



stem4math

Reuse of cooking oils



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Engage

During one week you will be aware of the garbage that is produced in your school. So you will explain to all the people who work and study at school that at least this week you will separate wastes that are produced in the school. To do this you will find bags or boxes to put: glass, plastics, papers, cans, objects, used cooking oils and in the last one food (it can't have holes), all in different places.

1. At the end of each day you will collect the bags or boxes and you will analyse them.
2. Complete the following table with masses in grams (g).

Table 1: Mass * of waste produced in a week at your school

Produced wastes	Week days						
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Glass	g	g	g	g	g	g	g
Plastic	g	g	g	g	g	g	g
Can							
Paper	g	g	g	g	g	g	g
Food waste	g	g	g	g	g	g	g
Used cooking Oil	g	g	g	g	g	g	g
Other waste	g	g	g	g	g	g	g
Totals	g	g	g	g	g	g	g

* You will need a balance.



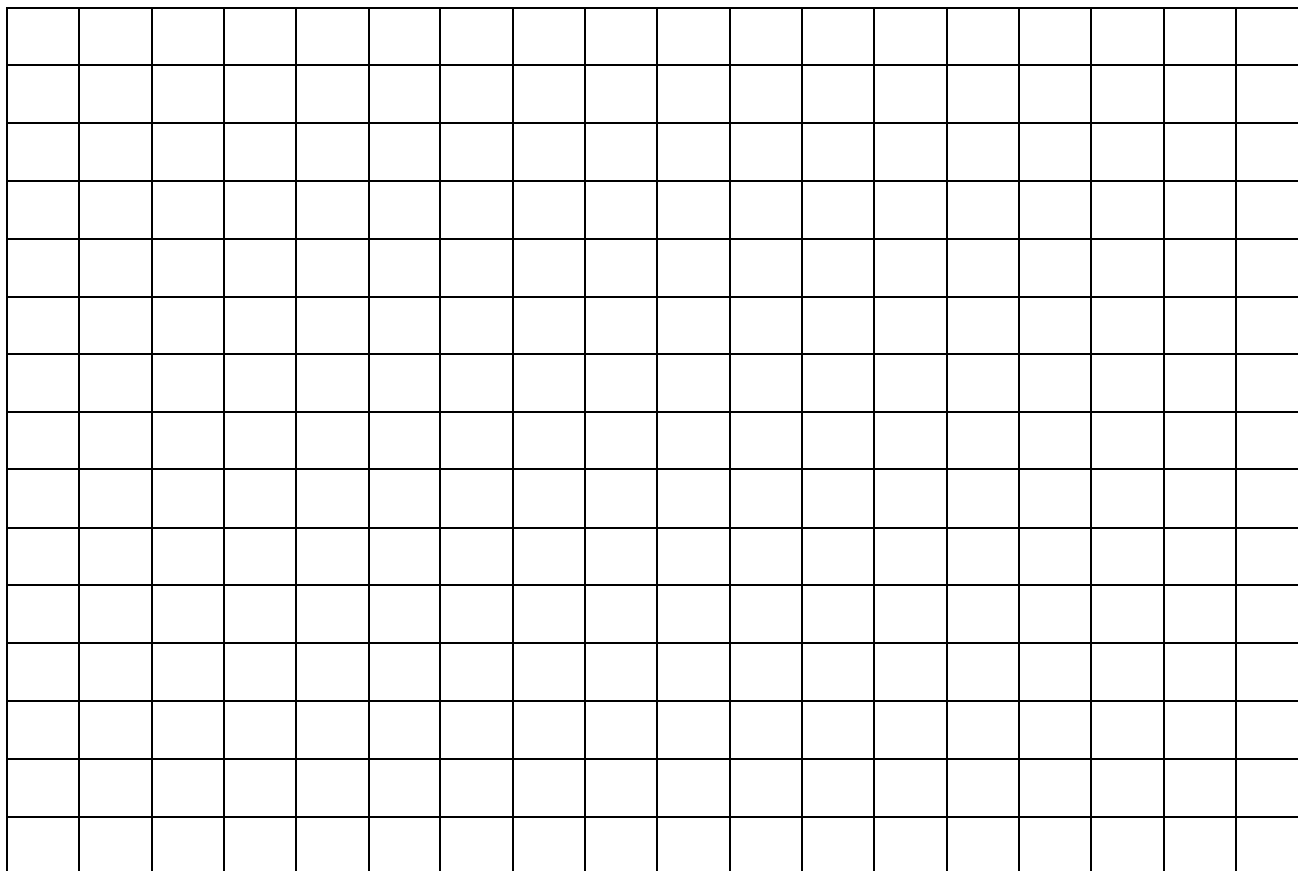
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3. Analyse the data you have collected, draw a suitable graph for used cooking oils.



3.1 Calculate the total mass of waste produced in your school this week (based upon the data in table 1). What does that number mean?

A large empty rectangular box for writing the answer to question 3.1.

3.2 What is the average amount of waste per person for this week? How can it be determined?

3.3 If you want to know the amount of waste from your school community, in a year, how should you proceed? What can you conclude from the number you have calculated?

3.4 In one year what amount of used cooking oil is produced on average at your school per person?

Note: You can use technology for this activity. For example Excel.

Adapted from: Vieira, R.M.; Tenreiro-Vieira, C. (2011). *A Educação em Ciências com uma Orientação CTS - atividades para o ensino básico*. Porto. Areal Editores.





Investigate

Please read carefully the following text.

One litre of used cooking oil (UCO) resulting from the frying of food is enough to pollute about one million litres of water, damage sewage, encourage the appearance of pests and damage wastewater treatment systems.

In cases where there is no collection system, the UCO's should be placed in the undifferentiated waste, carefully enclosed in a plastic bottle.

UCO has a high recovery potential and can be used for the production of soap or biodiesel. In the latter case, about 1000 litres of UCO allow to produce between 920 and 980 litres of biodiesel, whose emission levels of carbon dioxide can reach less than 80% of that of diesel.

On the other hand, for every ton of UCO not sent to a landfill, the emission of about 14 tonnes of greenhouse gases associated with biodegradation in the absence of oxygen is avoided.

Adapted from: <http://www.quercus.pt/fileiras-residuos/3617-oleos-alimentares-usados>

1 What is the main subject in the text?



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2 When oils are not collected and recovered, they can have serious consequences for the environment and public health. Write three of those consequences.

3 “The UCO has a high potential for recovery.” How is it possible to take advantage of these oils?

4 In your school’s canteen what’s the destiny of the rest of the used oils? And at home?



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5 Research in books or internet examples of UCO collection systems that exist in our country. In the town where you live, in your school, in the restaurants ... Is there any collection system?



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Plan

Version A

Used cooking oils can be used for soap production.

Rita did research on how to make soap by reusing UCO.

The results of this research are below.

How to make soap reusing cooking oil?

Place 1 kg of caustic soda in flakes in a container and slowly add 2 litres of hot water. Mix very carefully using the wooden spoon until the caustic soda dissolves completely. Add the 4 litres of cooking oil and continue stirring for 20 minutes.

Add 1 litre of alcohol and 5 ml of essence. If you want, this is the time to put decorating elements (aromatic herbs, dried flowers, shells etc.). Blend until you get a consistent paste.

Pour the content into a lined wooden crate with a cloth or in forms, spread well and put the paste into the container. Allow to dry for at least 24 hours. After drying, cut the soap to the desired size and wrap the pieces in foil paper.

Note: Caustic soda is a toxic and corrosive product. It should be handled with care. So use gloves and goggles.

Adapted from:
<http://www.bandab.com.br/mariana-martins1/fala-serio/aprenda-a-fazer-sabao-com-oleo-de-cozinha-usado/>



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In this part of the activity, we will carry out an activity to proceed with the production of soap from the cooking oil collected in your house, from your friends and from the school canteen.

Let's plan our activity, using the litres of oils that have been collected.

Let's reuse _____ litre of oil to make soap.	
<p>We will need:</p> <ul style="list-style-type: none"> * _____ litres of cooking oil * _____ kg of sodium hydroxide (caustic soda in flakes). * _____ litre of water * _____ litre of alcohol * _____ ml of essence (optional). * Herbs, shells, dried flowers (optional). 	<ul style="list-style-type: none"> * Container / Basin. * Kitchen wooden spoon. * Latex gloves. * Protection glasses. * Container or forms. * Cloth.



Create

How are we going to do...

1. Put on gloves and protection glasses.
2. Put in a container / bowl caustic soda and slowly add the hot water.
3. Mix very carefully using the wooden spoon until the caustic soda dissolves completely.
4. Add oil and continue mixing for 20 minutes.



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5. Add alcohol and the essence, dried herbs, shells
6. Mix until you have a consistent paste.
7. Put the contents into a lined container with a cloth or in forms and spread well.
8. Let it dry for a minimum period of 24 hours.
9. When it's dry, cut the soap to the desired size. You can wrap the pieces of soap in paper.



Report

Now let's evaluate all the work done. Report about positive aspects of this project and the less positive and explain your difficulties during all the process.



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Plan

Version B

Used cooking oils can be availed for soap production.

Research how to make soap by reusing UCO and choose the receipt you find the best.

Write your result below.

How to make soap reusing cooking oil?

Adapted from:



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In this part of the activity, we will carry out an activity to proceed with the production of soap from the cooking oil collected in your house, from your friends and in the school canteen.

Let's plan our activity, considering the litres of oils that have been collected.

Let's reuse _____ litre of oil to make soap.

We will need:



Create

How are we going to do...

1.



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Now create your amazing soaps.



Report

Now let’s evaluate all the work done. Report about positive aspects of this project and the less positive and explain your difficulties during all the process.

