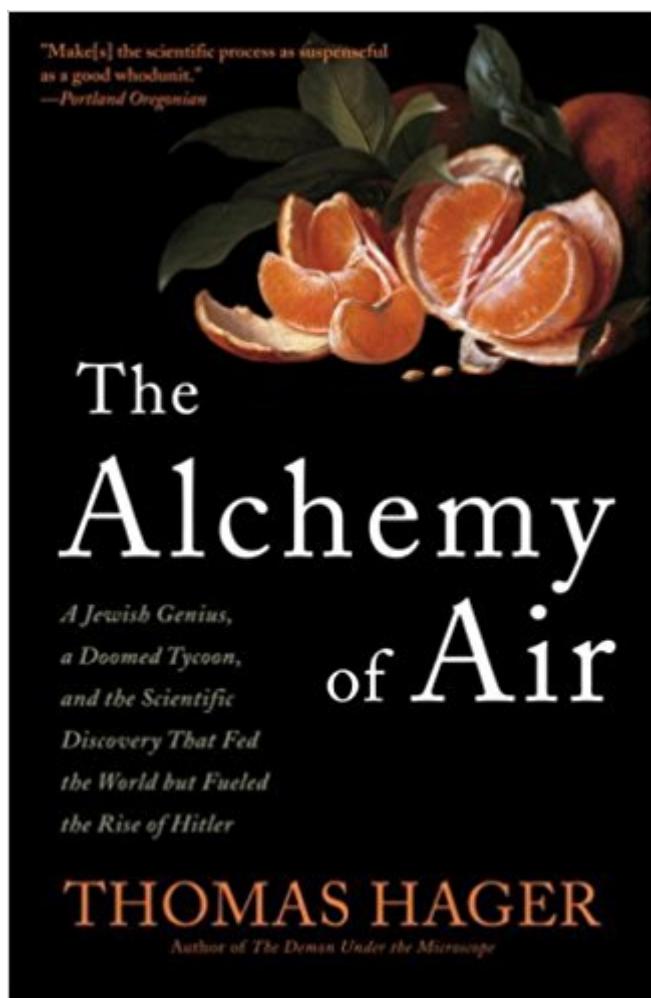


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The Alchemy Of Air: A Jewish Genius, A Doomed Tycoon, And The Scientific Discovery That Fed The World But Fueled The Rise Of Hitler



Synopsis

A sweeping history of tragic genius, cutting-edge science, and the Haber-Bosch discovery that changed billions of lives--including your own. At the dawn of the twentieth century, humanity was facing global disaster: Mass starvation was about to become a reality. A call went out to the world's scientists to find a solution. This is the story of the two men who found it: brilliant, self-important Fritz Haber and reclusive, alcoholic Carl Bosch. Together they discovered a way to make bread out of air, built city-sized factories, and saved millions of lives. But their epochal triumph came at a price we are still paying. The Haber-Bosch process was also used to make the gunpowder and explosives that killed millions during the two world wars. Both men were vilified during their lives; both, disillusioned and disgraced, died tragically. The Alchemy of Air is the extraordinary, previously untold story of a discovery that changed the way we grow food and the way we make war and that promises to continue shaping our lives in fundamental and dramatic ways.

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Customer Reviews

Fixed nitrogen (which is immediately usable to plants) is essential in agriculture. Its rarity, as science writer Hager (The Demon Under the Microscope) shows, dramatically shaped the world and its politics. But by 1905, as Hager details, German chemist Fritz Haber discovered a process for transforming abundant air-borne nitrogen into ammonia, and Carl Bosch's ingenious engineering scaled Haber's benchtop chemistry into industrial processes to make fertilizer. But Hager's story is

not only one of triumph, of how Haber and Bosch invented a way to turn air into bread, earning a Nobel Prize and saving millions from starvation. This is also a story of irony and tragedy. First, life-saving nitrogen is also the main ingredient in explosives, and Hager cogently summarizes the Haber-Bosch process's critical role in both world wars. In addition, Hager illustrates Haber's extreme German patriotism and desperate wish to assimilate; shattered by the rise of Hitler, he became an outcast, abandoned even by his onetime colleague Bosch. It's unfortunate that Hager ends his fine book with only a brief look at the deleterious role of nitrogen on the environment. (Sept.) Copyright © Reed Business Information, a division of Reed Elsevier Inc. All rights reserved. --This text refers to an out of print or unavailable edition of this title.

Named one of the Best Books of 2008 by Kirkus Reviews "Make[s] the scientific process as suspenseful as a good whodunit." •Oregonian "[A] smooth, well-researched book that reads like a fast-paced novel." •News & Observer (Raleigh) "This scientific adventure spans two world wars and every cell in your body." •Discover magazine "Haber and Bosch are fascinating if troubled personalities, brought by Hager compellingly to life." •Washington Post Book World "[A] gripping account of the partnership between two Nobel Prize winners whose efforts to save the world had tragic consequences we're still sifting through today." •Plenty magazine "You will certainly find [Hager's] story of [Fritz Haber and Carl Bosch] and their discovery to be enlightening and entertaining." I know of few other books that provide the general reader with a better portrait of chemistry as the most useful of sciences, and I intend to recommend it to scientists and non-scientists alike. •The Journal of Chemical Education "Many discoveries and inventions are touted as history-changing. But as Thomas Hager admirably proves in his new book, *The Alchemy of Air*, Fritz Haber and Carl Bosch not only changed history, they made much of recent human history possible. As Hager solemnly notes in his introduction, 'the discovery described in this book is keeping alive nearly half the people on earth.' As with almost all technological advancement, however, there is a downside. The synthetic Haber-Bosch nitrogen, which now makes up about half the nitrogen in every human body, also fueled the weapons of the world wars and created a nitrogen-rich environment that is having a huge impact on Earth, from lush vegetative growth to dead zones in the oceans. Thanks to two visionary and troubled scientists, we are all now, in Hager's words, 'creatures of the air,' dependent for our very existence on a process whose consequences we don't completely understand." •BookPage "A fast-paced account of the early-20th-century quest to develop synthetic

fertilizer. Today hundreds of factories convert atmospheric nitrogen to ammonia in order to manufacture the artificial fertilizers that make modern-day agricultural yields possible. They are based on the technological advance known as the Haber-Bosch process, developed prior to World War I by the German chemists and Nobel laureates Fritz Haber (1868–1934) and Carl Bosch (1874–1940). Hager (*The Demon Under the Microscope: From Battlefield Hospitals to Nazi Labs, One Doctor's Heroic Search for the World's First Miracle Drug*, 2006, etc.) offers a superb narrative of these brilliant men and their scientific discovery. Around the turn of the century, the world faced a shortage of the fixed nitrogen needed to provide food for a growing population. Hager sets the stage by describing the world's reliance in the 19th century on nitrates from Peru and Chile that could be used as natural fertilizer or to make gunpowder, and finds plenty of human drama in the battles to control the lucrative international trade. Determined to help end Germany's dependence on South American nitrates, Bosch and Haber worked at the German chemical company BASF to find a way to convert nitrogen into ammonia. Bosch developed the process, and Haber designed bigger industrial plants. By 1944, the Haber-Bosch factory at Leuna—a primary target for U.S. bombers—occupied three square miles and employed 35,000 workers. The author not only illuminates the scientists' complex work, but also digs into their personal lives. Bosch, a melancholic with a huge villa in Heidelberg, asked Hitler to spare Jewish scientists for the sake of German chemistry and physics (the Fuhrer replied: "Then we'll just have to work 100 years without physics and chemistry!"). Haber, a Jew, developed the chlorine gas used in World War I, sought a way to extract gold from the oceans to pay off German war reparations and conducted research that led to the development of the Zyklon B gas used in Nazi death camps. Science writing of the first order.

—Kirkus Reviews, starred review

This was a very good read - 4.5 stars. Author Thomas Hager is engaging, clear, and he held my interest. The subjects - renowned German chemists (and Nobel laureates) Fritz Haber and Carl Bosch developed what could be argued as the most important chemical process in human history - Nitrogen Fixation via the Haber-Bosch process. Nitrogen fixation - creating ammonia essentially from air (nitrogen and hydrogen) allowed for the production of both fertilizer and high explosives. World-wide fertilizer distribution in turn created the green revolution and has allowed the world's population to explode from less than 2 to over 6 billion (and growing), with the average person going from a marginal existence to an "over-eater". It has also contributed to nitrogen pollution of world-wide waters, ecological destruction, and climate change. High explosives greatly helped

create the horrors of both World Wars and countless smaller conflicts, killing many, many millions. It is close to impossible to overstate the importance of this discovery. As the author details, Haber and Bosch were fascinating, driven, and complicated men. They lived in a time of great upheaval. And they came to understand much of the bad, as well as great significance of their work. My one concern about the book is the range of subjects touched upon and consequent short discussion of a lot of it. Author Thomas Hager had enough important topics and material to write perhaps half a dozen good books. More detail could have been used on the chemistry involved, the moral dilemmas, the Jewish-Nazi interaction (Haber was Jewish), Bosch's synfuel development, and other topics. Despite this minor qualm, I recommend this book as one from which a lot will be learned.

This was an extremely interesting story and well worth the read; I learned a great deal about the dramatic influence that science and industrialization had on geopolitics during the 20th century. I have to also mention, however, that the author didn't seem to balance the arc of story very well. The balance between the lives of the principal characters and their scientific context started to unravel about two-thirds the way through the book and the sundry elements the author had researched, along w the chemistry, were kind of jammed in at the end. With a better editor this very good book, with a great story to tell, would be excellent.

This book is excellent and engaging. The author gives us a glimpse into how science, business, and government work together to both greatly benefit and greatly harm humanity and the planet. They book is fascinating on so many levels that is really hard to begin to describe. This is very well-researched, well written, and a book that you will not want to put down. I highly recommend it to any students of History, of Science, and of humanity's often futile and frustrated search to better the world.

This book is a history of the Haber-Bosch process for converting hydrogen and nitrogen gas into nitrates, which is estimated to take 1% of the world's energy. Without its fertilizers, a couple of billion people probably would have starved to death. Without its explosives Germany could not have completed WW1 or carried out WW2. Hager discusses the history of the use of nitrates for explosives and fertilizer - starting with mining of bird droppings and other natural deposits in South America. For a few decades that was satisfactory until the natural supply ran out. Haber won a Nobel prize for developing his process, for artificially creating nitrates from air and lots of energy, a couple of years before his friend Albert Einstein won his. The technical challenges for

breaking the extremely strong bond of atmospheric nitrogen (N₂), to combine it with hydrogen and get ammonia (NH₃) is well described. Later Haber sullied his reputation by implementing poison gas warfare in WW1. Bosch developed the technology and factories to scale up this process on a large scale for which he later won a Nobel prize. The scale was immense, costing more than the American Manhattan Project. The fate of both men and their industry under Hitler makes a compelling read. The scientist (Haber) was Jewish and in wanting to be a good German sold his soul to the devil - the tycoon was forced to work under the Nazis for whom he had contempt. Their effect on history was immense for both good and evil.

remarkably in-depth descriptions of several people involved in the explosion (pun intended) of physical chemistry and chemical engineering in Germany starting in the mid-19th Century. Surprising to learn also about the economics of fertilizers and the trade wars (and worse) they prompted in that period. The author tends to repeat himself and his themes, sometimes in the service of clear education-- but there is the impression with the sudden, rapid ending of the book that it was rushed to finish. The stories of these men and women, and some of their children, are sad, despite- and clearly because of-- the phenomenal achievements in science and industry they represent. Anyone interested in economics, personal histories, the relationships of science to politics and business, should read this book. In addition, it sheds a completely different light on the problem of climate change and what is feeding it.

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