent) whose diameter is smaller than the round filter base.

Constructing the filter column:

1. The filter plugs are specially designed for regulating the speed of water flow inside the column. There are six arches in the rim of each filter plug. Take two of the plugs and fill four arches in each one with a very small piece of wax, leaving two open arches. These two plugs will be used in the filter sections which contain sand and active carbon. They will reduce the speed of flow through the sections, allowing the sand and active carbon to achieve their best filtering effect.

2. Fit the filter plugs into the holes in the bottom of each filter section. You may need to push the plugs into place with a pen. You should have two sections with plugs with six open arches and two sections with plugs with two open arches.

3. Clean the gravel, sand and active carbon separately before filling in the filter sections. Simply place each of the materials in a small container (don't mix the materials). Rinse them with clean water a few times. This will remove any dust sticking to them. 4. Put the sand and active carbon into the filter sections with filter plugs of two open arches, and the filter paper and gravel into the sections with filter plugs of six open arches. 5. Put the filter base on a table. Put the filter sections onto the base in the following order from the bottom: filter paper, active carbon, sand, and finally gravel. Make sure each section snaps into place on the one underneath. 6. Stand the completed filter column on top of the glass.

Preparing the artificial "dirty water":

Half fill a small glass of water. Add the soil and oil to it and stir to make a brownish coloured mixture. This will be the "dirty water" for the filtering experiment. (Always wash your hands after handling soil or the dirty water.)

Doing the experiment:

Pour some artificial "dirty water" mixture into the top of the filter column VERY SLOWLY. The water will trickle slowly down through the filters. For the best results, the water should be moving between the filter sections drop by drop.
How clean is the water that runs into the glass?

How does it work?

Each section of the filter column removes particles from the water, purifying it. The different filters remove particles of different sizes. The grains of sand and gravel have small spaces between them. These allow water to pass through, but trap particles in the water. The carbon granules are made from a material called active carbon. Chemicals in the water cling to the surface of the carbon and are removed from the water. This process is called adsorption. The filter paper has tiny holes between its fibres. Water can trickle through the holes, but particles larger than the holes are trapped. It is particularly effective in filtering oil. The filter column demonstrates the principles used at water purification plants, which supply drinking water to households. At a water purification plant the filtering process is more advanced and chemicals are added to the water to ensure the water is safe for drinking.

Cleaning the filter material and filter column:

Always clean the filtering materials and the filter sections when you finish with them, or when you want to filter a new mixture. The sand, gravel and active carbon can all be cleaned and reused. Simply place each material into small glass (don't mix the materials). Fill the glass with clean water, add a drop of detergent and stir gently. Let the material settle to the bottom and then carefully pour away the water. Then rinse the material once or twice with clean water. Also rinse out the filter sections with clean water. When the materials are clean, pour them back into their filter sections (remember to put the sand and active carbon into the sections with two open arches in their plugs). When your filter materials have been used a few times, you may need to replace them with the spare supplies included in this kit. When you run out of the spares, you can buy more in most aquarium shops. Fine sand from a beach and gravels from a garden could also be used, but rinse them thoroughly before use. You could use tissue paper instead of filter paper.

Trouble shooting:

If you find the filtered water not clear or clean: • Try re-filtering the water. The filter column is only small and may not clean the water completely in one pass through, especially if your water is particularly "dirty" or "oily". • Check that the water is not running through the filter sections too quickly. If it is, try pressing the filter sections together more tightly, and even sealing around the joins with sticky tape. This will prevent air leaking into the filter sections, allowing the water to flow downwards slower. • Make sure you have put the sand and active carbon into the filter sections that contains the plugs with two open arches. The "dirty water" needs to flow slower in these two sections. • You may need to clean or replace the filter materials with the spare supplies included in this kit (see above).

Where we use filters for liquids & fun facts:

• Filters have a huge range of uses at home and in industry. At home we use filter paper for filtering coffee grains from coffee, and active carbon granules for filtering water, where they remove chlorine and other chemicals from tap water. Filter paper and active carbon are used in machines to clean water, fuel, oil and air before they are needed, and in gas masks to remove dust and dangerous gases from

air. • Sand filters are used mainly for cleaning water before and after we drink it. The type of sand filter in this kit is called a fast sand filter, as water trickles quickly through it. It removes solid particles, such as grit, from water. Slow sand filters are deep layers of fine sand. As water trickles through a slow sand filter, a layer of micro-organisms forms slime on the top. These organisms use particles in the water as food, so cleaning the water.• Sand filters clean the water in fish tanks and swimming pools, and water from sinks and baths (called grey water) so that it can be used to water gardens. • Active carbon is very porous - water flows easily through the granules because they are full of holes. • A one-gram piece of active carbon has a surface area of about 500 square metres - the same as a basketball court. • Active carbon is sometimes fed to people who have been poisoned because it traps the poison in their stomachs. • Filter paper is used in paper chromatography, which is a way of separating materials dissolved in a liquid.

The principle of water filtration:

Each section of the filter column removes particles from the water, purifying it. The different filters remove particles of different sizes. The grains of the sand and gravel have small spaces between them. These allow water to pass through, but trap particles in the water. The carbon granules are made from material called active carbon. Chemicals in the water cling to the surface of the carbon and are removed from the water. The filter paper has tiny holes between its fiber. It is particularly effective in filtering oil.

The filter column demonstrates the principles used at water purification plants, which supply drinking water to households.

This experiment is not intended as a filtering device for drinking water.

Please do not drink the water.

DIY: Using the same method, you can build your own water filtration (DIY = Do it Yourself)).

You will need:

1. Empty clear plastic bottle (cut the bottom).
2. Gravel.
3. Coarse sand.
4. Fine sand.
5. Cotton/cheese cloth.
6. Clean container to collect clean water.
7. Dirty water (half fill a small glass of water, add soil and oil to it and stir to make a brownish coloured mixture.

Constructing the filter:

1 . Cut the bottom of the clear plastic bottle.

2 . Fill the inside with layers of cotton/cheese cloth, fine sand, coarse sand and gravel (the filter sections), as you can see in the picture above.

3.Stand the bottle upside down on the top of the container.

Doing the experiment:

Pour the dirty water into the bottle.

How clean is the water that runs into the container?

Please do not drink the water!

Experiment 2: Water Rocket

We shot a regular PET-bottle appoximately 50 m up in the air using just water and an air pump. We had to use a compressor in Spain due to connectivity problems, but did the same experiment very successfully several times at Werneck Middleschool with a regular manual bike air pump).

The launch was fun because the rocket flew over one of the big school buildings and out of sight though still landing within school grounds.

Due to time problems we only had some minutes for the experiment and so just 3 launches.

The school yard in Jerez has limited space, therefor we could not go for the maximum possible hight and flying distance. Everybody agreed to repeat the experiment during the next LA meeting in December where we will highlight this awesome experiment again, perform further launches and investigate the physics behind it.

Warning: To ensure safety, please use flat, wide open spaces without buildings, electrical wiring or any other obstructive things for this experiment. The size of a regular football field is just right.

Conclusion

All but one of the experiments of this booklet were presented at the Learning Activity in Spain. This was the Experiment “Water cycle in a bag” which just could not be presented because it is a long term experiment. This shows a problem that many partners encountered when choosing a topic for their experiments, for the booklet and for the presentation also: a lot of experiments about the water cycle are very similar and a lot of them are long term ones which of course qualifies them for a booklet but not for a short presentation in a foreign country. Who could or would have brought a water cycle in a jar in which he had sown grass weeks before to Spain by plane? Right, no one.
“ Whereas during the first term when the topic was the properties of water there were literally thousands of experiments to choose from the number of experiments feasible and presentable was narrowed down to quite a small number. Still I was quite surprised, and impressed, to see which experiments the partners came up with. Some experiments, like the water cycle in a bowl, are very common and you instantly come across them when you look for experiments in school books or the internet and nearly every student knows them, mostly from primary school already. Of course those were the first experiments chosen. So the slower ones had to come up with something new, and everyone managed to come up with something interesting and not so common.

Of course the students practised the experiments several times before presenting them, and this time I had the impression that our students were even more ambitious to present them well then last year. Speaking in front of a big crowd of almost strangers in a foreign country in a foreign language really is a challenge for most of our students. As I heard it worked out well for all students and thus some of the aims of our project were achieved: the students learned a lot about the water cycle, they practised experimenting but most of all speaking English in front of other foreign students and carrying out their experiment successfully really boosted their self-confidence.

Also by practising and trying out different experiments our project became even better known at our schools and a lot of students got involved. We had a project group of young “scientists” at our school and a lot of the students had their own water cycles in a bag and water cycles in jars and strangers coming into our room kept asking about them and so got to know more about the water cycle and Erasmus +. We set of with our first water cycle in a box and

water cycle in a bag on November 19th 2015 and both are still “alive” with grass still growing even after the summer holidays 2016. I really call that a long term experiment.

Putting the booklet together was also a little bit challenging as the first one was already very good and of course we did not want to do any worse. But on the other hand, having participated on the first booklet already, some operations were quite familiar.

The assembling of the booklet also showed how well we work together as a group: most experiments were handed in as demanded and quite on time. I also was provided with lots of photos taken during the water week in Jerez-de-la-Frontera, which I did not attend myself. Although if I did it again I would prefer to travel to the meeting myself and to see all the experiments in person.

To sum it up, this booklet contains some really interesting experiments, some of which are not so common. They have all been tried out and can all be carried out by students themselves without the help of a teacher. So hopefully this booklet will be of use for a lot of teachers across Europe, making teaching science easier and more interesting, and most important, with a lot of students’ activity. If you have any questions or remarks about our experiments feel free to contact us on etwinning our on our web page our-comenius.net.

A selection of experiments about the water cycle made by students and teachers of Grunnskolinn í Borganesi, from Borganes, Iceland; Lauritsalan koulu from Lappeenranta, Finland; Rujienas vidusskola, from Rujiena, Latvia; Balthasar-Neumann-Mittelschule from Werneck, Germany; Agrupamento de Escolas from Valongo, Portugal;
IES La Granja from Jerez-de-la-Frontera, Spain and Mittelschule Holderhecke from Bergrheinfeld Germany

Water Around Us

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