

Teacher's guide Bioplastic Street.

The Bioplastic Street is a workshop with successive practical activities where the pupil makes bio-based plastic from natural, renewable raw materials instead of petroleum. Actually, the Bioplastic Street contains two parts: 1. refining starch and 2. making bio-based plastic.

To compose the Bioplastic Street yourself you find a list of required supplies.

The tablecloth indicates very easily where all parts should be, contains useful information and ensures that you work in a structured way.

Before and after the workshop.

You can find information and suggestions for additional lessons in the bio-based lesson set. The lesson set can be downloaded via the website: <https://www.coebbe.nl/academy/lesmateriaal-basisonderwijs/>

An introduction to the thematic area of bio-based plastics is described in chapter 1 (plastic from plants, pages 8 through 10). Information on identifying starch is presented on pages 13 through 18. For videos about plastic see pages 14, 15 and 16 of the lessons set.

After this activity you can continue in the classroom with follow-up assignments, these are also described in the lesson set.

Specification components Bioplastic Street

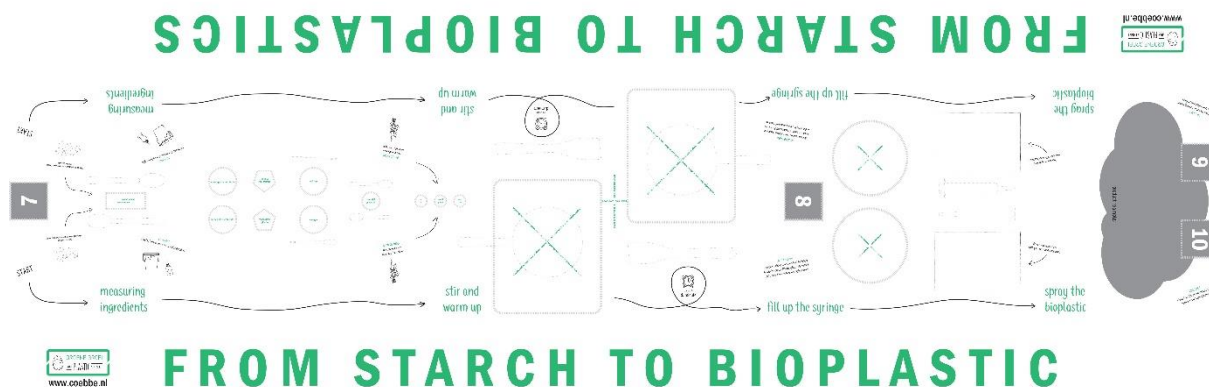
You can use tables preferably with a width of 60 cm so that you can work on both sides. The length for the two parts of the street are 2 x 4 meter.

Description material	numbers
fries cutter, standing	1
blender, with transparent cup	2
induction plate	2
jerry can with tap, 15 l.	1
little casserole	2
beaker, 1 l	4
measuring cylinder, 50 ml	2
spray bottle, 250 ml	2
pipette, spatulas, tablespoons	2 each
syringe, 60 ml	3
crate (closed) 30x4 (1 serves as a water basin)	2
crate 60x40 (storage)	5
extension cord, 3500 watt, 10 m	2
clipboard for instruction signs	10
Ingredients (see grocery list)	

Table-clothes

There is the possibility to order the two table clothes. The Centre of Expertise Biobased Economy (CoEBBE) can deliver the table clothes on easy washable material printed with eco-ink. For more information about delivery time and prizes, please contact: info@coebbe.nl.

You can also print the table clothes yourself. For this you can use [these documents](#).



Instruction signs

The signs are intended to give the student brief instructions. You can print these in A-5 format, using [this document](#).

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All things blue

Let it settle

1. Throw the content of the blender in the big can and let it rest for 2 minutes to settle.
2. Throw the foam and brown water back in the blender and meal it again for 1 minute.

WOW. In the big can you can see now a small layer of white starch. Keep it for the next step.

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All things blue

Flush

1. Put the layer of starch in the can with 200 ml water. Pour this in a 500 ml cup and let it rest for at least 1 minute or longer.
2. You can use the blender time and time again and let the content settle.
3. Repeat the settling and flushing if there is enough time. You have 2 500 ml cups to use.

Grocery list

Collect the ingredients on the shopping list before the visit with the pupils.

Step 1:

Sufficient potatoes. Two big sized potatoes are needed per group of two pupils.

Step 4 and 5:

Corn and/or potato starch

Food colorants

Vinegar

Glycerol

Baking paper

Information about the different steps of the Bioplastic Street.

Step 1: Refine starch from potato

You can ask the students:

Why do we divide the potato into pieces? This makes it better suited for grinding in the blender.

What happens during fine grinding? The cells are made 'broken'. This way the starch can be removed from the cells.

Step 2 and 3: settling and rinsing.

Ask (or tell) the students what happens and what they see.

The starch granules are washed from the potato pulp by washing and stirring. During the settling, the starch sinks to the bottom.

The washing water turns orange that is due to the proteins present in the potato.

Step 4 and 5: making bio-based plastic

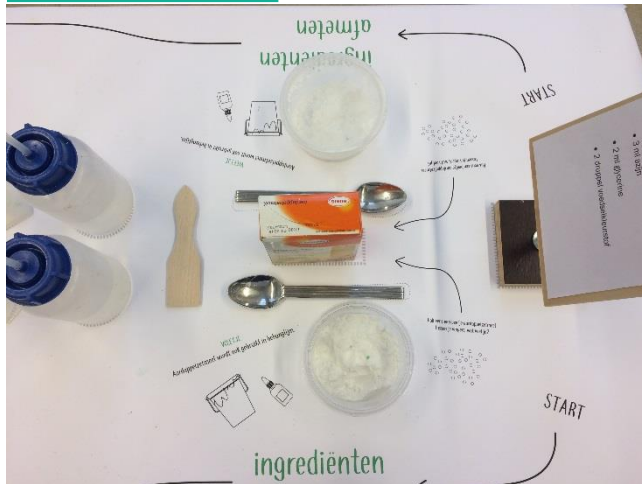
By making variations in the recipe you get different results.

This can be done by:

Your 'home-made' starch or corn starch or potato starch.

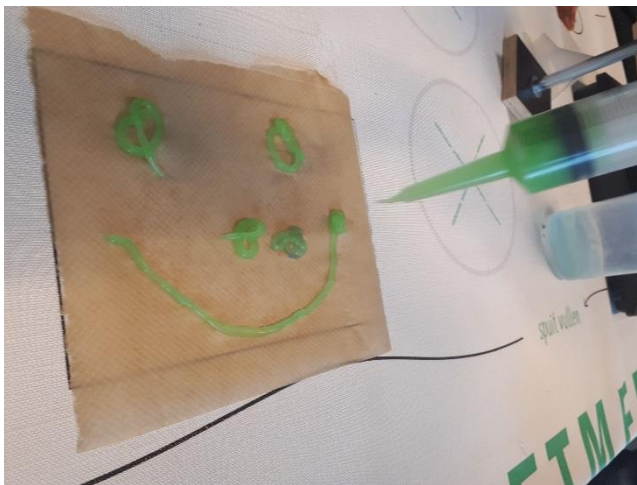
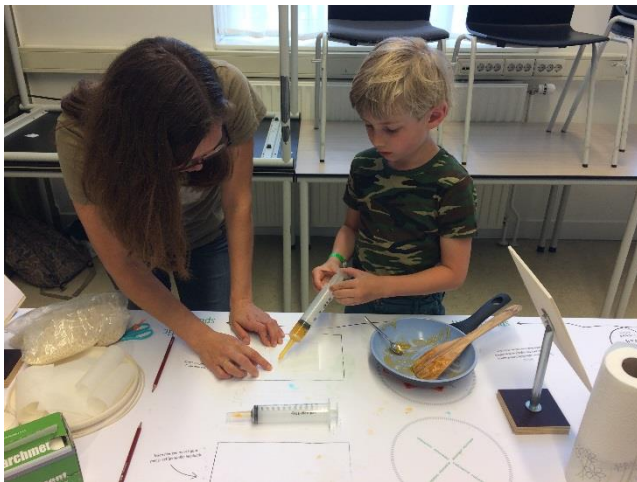
To vary with the amount of starch. What happens if you use more / less starch and the amount of water, vinegar and glycerine remains the same.

Leave out glycerine and / or vinegar. Glycerine or glycerol has the function to make the plastic soft and less brittle.



Step 6 and 7: Injection molding of bioplastic

This activity is comparable to injection molding from the industry: the liquid substance is sprayed under pressure in a mold.



The pupils can view the different results and compare them with each other.