

Regina Palkovits, *Chemical Engineer*

What would have happened if Regina Palkovits had not gone to a summer academy when she was in school?

Can you imagine a banana peel serving as fuel for a car? This is only one of the interesting problems Regina Palkovits deals with in her work at RWTH Aachen University. She was born in Essen (Germany), in the middle of the Ruhr region, in 1980. In earlier times this was a region where coal was mined and burned for energy. So it's probably not a coincidence that today Professor Regina Palkovits is looking for ways to generate energy from renewable raw materials.

Wood, for example, is a renewable raw material. If you chop down a tree in order to use it for heating or for making furniture, a new tree can grow in its place. But this is not true of petroleum, natural gas or coal. They will not be renewed in the foreseeable future.

Chemical engineers do a variety of things

In primary school, Regina Palkovits' favourite subjects were maths and art; later on she also liked chemistry. When she was in an upper form at grammar school, she went to a summer academy. This is a kind of holiday camp where the campers really have to use their brains. There she did a lot of

experiments in the area of renewable energy. She found this topic so exciting and important that she decided to become a chemical engineer. Chemical engineers are needed wherever large amounts of materials are changed into other materials – for example, potatoes into crisps, oils and other ingredients into cosmetics, and renewable raw materials into energy. To manage these processes, you need expert knowledge in technology as well as the natural sciences. A chemical engineer can do research and development, planning, building, improving and controlling, as well as operating and managing big production plants.

Research and development was exactly what Regina Palkovits wanted to do. She has already done research in many different areas. At the moment she is looking for a new way of making fuel for cars.

Alcohol as a fuel?

Petrol or diesel, which are used to fuel most cars, are made from petroleum. But petroleum is not available in unlimited amounts, so researchers are working to find a substitute. This could be a certain type of alcohol called ethanol, for example. It can be



made by allowing sugar beet, maize or grain to ferment. This creates ethanol, in the same way that allowing grape juice to ferment makes wine.

Because we also need grain for food, Regina Palkovits is looking for a way to make new kinds of fuel from plant waste, such as stems or wood scraps. Such plant waste consists largely of cellulose, a material that contains a lot of energy. Unfortunately, it is fairly difficult to extract this energy. You need a special helper material called a catalyst to change cellulose and make fuel from it. Regina Palkovits discovered a catalyst of this kind and received a patent for the process she invented. If someone has a patent, other people who want to make the same thing first have to ask the person who owns the patent and pay that person.

Making our environment a better place to live

Regina Palkovits says she enjoys doing research mainly because it allows her to really change things and help make our environment a better place to live. That won't happen overnight, but over the years new production processes will be developed, and one day our cars may really run on fuels that come from plant waste – possibly including banana peels!

Regina Palkovits also enjoys talking to young people about science and getting them interested and enthusiastic. For example, she supports the young people who are doing projects for the “Jugend forscht” science and technology competition in Germany.

When she finds a spare minute in her busy schedule, Regina Palkovits likes to do karate. She finds it very relaxing, because she has to concentrate on it so hard that there's no room in her mind for anything else. She also used to go jogging, but her co-workers made her stop. That's because while she jogged she got so many ideas for new research projects that her co-workers couldn't keep up with them.

What does a person need in order to be a good researcher? Regina Palkovits says, “Above all, you have to be curious and enthusiastic.”



Maize is a versatile plant. It provides food and can also be processed into fuel.
(@fotolia.com/JLV Image Works)



Now it's your turn!



1 Renewable raw materials

Find out about renewable raw materials and renewable sources of energy and look for various examples.

2 Petroleum

Find out how petroleum is created and how long this process takes.

3 Fuel from renewable raw materials?

Can you imagine why many people are against the idea of processing raw materials such as sugar beet, maize or grain into fuel? Collect arguments for and against this idea and discuss them.

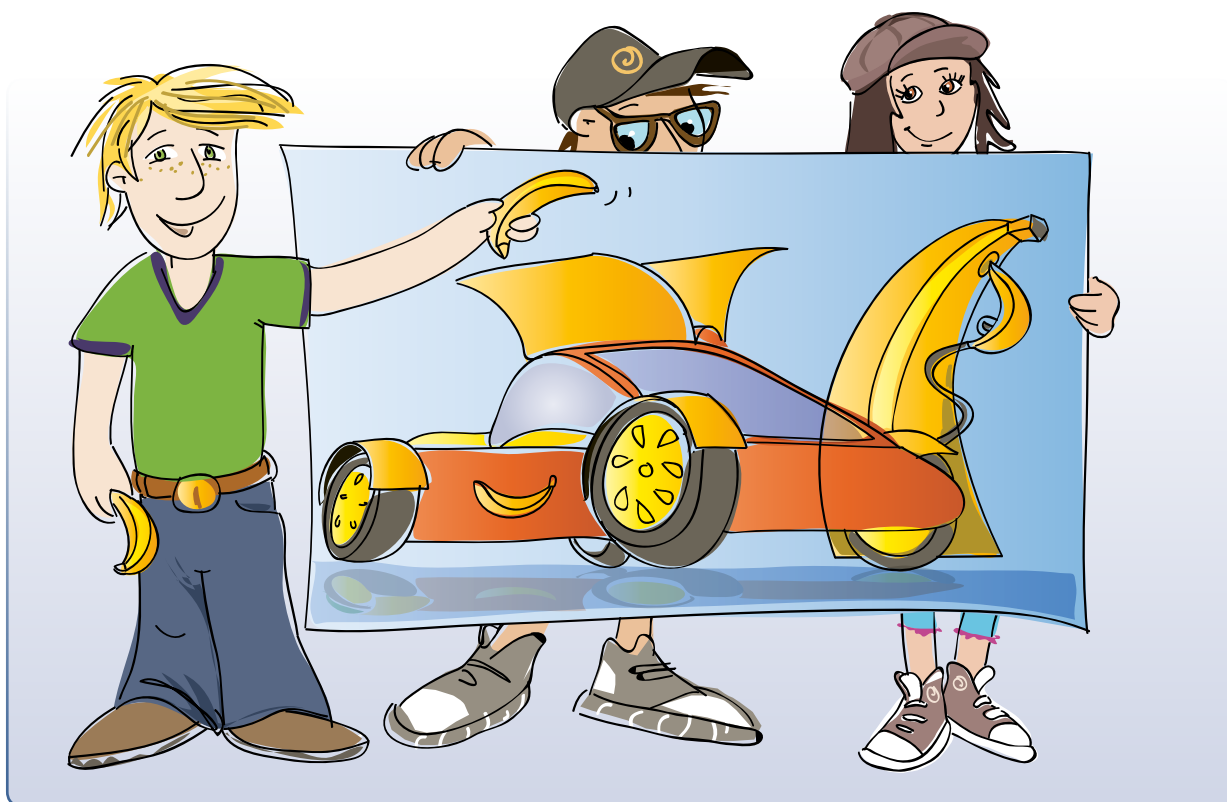
4 Catalytic converter

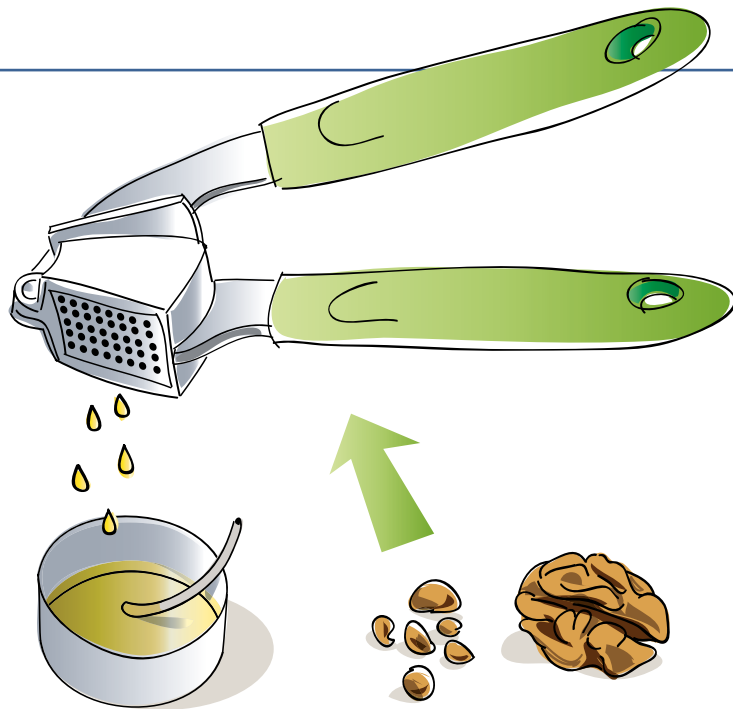
Find out what a catalytic converter is and then select the right answer:

- ▷ A catalytic converter is a kind of fuel that makes cars run faster.
- ▷ A catalytic converter is a kind of cleanser that makes hazardous materials disappear.
- ▷ A catalytic converter is a kind of matchmaker between different materials. It enables two materials to react with each other without being changed itself.

5 Chemical engineer

What do chemical engineers do? Find out the answer (for example on the internet) and collect as many verbs about it as possible.





6 Experiment: Making lamp oil

Make a lamp that burns a renewable raw material.

What you need:

- ▷ 1 aluminium cup from a tea-light
- ▷ 1 short piece of wick
- ▷ 2 or 3 walnuts
- ▷ 1 nutcracker
- ▷ 1 kitchen knife
- ▷ 1 cutting board
- ▷ 1 garlic press
- ▷ Matches

How to do it:

- ▷ Crack open the walnuts, remove the shells and cut the nuts into small pieces with a kitchen knife.
- ▷ Cut off a piece of wick that is about 3 centimetres long and put it in the aluminium cup so that it partly stands up along the side.
- ▷ Put the walnut pieces into the garlic press and press the oil directly into the aluminium cup.
- ▷ When you have pressed out a few drops of oil, you can light the wick.

7 Seeds that contain oil

Your lamp burns nut oil. Do some tests to find out if other kinds of seeds also contain oil. Take different kinds of seeds, put them between two paper towels and gently pound them with a hammer. Now hold the paper towel against the light. What do you see?

8 A play

You've made a nut oil lamp. Now imagine the following situation:

You are a small team of researchers (three or four people) that has just invented this wonderful lamp. In a meeting with other scientists and representatives of industry, you report on your work and try to persuade the factory managers to manufacture this lamp.

Act out this scene as a short play, taking on different roles.



Regina Palkovits – Chemical Engineer

- 1 Regina Palkovits was born in the Ruhr region in Germany in 1980. People used to mine coal there in order to get energy. Regina Palkovits works to get energy too.
- 5 In grammar school she went to a summer academy. This was a holiday camp with lots of experiments. After that she wanted to go on doing research. She became a chemical engineer. Chemical engineers look at how materials change:
- 10 for example, how potatoes become crisps or how oil becomes cosmetics. Regina Palkovits has done lots of research. Now she is working on a new way to make fuel for cars.
- Cars can run on a type of alcohol called ethanol. People now make ethanol from sugar beet, maize and grain.
- 15 But we need these things for food. Regina Palkovits has found a way to make ethanol from plant waste. To do that, she needs a special helper material, a catalyst. She has a patent for this material. Other people have to pay if they want to use it.
- 20 What does a person need in order to be a good researcher? Regina Palkovits says, “You have to be curious and enthusiastic.”



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WEBERSUPIRAN.berlin

Illustration

Rupert Tacke
info@ruperttacke.de

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info@science-on-stage.de

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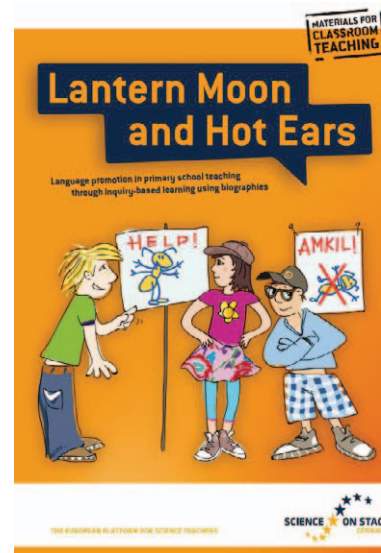
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