BBC LEARNING ENGLISH

6 Minute English
The Manhattan Project

This is not a word-for-word transcript

Sam
Hello. This is 6 Minute English from BBC Learning English. I'm Sam.

Rob
And I'm Rob.

Sam
On August the sixth 1945, the US aircraft, Enola Gay, dropped an atomic bomb on the city of Hiroshima, instantly killing 70,000 people. When Japan refused to surrender, a second bomb was dropped on Nagasaki three days later. Many believe the bombings quickened the end of the Second World War. But it came at a terrible human cost, which some have called a crime against humanity.

Rob
The invention of the atomic bomb, which resulted from the cooperation between the US military and some of the world's leading scientific minds, was known as The Manhattan Project. In this programme we'll take a look into the science and the politics of The Manhattan Project, and as usual, we'll learn some new vocabulary as well.

Sam
Even before World War Two, scientists had known about the potential energy inside uranium, the heaviest metal in **the periodic table** – a diagram which groups the chemical elements into rows and columns according to their atomic number and symbol. The challenge for science was learning how to unleash this potential energy in a controlled way. We'll hear more soon, but first I have a question for you, Rob. I mentioned that uranium is the heaviest element in the periodic table, but which is the lightest?

a) hydrogen
b) carbon
c) oxygen

Rob
Well, oxygen is a gas, so it must pretty light. I'll say c) oxygen.

Sam
OK, Rob, we'll find out the answer later in the programme. First, let's find out a bit more about the science of uranium from Frank Close, an Oxford professor of theoretical physics, in conversation with BBC Radio 4 programme, In Our Time.

Prof Frank Close
In 1938 the discovery was made that if you use uranium, the atoms of uranium, which are the heaviest that occur naturally in **the periodic table**, they're very **fragile**… and the discovery was that if you just almost touched them with a single neutron, that's a nuclear particle, the uranium was like a drop of water, it would just break apart, **split** in two… and this action of splitting the uranium has become known as **fission.**

Rob
Atoms of uranium are very **fragile** – easily broken or damaged. In 1938, it was discovered that when nuclear particles called neutrons were fired at uranium atoms, they would **split**, or break in two.

Sam
This process of splitting uranium, or fission, did two things. First, it released huge amounts of energy, a billion times more than would be released in a normal chemical reaction.

Rob
Secondly, the act of splitting atoms released two more neutrons. These new neutrons were freed to hit more uranium, creating four neutrons, which in turn were freed and created eight, then sixteen and so on, making what's known as a chemical chain reaction.

Sam
In everyday English, a **chain reaction** is a series of events where each event becomes the cause of the next.

Rob
The politics behind the development of the atomic bomb was no less complex than the science. In the same year that Hitler invaded Poland, two Jewish scientists exiled from Nazi Germany - Rudolf Peierls, and Otto Frish - first realised uranium's power as a weapon of war. Listen as Professor Frank Close takes up the story for BBC Radio 4 programme, In Our Time:

Prof Frank Close
Having had the idea and the shock of the discovery, you immediately then think, 'maybe scientists in Germany have already had the same idea and come to the same conclusions – could Hitler already be building such a weapon?' And in their **memorandum** which they wrote and reached the British government they said it's **conceivable** that Germany is in fact developing this weapon, and the only defence against it is to have one yourself.

Sam
After their discovery, Peierls and Frish were worried that the Nazis had already found out how to weaponize uranium. It was **conceivable**, or believable, that Germany was building an atomic bomb.

Rob
They shared this terrifying thought in their famous **memorandum** – a short written report on a specific topic. As soon as US President Franklin Roosevelt read it, he started the Manhattan Project, and the race to build an atomic bomb began.

Sam
In a strange twist of history, it turned out that Hitler hadn't been building atomic bombs at all. And Hiroshima, the Japanese city destroyed in 1945, was rebuilt and stands as a symbol of peace today.

Rob
Let's end on a lighter note, Sam, with your question.

Sam
Yes, I asked which is the lightest element in the periodic table. It's A, hydrogen, the lightest of all gases which come at the very start of the periodic table, having the atomic number 1.

Rob
Ah, if only I'd remembered what our chemistry teacher taught us about **the periodic table** – a chart grouping all the chemical elements according to their atomic number.

Sam
Let's recap the rest of the vocabulary too. If something is **fragile** it's easily broken.

Rob
To **split** something means to break it into two parts.

Sam
A **chain reaction** happens when one event becomes the cause of the next.

Rob
A **memorandum** is a short, written report on a specific topic.

Sam
And finally, the adjective **conceivable** means believable. That brings us to the end of our programme! We hope you'll join us again soon for more interesting issues and useful vocabulary. Bye for now!

Rob
Bye!

Vocabulary

the periodic table
chart grouping all the chemical elements according to their atomic number and symbol

fragile
easily broken or damaged

split
break into two parts

chain reaction
series of connected events, where each event becomes the cause of the next

memorandum
short, written report on a specific issue or topic

conceivable
possible to believe