

# Cleaning agents in household and their impact on living water



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ENVI-MOBILE: Integration of mobile learning into environmental education fostering local communities' development

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## Lesson 1

### Activity No. 1

### Part of the lesson: EVOCATION

**The aim of the activity:** Finding out what kind of detergents pupils use for cleaning in their families and households.

#### Step 1

Brief description of the activity:

Teacher draws a table consisting of 2 columns on the board. He asks pupils what kind of detergents do they use at home and writes down their list in the first column. /eg. bleach, washing powder, dishwasher powder, WC cleaner, shower gel, shampoo and also writes down some ecological ones, such as vinegar or soda.

Instruction (what you need to tell the students):

In the first column of a table, write down the list of all the detergents you use at home.

#### Step 2

Brief description of the activity:

Teacher asks pupils to put comma in the second column next to each detergent used.

Instruction (what you need to tell the students):

Now you draw comma next to each detergent you use at home.

#### Step 3

Brief description of the activity:

Together with pupils evaluate the results – do more pupils use usual, or ecological detergents, what concrete kinds they use and why.

Instruction (what you need to tell the students):

What type of detergents do you use most frequently and why? Do you use ecological or usual detergents more often? Why?

**Tools for the activity (everything you need to take to the classroom):** Interactive board/ board and chalk or flipchart and markers

**Estimated time (max. 40 min.):** 10 minutes

## Activity No. 2

**The aim of the activity:** Finding out, what detergents are acid and alkali and their pH.

### Step 1

Brief description of the activity:

Divide pupils in the groups of 2 – 3. Each group receives tray with 10 universal indicator papers, coloured pH scale, 10 small (50ml) plastic cups with cover or 10 glasses and small spoon, measuring cylinder, permanent marker, beaker with distilled water, latex gloves for each pupil, worksheets (ANNEX 1).

Instruction (what you need to tell the students):

Now we spilt into pairs or groups of 3. Each group receives working tools and worksheet to fill in.

### Step 2

Brief description of the activity:

Tell pupils to mark the cups/glasses with the letter A – K and explain the process of preparation liquid samples for testing – put 2 small spoons of detergent into each cup following the list in table 1 (A – bleach, B – washing powder, ..), than add 30 ml of distilled water in each cup, close it and shake well. The cup “K” serves as control sample and contains only 30 ml of distilled water without any detergent.

Instruction (what you need to tell the students):

Mark the cups with letters A – K. Put 2 spoons of concrete detergent in each cup as stated in the worksheet. Then add 30 ml of distilled water to each cup, close it and shake well. In cup “K” you will have only distilled water without any detergent.

### Step 3

Brief description of the activity:

Ask pupils to find out what pH different detergents have and let them write it into concrete column of table 1. Than explain how to measure pH – open the lid on the cup, and put the indicator paper in. Compare with pH scale and write down the value in the table. Do the same with B – J cups.

Instruction (what you need to tell the students):

When ready, write in the first column what pH you estimate the other detergents have. Then put indicator paper into each cup with the solution and compare it with the coloured pH scale, writing the value down to next column. Do not forget to write whether the solution is acid, alkali or neutral.

Part of the lesson:  
**APPRECIATION**

## Part of the lesson: APPRECIATION

### Step 4

#### Brief description of the activity:

Afterwards pour the solutions from all the A cups into one bigger A beaker, all B cups into B beaker etc. Pupils can do this themselves or teacher does it. Do not mix the solutions!

#### Instruction (what you need to tell the students):

After finishing your work, pour the solutions from all the A cups into one bigger A beaker, all B cups into B beaker etc.

### Step 5

#### Brief description of the activity:

Preparation of tools for the next lesson.

#### Instruction (what you need to tell the students):

Put the same amount of *Cladophora* into each beaker (A – J). "K" beaker is a control one – put there *Cladophora* in its original water.

**Tools for the activity (everything you need to take to the classroom):** Washing powder, bleach, dishwasher powder, detergent for manual dishwashing, WC detergent, shower gel, shampoo, vinegar, soda, distilled water

For each group: 10 universal indicator papers, coloured pH scale, 10 small (50ml) plastic cups with lids or 10 glasses, small spoon, measuring cylinder, permanent marker, beaker with distilled water, latex gloves for each pupil, 10 beakers for melding of solutions, *Cladophora* or Mosquito larvae or Euglenoids, ANNEX 1, pen

**Estimated time (max. 40 min.):** 20 minutes

**Notes:** If you want to, you can use also mosquito larvae or euglenoids instead of *Cladophora*.

## Activity No. 3

### Part of the lesson: REFLECTION

**The aim of the activity:** Discussion on the results of solutions research.

#### Step 1

Brief description of the activity:

Discuss the results of research measurements with pupils. Where their estimations correct? What were the results?

Instruction (what you need to tell the students):

Where your pH estimations of concrete solutions correct? What solutions were acid, alkali and neutral? What about ecological detergents and their pH? What detergents should we rather use at home?

#### Step 2

Brief description of the activity:

Assign pupils homework – exercises 1 – 3 (ANNEX 1).

Instruction (what you need to tell the students):

Please do the exercises 1 – 3 in worksheet from ANNEX 1 at homework.

#### Step 3

Brief description of the activity:

Tell pupils to clean the cups and tidy up their working tables. Let the beakers with *Cladophora* stand until the next lesson.

Instruction (what you need to tell the students):

Clean the cups and tidy up your working tables. Let the beakers with *Cladophora* stand on the concrete place until the next lesson.

**Tools for the activity (everything you need to take to the classroom):** Annex 1

**Estimated time (max. 40 min.):** 10 minutes

## Lesson 2

### Activity No. 1

Part of the lesson:  
**EVOCATION**

**The aim of the activity:** To review pupils' knowledge from the previous activity.

#### Step 1

Brief description of the activity:

First discuss the homework and results of exercises 1 – 3.

Instruction (what you need to tell the students):

At home you worked on exercises 1 – 3 in the worksheet (ANNEX 1). What interesting did you find?

**Tools for the activity (everything you need to take to the classroom):** Worksheet with homework assignment from ANNEX 1.

**Estimated time (max. 40 min.):** 7 minutes

## Activity No. 2

**The aim of the activity:** To observe and realize the impact of detergents on the living organisms.

### Step 1

Brief description of the activity:

Let pupils observe the changes in beakers A – K and compare them. Ask them to briefly describe the changes in concrete samples and write them down into Table 2 (ANNEX 2).

Instruction (what you need to tell the students):

Observe the changes in beakers A – K and compare them. Briefly describe the changes in concrete samples and write them down into Table 2 (ANNEX 2).

### Step 2

Brief description of the activity:

Getting ready the microscopic preparations of *Cladophora* (or other organisms). 1 preparation from each beaker, all together 11 preparations (each group does 1 – 2 preparations).

Instruction (what you need to tell the students):

In each group get preparation ready to observe under the microscope.

### Step 3

Brief description of the activity:

Pupils try to find out why *Cladophora* in bleach solution turned brown (because of the bleached chlorophyll) and why in some solutions *Cladophora* partially dissolved (these detergents dissolve lipids and cell membranes – it can be better observed on animal cells).

Instruction (what you need to tell the students):

What do you think, why *Cladophora* in bleach solution turned brown? Why in some solutions *Cladophora* partially dissolved?

**Tools for the activity (everything you need to take to the classroom):** Microscope with digital camera and interactive board (or 11 optical microscopes), slides and cover slips, 11 droppers, beakers A – K with samples of *Cladophora* from the previous lesson

**Estimated time (max. 40 min.):** 25 minutes

**Notes:** If needed, explain pupils how to make microscopic preparation ready. If you use 11 optical microscopes, pupils will gradually observe preparations and write down their findings into Table 2. Better and faster way is to use the microscope with digital camera connected with interactive board. Project the preparations on the board and describe them together with pupils.

Part of the lesson:  
**APPRECIATION**

## Activity No. 3

### Part of the lesson: REFLECTION

**The aim of the activity:** To discuss the results of observations and conclude how pupils themselves can support the protection of the environment.

#### **Step 1**

Brief description of the activity:

Discuss the observations of the organisms effected by detergents.

Instruction (what you need to tell the students):

What do you think, what kind of effect do detergents have on the live organisms?

#### **Step 2**

Brief description of the activity:

Inspire pupils to think about what they can do personally to protect the environment.

Instruction (what you need to tell the students):

What can you do personally to protect the environment?

**Estimated time (max. 40 min.):** 8 minutes

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## Excursion

### Activity No. 1

#### Part of the lesson: EVOCATION

**The aim of the activity:** To inform pupils about planned excursion.

#### Step 1

Brief description of the activity:

Teacher informs pupils about the logistics of the excursion and its programme and provides all the necessary information before the trip. He/she divides pupils into the groups. After the excursion, each group develops a project concerning the water purification station..

**Estimated time (max. 40 min.):** 10 – 15 minutes

**Notes:** The most effective is to inform the pupils about the day right before the excursion.

### Activity No. 2

#### Part of the lesson: APPRECIATION

**The aim of the activity:** Pupils will realize the importance of cleaning of waste water (containing, among other stuff, also the rests of detergents) before it is released to the river. They will find out that waste water is polluted and stinks.

#### Step 1

Brief description of the activity:

Excursion to nearby waste water purification station.

Instruction (what you need to tell the students):

You will have a professional guided tour in waste water purification station, and be introduced its functions and processes of water cleaning.

**Estimated time (max. 40 min.):** 45 – 60 minutes

### Activity No. 3

#### Part of the lesson: REFLECTION

**The aim of the activity:** Pupils will deepen their knowledge of the meaning of waste water purification stations.

#### Step 1

Brief description of the activity:

As a homework, pupils will develop projects based on the received information and present it to the class on the next lesson.

Instruction (what you need to tell the students):

Together in a group, as a homework, prepare the project presenting your knowledge on waste water purification stations. One of the group members will present your project to the entire class on the next lesson.

**Estimated time (max. 40 min.):** 5 minutes

## Annex 1 - chart 1

### Cleaning agents in household and their impact on living water

Name: \_\_\_\_\_ Date: \_\_\_\_\_

sample	cleaning agent	your guess		universal indicator strip		✓ ✗
		pH	acid / base / neutral	pH	acid / base / neutral	
A	bleach					
B	washing powder					
C	dishwasher detergent					
D	dishwashing detergent					
E	product for cleaning toilet					
F	shower gel					
G	shampoo					
H	vinegar					
I	baking soda					
J	tap water					

#### Choose the correct word:

By detecting the pH of the substances commonly available in the home we conclude that most detergents are **acid / base / neutral**. The pH is a measure of **acidity / solubility** of water solutions. The more acidic the solution is, the **lower / higher** is pH, the more alkaline the solution is, the **lower / higher** the pH is.

#### 2 Why did the pH strips discolour when dipped in bleach? Choose the correct answer.

- a) bleach contains chemicals with bleaching effects
- b) bleach is so acidic that it will not fit in the pH scale

#### 3 Find out how pH effects water organisms (use encyclopaedias and internet).

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## Annex 2 - chart 2

beaker	cleaning agent	the overall appearance of the sample	description of the microscope slide
A	bleach		
B	washing powder		
C	dishwasher detergent		
D	dishwashing detergent		
E	product for cleaning toilet		
F	shower gel		
G	shampoo		
H	vinegar		
I	baking soda		
J	tap water		
K	control sample		

# NOTES