



AUTHOR: Dr Keith Suter
Global Thought Leader
Real Insights & Authority



THE INVENTION OF MODERN GAS WARFARE

The man who invented gas warfare went on to win the Nobel Prize for Chemistry.

Dr Fritz Haber was a tragic genius. His various inventions both saved life and took it. He is now largely forgotten.

Haber was a German scientist and he saw gas warfare as a way of helping the German side in World War I.

He originally made some of his name with the development of fabric dyes before the war. He realized during the war that the toxic side effects of the fabric dyeing could become a weapon to help the German cause.

His invention was first used on April 22 1915 against French and Algerian troops in Belgium. The green chlorine gas rolled over the Allied frontline and created panic.

The chlorine burnt the lungs and the Allied soldiers died slowly. Two days later, the gas was used against the Canadian lines with similar results. Allied casualties in the two days of gas attacks were estimated at 5,000 dead, with 10,000 more disabled, half of them permanently.

But Haber was not happy. The German high command had not believed that the gas attacks could be so effective and so they did not make the most of their opportunity to storm the Allied frontlines. Indeed, they were reluctant to use gas at all.

When World War I began in August 1914, both sides expected a quick victory.

It was only when the Western front had become bogged down in a stalemate, running from the North Sea to the Mediterranean that the German High Command listened to Haber's suggestion about gas warfare. The two front lines were so close that it was often risky to fire shells, in case they fell short and landed on one's own line.

Haber thought that gas warfare could end the stalemate. If the German high command had listened fully to his strategic advice, then the war could have had a very different outcome.

The Germans could have mobilized all their western front forces for a "blitz"-type run across the Allied lines and on to the English Channel. They could have done far more to exploit the shock value of gas warfare. The war could have ended while the Gallipoli campaign was hardly

underway. Instead, the German high command did not have enough troops ready to follow up the gas offensive, and those that they did have, did not have enough gas masks. A supreme German advantage had been squandered by the conservative high command.

Meanwhile, the Allies soon developed their own gas weapons and so the stalemate became even more deadly. Many thousands of people continued to suffer from the effects of the gassing for the rest of their lives. They may have survived the war alive but they often did not have a life worth living.

One of Haber's victims was a British soldier named Fred Cayley. He was gassed in 1917. He had poor health for the rest of his life and he had to visit a doctor every week until his death in 1981. The coroner recorded that Cayley had been "killed by the King's enemies". This is the statement that would have appeared on his death certificate if he had been killed outright 64 years earlier. As far as the coroner was concerned, Cayley was good as dead back in 1917 – it was simply that he did not get buried until 1981.

Dr Fritz Haber was born in Breslau, Germany in December 1868 into a wealthy family. He was a brilliant pioneer in the Germany chemical industry.

In the first decade of last century, the rapidly increasing demand for nitrogen fertilizer greatly exceeded the supply (most of which then came from sea bird droppings in Chile). Germany was Chile's biggest customer, with the United States as the second largest.

Haber helped invent ways of making fertilizer. Indeed, this artificial fertilizer may have been an even greater contribution to the German war effort than the chemical weapons because he helped Germany become more self-sufficient in agriculture. His invention has gone around the world and many millions of people have been able to feed themselves because of his brilliance.

Around 1908 he discovered a way to tap into the atmosphere's vast reservoir of nitrogen gas and convert it into compounds that plants can use. The innovation, called the Haber-Bosch process, produces liquid ammonia. This is the raw material for making nitrogen fertilizer. About two billion people around the world now depend on this process to help grow the food they eat.

He also helped Germany overtake Britain in engineering. He was able to build bridges between the worlds of science and finance. He claimed that the British financiers lacked an interest in science and how it could be mobilized to improve production. He encouraged German financiers and scientists to see how each could help the other.

Were it not for his invention of gas warfare, he would have a far higher greater public standing today.

Dr Fritz Haber was born in Breslau, Germany in December 1868 into a wealthy family. He was a brilliant pioneer in the Germany chemical industry.

In the first decade of last century, the rapidly increasing demand for nitrogen fertilizer greatly exceeded the supply (most of which then came from sea bird droppings in Chile). Germany was Chile's biggest customer, with the United States as the second largest.

Haber helped invent ways of making fertilizer. Indeed, this artificial fertilizer may have been an even greater contribution to the German war effort than the chemical weapons because he helped Germany become more self-sufficient in agriculture. His invention has gone around the world and many millions of people have been able to feed themselves because of his brilliance.

Around 1908 he discovered a way to tap into the atmosphere's vast reservoir of nitrogen gas and convert it into compounds that plants can use. The innovation, called the Haber-Bosch process, produces liquid ammonia. This is the raw material for making nitrogen fertilizer. About two billion people around the world now depend on this process to help grow the food they eat.

He also helped Germany overtake Britain in engineering. He was able to build bridges between the worlds of science and finance. He claimed that the British financiers lacked an interest in science and how it could be mobilized to improve production. He encouraged German financiers and scientists to see how each could help the other. Were it not for his invention of gas warfare, he would have a far higher greater public standing today.

Haber was a very patriotic German and so when the war began he looked for ways to assist the military effort. His first major critic was his childhood sweetheart and wife Clara. She was a talented chemist herself who had a doctorate.

She was appalled at the use of science to kill people. A few days after the first use of gas, she used his army pistol to commit suicide.

This did not deter Haber. He went off to supervise the use of gas warfare on the Eastern front and he left others to handle her funeral arrangements.

When the war ended in 1918, Heber donned a disguise and fled temporarily into Switzerland. The use of gas warfare had been so controversial that he was afraid that he would be tried by the Allies as a war criminal. About 1.3 million people had been wounded by gas, with 91,000 being killed.

If the war had gone on longer, then the casualties would have been even higher because new chemical weapons were about to come into service. The United States had only entered the war in 1917 but it was already assembling the world's largest ever scientific team to develop additional chemical weapons.

There is a continuing debate about how effective was the use of gas warfare. It certainly inflicted great suffering. But the changes in wind direction made it an unpredictable weapon. Additionally, to follow up the successful use of gas required one's own troops to then run through the gas to chase the retreating enemy and they were reluctant to do so (at the very least, it was difficult to charge forward wearing gas masks.)

Haber retained his interest in gas warfare. When Germany surrendered in 1918, it was forbidden from maintaining its military forces. Hitler formally ended that ban when he came to office in 1933 and got the country ready for another world war.

But Haber was among those dishonest Germans who never really stopped preparing for a war. He used the cover of "pest control" as a way of continuing his own research into gas warfare.

Haber therefore pioneered two eras of gas warfare. The first era consisted of chemicals that choked people to death in World War I. This gas warfare was based on chlorine. It stripped the lining of the bronchial tubes and lungs, which caused inflammation, which in turn produced excessive fluid that blocked the lungs. Effectively each victim drowned.

The next wave – nerve gas – came from the insecticide business. Flies and mosquitos are killed by sprays that attack the nervous system. Haber and his colleagues took their expertise into developing – but thankfully not using – nerve gas weapons in the late 1930s.

Haber never went on trial after World War I as a war criminal. Instead, the Nobel Prize committee thought Haber's pre-war work, especially on artificial fertilizer, was so important that he was awarded prize for chemistry in 1919.

This was a controversial decision because of his wartime work. But Haber was not worried. He said that gas warfare was a "higher form of killing" because it took a soldier out of the battle but it did not necessarily kill him. Therefore, the gas could end a person's role in war but still give him the opportunity to live in peacetime afterwards.

After the war, Haber's research institute in Berlin became the world's leading centre of research in physical chemistry, mainly for the benefit of civilian science. It attracted a staff from around the world.

Haber also enjoyed international prestige, with foreign visits explaining how the worlds of science and finance could work together for mutual gain. He received many honours and awards in Germany and elsewhere.

He remained a patriotic German. After the war, Germany was obliged to pay "reparations" to the victorious Allies to help defray the cost of their having to go war to defend themselves against German aggression.

One of Haber's projects in the 1920s was to try to extract gold from seawater. There is some gold content in seawater but not much - and he was not able to process enough of it to help repay German's foreign debts.

Haber's life ended tragically. Haber had been Jewish but later converted to Christianity. When Hitler came to power in 1933, all the Jewish staff at Haber's research institute had to be sacked. Haber decided to leave Germany as well. He was offered a position at Cambridge University.

He did not stay long in England because ill health (due to heart problems) and the climate depressed him. He died in Switzerland in 1934, in his 66th year.

His death was hardly publicized in Germany. He himself is now hardly known – even though his life story has some "lessons" for the perils of scientists who put their genius to the service of the state.

Meanwhile, gas warfare has continued to have a chequered career in wars. Both sides made preparations for its use in World War II but it was not used.

Saddam Hussein used it in 1988 on the Kurds – the largest use of gas warfare since World War I. This massacre will be one of the charges brought against him when he stands trial as a war criminal later this year.

In 1995, a Japanese terrorist group used sarin gas for its attacks on the Tokyo passenger train system.

It is encouraging to note that Australia has been in the forefront of trying to restrict the sale of potential materials and equipment for chemical and biological warfare. Exactly 20 years ago this year, the “Australia Group” was formed.

Australian scientist Dr Peter Dunn was part of the UN investigation into Iraq’s use of chemical warfare in the Iran-Iraq war, one of last century’s longest-running conventional wars. Iraq’s acquisition of the weapons posed the question of how to prevent Iraq (and other countries) from acquiring materials for the production of chemical weapons through otherwise legitimate commercial trade.

Australian diplomats noted that some countries were individually creating export controls over materials that could be used for chemical or biological weapons - or else could be used for legitimate civilian purposes. For example, sodium cyanide is widely used for processing gold but it could also be used for making the nerve gas tabun.

The “Australia Group” is a low-key, hardly publicised international initiative to pool information on export controls and to share experiences. It has now 38 member-countries and the European Commission.

It normally meets in Western Europe. But in April year – coincidentally very close to the 90th anniversary of the first use of modern gas warfare - it held its first meeting in Australia to mark the 20th anniversary of the Group.

It is unusual in that it has no international law treaty underpinning its work. It has no secretariat. It is simply an informal get together to restrict the spread of chemical and biological weapons.

It is also unusual in that one country (Australia) is the permanent chair and so there is no fuss over elections. The specialists are there to do a job and not get involved in politicking. They are making the world a little safer.

Keith Suter