

HABER AND THE MORALITY OF SCIENCE

The 1919 Nobel Prize for Chemistry is the only Nobel Prize in science that was ever openly contested. Why did the awarding of this prize to the German chemist, Fritz Haber, create such an uproar? Haber's process for the production of synthetic ammonia definitely increased fertilizer production and hence the ability of agriculture to feed the world's population. Surely this was enough of a scientific and humanitarian achievement to deserve a Nobel Prize. The protest was not that Haber was undeserving of the prize for his scientific accomplishments, but that other research had, both intentionally and unintentionally, led to a mass destruction of people. The double irony here is that Alfred Nobel, the Swedish millionaire who endowed these prestigious prizes, made his fortune from the development of dynamite, an explosive that is also used in other beneficial ways.

The world's first synthetic ammonia plant was established in Germany in 1913. In 1914 World War I broke out. Germany's supply of nitrates from Chile were cut off by a British naval blockade. However, the synthetic ammonia plants were able to supply raw material not only for fertilizers but also for production of ammunition and explosives. Nitrogen fixation quickly became a vital factor in the waging of war.

But it was not really this use for Haber's process that caused his scientific colleagues to protest his Nobel Prize. At the outbreak of the war, Haber, now the director of the Kaiser Wilhelm Institute for Physical Chemistry and Electrochemistry, worked on a variety of military problems. Foremost in his research was the development of gas warfare. By the end of January 1915, preliminary studies were complete and in April 1915, 5000 cylinders of the yellowish-green chlorine gas were released over a six kilometre front near Ypres, Belgium. Five thousand men were killed and another ten thousand suffered devastating effects from chlorine exposure. A new era in the horror of war had begun. This initial attempt at gas warfare was, in Haber's opinion, too conservative. If the military had taken his advice they would have conducted a large scale attack rather than the experimental attack at Ypres.

Under Haber's leadership a number of new substances including mustard gas, $(\text{ClCH}_2\text{CH}_2)_2\text{S}$, and phosgene, COCl_2 , were also tested and used. Ultimately, gas warfare was not the deciding factor in the outcome of World War I. Of the 20 million casualties only 5% are attributed to gas. But even 50 years later, survivors of gas warfare still had the appalling symptoms of exposure to these chemicals. In the eyes of many scientists, Haber's part in the development of these early chemical weapons could not be cancelled by his earlier great innovation that had done so much to advance world agriculture. They considered a Nobel Prize under these circumstances as a travesty and the resulting outcry deeply affected Haber, who saw little difference between conventional and gas warfare.

After the war, Haber devoted himself to the extraction of gold from sea water, a project based on the assumption that each tonne of sea water contained 10 mg of gold. The assumption was erroneous. There is less than one tenth that amount of gold in sea water, and Haber's process proved uneconomic.

In 1933 Haber was told by the Nazi government to dismiss all Jewish workers on his staff at the Kaiser Wilhelm Institute. With little regard to his own personal safety, Haber left the Institute, writing in his letter of resignation that "...for more than forty years I have selected my collaborators on the basis of their intelligence and their character and not on the basis of their grandmothers, and I am not willing for the rest of my life to change this method which I have found so good."

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