

## Lesson on plastic waste



**Aim:** Understanding the impact of plastic on our environment and on our food chain. Raising awareness of our own plastic-footprint and discussing ideas on how to minimize plastic production.

Time needed: 90 min

**Start/Warming up:** Students walk around class and stop in front of a classmate when they hear a signal (or when the music stops).

The teacher then shows the first of the three questions below. The students in the pairs ask each other the question and give each other an answer.

After about 60 seconds students walk around again and stop in front of another student at the sound of the signal. The second question is shown and the pairs talk about it.

The same is done a third time with the third question.

Question 1:

**Could you do without plastic?  
If yes, why? If not, why not?**

Question 2:

**What do you think of plastic? What is special about plastic?**

Question 3:

**What do you think is happening to your plastic waste?**

Now the following “headlines” are shown and two corners are identified – one representing plastic as a curse and one representing plastic as a blessing. Students are asked to position themselves in one of the corners or in between the corners – getting them to think about their attitude towards plastic.

Position yourself:

**„Yesterday a whale died off the coast of Norway - Cause of death: too much plastic eaten.“**

**Curse?**

**or**

**Blessing?**

**„Intelligent plastic saves lives - flexible plastic chips monitor body functions“**

**Work on the topic:**

Now students are asked to work at four different stations to find out more about plastic. They all get a routing slip to mark their progress. See Appendix.

Station 1: Use of plastic

Here you can place different objects made from plastic on the table (for inspiration) or a picture collage (see appendix.)

Station 2: Plastic in numbers – economic data

Station 3: Plastic and environment

Students should have the possibility to watch a short film (either using their mobile devices or a tablet/computer is made available) – a QR-code is presented with which they can get to to the film. (Other films in the local language could be presented – many are available on youtube).

Station 4: What happens to plastic waste?

Students read a text and fill in advantages and disadvantages.

**Discussion/Looking at the results:**

After all students have completed the four stations, the whole group will discuss about plastic.

Station 1: A big mindmap can be created together – either online (e.g. padlet or other tools) or on the blackboard or a big poster. This way all the ideas are put together.

Students and teachers talk about the findings. Students realize the enormousness of the plastic problem.

At the end students identify way to reduce plastic production.

Appendix

Question 1:

**Could you do without plastic?  
If yes, why? If not, why not?**

Question 2:

**What do you think of plastic? What is special about plastic?**

Question 3:

**What do you think is happening to your plastic waste?**

Position yourself:

**„Yesterday a whale died off the coast of Norway - Cause of death: too much plastic eaten.“**

**Curse?**

**or**

**Blessing?**

**„Intelligent plastic saves lives - flexible plastic chips monitor body functions“**

## **Routing slip**

Stations are set up at fixed places in the classroom. At every station you will find material on the respective topic and an assignment slip.

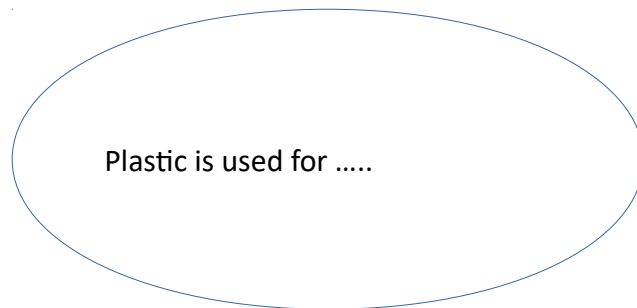
Work at each station one after the other! Have you done the tasks at a station, you can tick your routing slip. Have fun!

Tip: In the middle column under the heading "Information" you can write notes or you can also write down questions.

Station	Information/Questions	Done
Station1: Use of plastic		
Station 2: Plastic in numbers – economic and statistical dates about plastic		
Station 3: Plastic and environment		
Station 4: What happens to plastic waste?		

## Station 1: Uses of plastic

1. Create a mind map on the topic of "uses of plastic".  
In the middle it says "Plastic is used for ..."



Station 1:



Fotos: Peter Weidemann, Collage: Ronja Goj  
In: Pfarrbriefservice.de

## Station 2:

### Plastic in numbers - economic data on plastic

Tasks:

1. Table 1 contains, among other things, information on the production of plastics.
  - a) Analyze the table and create a coordinate system with a graph where you represent the values of production.
  - b) Connect the entered values so that a graph is created. c) Name in a sentence what the graph represents.
2. Describe the course of the graph in a few sentences.
3. Explain the course of the graph.

Table 1: Plastic production worldwide (1950 – 2019)

year	1950	1970	1974	1975	1989	2002	2008	2009	2010	2011	2018
Million tons	~ 1,7	~34	~47	~41	~99	~204	~265	~250	~270	~280	~359

Source: [https://www.plasticseurope.org/application/files/5716/0752/4286/AF\\_Plastics\\_the\\_facts-WEB-2020-ING\\_FINAL.pdf](https://www.plasticseurope.org/application/files/5716/0752/4286/AF_Plastics_the_facts-WEB-2020-ING_FINAL.pdf) , viewed 25/05/2019



### Station 3:

Plastic and environment

1. Watch the short film and take notes of the problems caused by plastic being represented in the film.
2. Read the text and explain what the problems with plastic have to do with you. Why are you affected by it? Also take into account your notes from the movie.
3. Create a food chain that shows how the discarded plastic enters your body.

Video: <https://www.youtube.com/watch?v=ULIGrvSdmAw>



Text:

Plastic poisons our food chain

In our environment, plastic is broken down into smaller and smaller particles, which attract highly toxic chemicals (pesticides, mercury, etc.). Scientists speak from the sponge effect. These particles are mistaken for food by wildlife and fish, both on land and to water, and eaten. The toxic additives that make plastic malleable are already detectable in the blood and tissue of almost every human including newborns (our children). Plastic waste covers millions of square kilometers in the North Pacific Ocean, and the North Atlantic and in the rest of the oceanic whirlpools. There is no known way to clean up plastic pollution in the oceans because the plastic particles are very small (as big as plankton) and spread all over the place in every depth of the oceans. The amount of plastic parts in the oceans is increasing at disastrous speed.



## Station 4:

What happens to our plastic waste?

1. Read through the text and then fill out the table, noting the utilization methods and the respective advantages and disadvantages.

2.

a) Decide on what you think are the 2 most important benefits (of all advantages) by marking them with a + in the table.

b) Decide on what you think are the 2 most important disadvantages (of all disadvantages) by marking them with a - in the table.

## How do you dispose of plastics? - Ways of Recycling

In the last few years plastic consumption has increased explosively. In 1994 there were 36 million tons of waste in Germany alone - of that 5 percent, i.e. 1.8 million tons, was plastic waste! But where to put the garbage which does not rot over time? Should it just be dumped or burned or should it be broken down again into different chemical components in order to be able to reuse "raw materials" obtained? So what speaks for or against these different ways to deal with the problem of plastic waste in today's consumer society?

The first method of plastic recycling is called "material recycling".

In the process, thermoplastic plastic waste is shredded and melted down, these leftovers are added to a new production process, which saves materials. The old new plastic can be reused up to 20 times, for example in plastic boxes. The saving of energy, raw materials and, of course, costs in direct application speaks for this system of recycling.

Against this "material recycling" speaks, above all, the costly sorting of the various plastics and the deterioration in the quality of the finished products that sometimes occurs.

The most complex and expensive type of recycling is "raw material recycling".

The plastic is broken down into individual molecular parts, so that different raw materials can be recovered. In the process, the plastics are heated to 600 to 900 degrees Celsius on a quartz bed and thereby disintegrated into their molecular substances.

The saving of crude oil speaks in favor of this recycling method and the high level of recyclability of the materials without the loss in quality is another advantage as well as the fact the sorting of the material is not required.

The disadvantage of this type of recycling, above all, is the high energy usage and thus the high costs. These are going up by the need to separate the melted products.

The most obvious way of recycling plastic waste is by incineration.

The residual waste is reduced to a very small volume and the existing energy the plastic itself is used, and this alternative is very inexpensive. For example, the plastic waste can be used as fuel in the manufacture of steel used - it then replaces the raw material oil. The biggest disadvantage,

however, is also in this process, because by burning the plastics the environment is polluted by emissions, and the incinerators collide to a low acceptance in the population.

Method	Advantages	Disadvantages