

# The 2017 Nobel Prize in Chemistry

Since 1901 the Nobel Prize has been presented to the Laureates each December 10, but in October we learn who they are.

## Alfred Nobel and the Nobel Prize

Alfred Nobel lived between 1833 and 1896. During his lifetime he made many inventions, with the best-known being dynamite.

Alfred Nobel was thus an inventor, but also a chemist, entrepreneur and industrialist. When he died, he left behind a large fortune. In his will, Nobel declared that a large part of this money should be used to establish a prize for “those who shall have conferred the greatest benefit to mankind.” The Nobel Prize is divided into five equal parts, with the Chemistry Prize being one part. The Nobel Prize in Chemistry is awarded to a person or persons who have made important discoveries or inventions in their field.



## The Nobel Prize in Chemistry

Alfred Nobel received a solid education in chemistry and technology during his childhood in St. Petersburg. He was taught by one of Russia’s foremost chemists, Nikolai Zinin.

It was Zinin who demonstrated nitroglycerine and its explosive power to Alfred Nobel for the very first time, when Alfred was only 15 years old. At age 17, Alfred embarked on an educational tour of Europe, including a period in Paris working with one of the most talented chemists of that period – Jules Pérouze.

Alfred Nobel enjoyed being in a laboratory where he could experiment and develop new ideas. During his lifetime, he built many such labs in different places around Europe.



## This year’s Chemistry Prize

The 2017 Chemistry Prize was awarded to Jacques Dubochet, Joachim Frank and Richard Henderson “for developing cryo-electron microscopy for the high-resolution structure determination of biomolecules in solution”.

Our bodies contain many billions of cells, which in turn consist of different kinds of molecules. All these molecules perform important tasks that are necessary to keep us feeling healthy. To understand how such “biomolecules” function and do their work, we need to know how they look.

Molecules are very tiny and cannot be studied with ordinary light microscopes. This year’s Laureates developed methods that enable us to use another kind of microscope – the electron microscope – to study biomolecules. Electron microscopes have been used before to find out how molecules look, but they did not work very well when researchers wanted to study the important protein molecules in the body. The images either turned out to be unclear or the molecules burned up or dried out in the electron beam, destroying them.

The 2017 Laureates in Chemistry found ways of freezing the molecules in a liquid that allowed them to keep their shape. The Laureates also worked out how to use a weaker electron beam and instead take many two-dimensional images that can then be processed and merged into a sharp, detailed three-dimensional image by employing smart computer programmes created by one of the Laureates. These methods are now being used by many researchers around the world. Once we know what important biomolecules look like, we will be able to understand why they sometimes do not function as they should and we can develop new medicines.

## Discussion questions



Below are a few questions about the Chemistry Prize and the Laureates. Think about them by yourself or discuss them in groups, as your teacher suggests.

### 1. What phenomena did the Laureates study?

Chemists study the composition, structure and properties of materials and how different materials change as a result of chemical reactions.

- Why do you think the 2017 Laureates studied these particular phenomena?

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### 2. What did the Laureates do?

Imagine that you are asked to explain the work of the 2017 Laureates to someone aged around 13.

- What did the Laureates do?
- What was new about it, and what were the results?

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### 3. Conferring the greatest benefit to mankind

According to Alfred Nobel's will, the Chemistry Prize should go to the person(s) "who shall have made the most important chemical discovery or improvement".

- What can this new knowledge lead to?
- Do you think it is something that will benefit you?
- Can it help other people in some way?

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