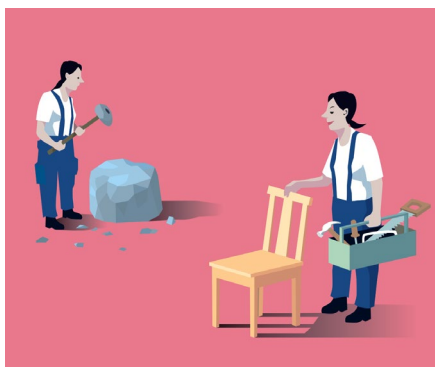


## Student Worksheet – Chemistry prize 2021

### Tools that are revolutionising molecular construction



The 2021 Nobel Prize in Chemistry is awarded for the discovery of a tool that has revolutionised the construction of molecules. This tool is called asymmetric organocatalysis. The tool, which is a catalyst, has made it possible to produce chemical reactions more quickly, more cheaply and more sustainably. The method is used to make the molecules found in, for example, various medications.

The 2021 chemistry prize is divided between **Benjamin List** and **David MacMillan**. List and MacMillan both studied how chemical reactions work and how they can be accelerated, but they did it independently of each other.

Nature has its own tools for making the molecules it needs. Think of a tree. For a tree to grow, it needs sunlight, carbon dioxide and water. The tree transforms these substances into dextrose and oxygen. In order for this reaction to occur, a particular enzyme is needed. This enzyme works as a catalyst – that is, a substance that gets the reaction started but is not affected by it. Nature has many smart strategies like this that make use of different catalysts. People have been trying to imitate these natural strategies for a long time in order to construct molecules that make everyday life easier and more efficient. But the strategies developed by chemists used to be big and clumsy, which meant they produced more substances than they wanted to in their test tubes. Their test results included a mix of different substances. But a chemist wants test results that are as clean as possible.

List and MacMillan both used experiments to discover that a catalyst can be made of only *one single* molecule. We don't need a whole enzyme made up of millions of different molecules.

### Vocabulary

**MOLECULE** Two or more atoms that are joined together.

**ENZYMES** Proteins that aid in the chemical reactions that take place in the body.

## What do you think?

What is the most interesting part of the laureates' work?

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Alfred Nobel wanted the Nobel Prizes to be awarded to people who worked for the greatest benefit to humankind. What is the greatest benefit of the laureates' contributions?

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