1ST AND 2ND YEAR SECONDARY SCHOOL

# How do I separate out the waste?

Environmental awareness activities.
Sanitation

Canaleduca

# Introduction

More and more people are becoming aware of the **solid waste** that pollutes our water, particularly the problem that, for some time now, has been causing what we call ***emerging waste***.

What is this waste? This group includes wet wipes, cotton buds, leftover food, medicines, fats and oils.

To raise awareness and to work on how to dispose of this waste properly, at Canal Gestión we have created the character of Matilda, an inquisitive and likeable girl who, at only 5 years of age, is able to instil greater environmental awareness in both adults and children.

At Canal Educa we have designed this activity —in which both your students and Matilda play leading roles— so that you can work on how to **manage this waste correctly**, especially the waste generated in children's daily lives.

## What does it involve?

We have designed a **hands-on, experimental activity** for you to do in the classroom that encourages the students to think and stimulates their curiosity, while encouraging their active involvement as part of the solution.

## What information will you find?

- Type of activity
- Brief description of the activity
- Objective
- Contents developed
- Duration of the activity
- Materials required
- Instructions for the activity
- Printable material and links for downloading

8 End this part of the activity by explaining, in summary, what the various stages of water treatment consist of, especially the part of the process in which solid waste is removed. We have provided a short outline below.

| PROCESS | OBJECTIVE |
|---|---|
| Pre-treatment | **Screening:** remove coarse solids (trunks, stones, plastic, paper, wipes, cotton buds, etc.) with a system of grates and screens of different mesh size.<br>**Degreasing:** remove fats and oils by pumping air in and once on the surface, skimming it off.<br>**Sand trap:** remov sand and grit by allowing it to settle. |
| Primary treatment | Remove suspended solids by sedimentation. |
| Secondary treatment | Remove organic matter, suspended solids and phosphorus and nitrogen (the main cause of the eutrophication of water) using microorganisms. In this phase a second sedimentation is also carried out. |
| Tertiary treatment | In some treatment plants the water is subjected to a higher level of treatment to obtain reclaimed water, suitable for irrigation, street cleaning or industrial use. |

You can find more detailed information on water treatment on our website dedicated to the integrated water cycle.
www.canalconlohemejoblagua.es

**Solution:**

1st **Group C.** Filtration of coarse solids (thicker to thinner): barbecue tongs, oven rack and colander or skimming spoon.

2nd **Group A.** Separation of oils: straws and spoon.

3rd **Group B.** Sedimentation of suspended solids: no tools needed.

9 Next, **read or project the three news reports** on the various environmental problems caused by a failure in wastewater treatment. The consequences of each problem are due to a failure in one of the treatment processes that have been explored in this activity. Each group should **identify the environmental problems** that are caused when the wastewater treatment process that they have studied breaks down.
• Printouts: *News*. Link.

10 To conclude, **each group should propose a single solution** to prevent the treatment process that they have studied from breaking down. The solution is simple and inexpensive: all you have to do is deposit all solid waste in the corresponding bin, and take your used oil to the nearest collection point.

# Introduction

## Do you want more?

If you want to see Matilda in action, and learn her secrets in the fight against wet wipes first-hand, take a look at this fun *video.*

**Show it to your students and tell them to share it with their younger siblings!**

You also have access to educational posters that you can put up in your school or distribute amongst your peers at *www.sumatealretodelagua.com* or by clicking *here*.

1ST AND 2ND YEAR SECONDARY SCHOOL

# How do I separate out the waste?

Activity worksheet

60 minutes

## What are you going to do?

This is a hands-on activity in which your students will perform a simple **experiment** equivalent to each of the processes that take place in wastewater treatment plants to remove solid waste. They will only be provided with the material, and they themselves will have to figure out the procedure.

After the exercise they will reflect on the impact of this type of waste on the environment, analysing a case study that they will have to relate to their experiment.

## Objectives

- Understand the integrated water cycle as a whole.
- Understand how the sanitation phase works, mainly wastewater treatment.
- Emphasise the importance of the water user in the proper functioning of the sanitation system.
- Acquire responsible water use habits.

## Contents

- Integrated water cycle.
- Wastewater treatment (pre-treatment of water – elimination of solids).
- Domestic management of solid waste.

## Materials you will need

- Wastewater sample: mix 2 litres of water in a washing-up bowl with a small crisp packet, 2 wet wipes, cotton, a tissue, 2 cotton buds, a couple of stones (the size of a rubber), leaves from a tree, a twig, a piece of cardboard, half a glass of oil, dirt and sand, and stir well.
- Materials for cleaning the water: oven rack, piece of green mesh, funnel, barbecue tongs, straws, spoon, colander, skimming spoon, sieve and cloth strainer (or, failing that, a piece of cloth or rag) and coffee filter.
- Empty container for eliminating the waste (can be another washing-up bowl).
- Printout: *News*.

## How to do the activity

**1** Prepare the activity materials including the wastewater sample.

We recommend doubling up and using 2 wastewater samples and creating 6 groups (3 for each water sample).

**2** Introduce the activity to the students with questions about the origin and final destination of the water that we use.

**3** To answer these questions, and before you start the experiment, your students must be clear about what the **integrated water cycle** is. To do this, show them the following *video*.

**4** **Create 6 groups** and introduce the materials and the wastewater sample to your students. Explain that their mission will be to separate 3 types of waste from the water, by simulating the techniques applied at the pre-treatment and primary treatment stages at a wastewater treatment plant:

- Group A: separate fats and oils
- Group B: separate suspended solids
- Group C: separate large solids

**Each sample will be worked on by two groups.**

**5** Before they start the experiment they must decide between themselves the order in which they will separate the various types of waste, i.e., **which group goes first**. Next, each group will have 5 minutes to **decide on the method and the material** used to separate their waste from the water (maximum 3 items per group).

**The correct order is: group C, group A, group B.**

**6** They now **begin the water treatment process** in the order that they have decided. Each group will have 5 minutes to remove their waste with the selected materials. They can deposit the waste that they have extracted in the container provided for that purpose.

**7** When the last group has finished, **look at the final state** of the water and decide whether the **water treatment process** has been effective:

a) Would you change the order in which you separated the waste?

b) What difficulties did you have?

**8** End this part of the activity by explaining, in summary, what the various stages of water treatment consist of, especially the part of the process in which solid waste is removed. We have provided a short outline below.

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|---|---|
| **Pre-treatment** | **Screening**: remove coarse solids (trunks, stones, plastic, paper, wipes, cotton buds, etc.) with a system of grates and screens of different mesh size.<br>**Degreasing**: remove fats and oils by pumping air in and once on the surface, skimming it off.<br>**Sand trap**: remov sand and grit by allowing it to settle. |
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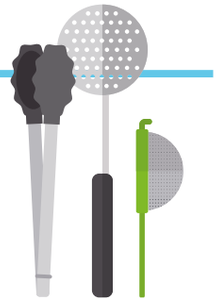
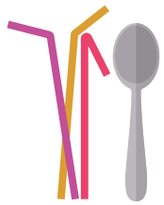
*www.canalciclointegraldelagua.es*

**Solution:**

**1st** **Group C**.
Filtration of coarse solids (thicker to thinner): barbecue tongs, oven rack and colander or skimming spoon.



**2nd** **Group A**.
Separation of oils: straws and spoon.



**3rd** **Group B**.
Sedimentation of suspended solids: no tools needed.

**9** Next, **project the three news reports** on the various environmental problems caused by a failure in wastewater treatment. The consequences of each problem are due to a failure in one of the treatment processes that have been explored in this activity. Each group should **identify the environmental problems** that are caused when the wastewater treatment process that they have studied breaks down.

**10** To conclude, **each group should propose a single solution** to prevent the treatment process that they have studied from breaking down. The solution is simple and inexpensive: all you have to do is deposit all solid waste in the corresponding bin, and take your used oil to the nearest collection point.

www.canaleduca.com

T. 900 213 213
canaleduca@canaldeisabelsegunda.es