

THE ALCHEMY OF AIR Pdf Free Download

THE ALCHEMY OF AIR. The Alchemy of Air. .



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Thomas Hager
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I recommend reading "Demon" first then this one. I loved this! I was so hooked, the whole story is fascinating, I very much recommend this book. I did find the narrator hard to listen to to begin with, but got use to it. Before listening to this book I knew nothing about how fertilizer is produced and it's huge importance to the whole world. This wonderfully researched history was a revelation. The two main characters Haber and Bosch , a genius and an Industrial tycoon should be much better known. Written as if it were a story and very well narrated. Whole heartedly recommend. What a great book, I've been meaning to read it for over a year now. I wasn't disappointed with the story, an amazing peek into history from a fresh angle that we don't really learn about in any other platform. Adam Verner's voice was really a problem, I am a sound engineer myself so I do understand the studio process, the voice sounds very much robotic, as if it has auto tune running on it!?

Having gone so far as to look at Mr. Verner's website, he is actually a great voice actor, so either the processing on the voice was extremely heavy or Adam just missed the plot on this particular performance. It really made the listening experience less pleasant than it should have been. Having said that, I would still get the book, regardless. The story is really strong enough to deal with the voice. What could have made this a 4 or 5-star listening experience for you? I was convinced at the start that this was the result of automated text-to-speech software, but apparently the narrator is a real human. The intonation and cadence is most strange - I am surprised that a professional 'voice talent' can make a career sounding like a robot. The pronunciation of German names and words quite a few in this book were also very unlike the correct versions - a little homework goes a long way.

Who might you have cast as narrator instead of Adam Verner? A human. The story is fascinating, if a little heavy in detail. I mostly enjoyed the book and have learnt a lot from this well-researched history. Add to Cart failed. Please try again later. Add to Wish List failed. Remove from wishlist failed. Adding to library failed. Please try again. Follow podcast failed. Unfollow podcast failed. Stream or download thousands of included titles. Narrated by: Adam Verner. No default payment method selected. Add payment method. Switch payment method. We are sorry. We are not allowed to sell this product with the selected payment method. Pay using card ending in. Taxes where applicable.

Listeners also enjoyed Reich Narrated by: Robert B. Reich Length: 8 hrs and 19 mins Unabridged Overall. Lewis Length: 7 hrs and 4 mins Unabridged Overall. Publisher's Summary A sweeping history of tragic genius, cutting-edge science, and the discovery that changed billions of lives - including your own. Critic Reviews "This scientific adventure spans two world wars and every cell in your body. Reviews - Please select the tabs below to change the source of reviews. Amazon Reviews. Sort by:. Most Helpful Most Recent. Filter by:. All stars 5 star only 4 star only 3 star only 2 star only 1 star only. Terry A. Gray Great Book Thoroughly Researched This is one of the best audio books I have listened to in a long time, and I listen lots. Fascinating history A small slice of history that is very interesting and informative. Riveting Although only a third of the way through this book I wanted to add my review to the mix since there are currently only 2 reviews.

Donald A shorter title than the book's My favorite niche in audible books seems to be books that examine technical advances and the sociological theatre that surrounds the development. Douglas Another reviewer wrote Mark Surprisingly interesting What a dry subject, nitrogen! Ryan Hager delivers again! MidwestGeek Science, technology, personalities entangled. Calliope Chris Another good one by Thomas Hager I got this after reading Mr. Write a Review. About this book Summary. Book Summary. More about membership! Reviews Media Reviews Reader Reviews. Media Reviews "Not only [a story] of triumph, Reader Reviews Write your own review Bailey. Author Information Biography. More Recommendations More Books. Readers Also Browsed. Find out more. Du Bois explores the Black experience in Beautiful World, Where Are You centers around four key characters, the most prominent of which are In the annals of Nazi crimes, the industrialized killing of human beings didn't begin with the Book Club Discussion.

Molly Caldwell Crosby. Sailing True North. Honor in the Dust. The Knife Man. Broad Band. Claire L. David Oshinsky. The Mercury Martha Ackmann. Sea Power. Enemy of All Mankind. Steven Johnson. Scott Kelly. The Ice at the End of the World. Without Precedent. Joel Richard Paul. Money for Nothing. Thomas Levenson. Names of New York. Joshua Jelly-Schapiro. Here Is Where. Andrew Carroll. The Company. Stephen Bown. Boom Town. Sam Anderson. Mike Massimino. Written Out of History. The Invention of Nature. Praise Named one of the Best Books of by Kirkus Reviews "Make[s] the scientific process as suspenseful as a good whodunit. Related Articles. Looking for More Great Reads?

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Quotations in the margins amplify the lesson being taught. While compelling in the way an auto accident might be, the book is simply nonsense. Rules often contradict each other. To ask why this is so would be a far more useful project. The author's youthfulness helps to assure the inevitable comparison with the Anne

Frank diary although over and above the He was the only one of the family to survive what Francois Maurois, in his introduction, calls the "human holocaust" of the persecution of the Jews, which began with the restrictions, the singularization of the yellow star, the enclosure within the ghetto, and went on to the mass deportations to the ovens of Auschwitz and Buchenwald.

There are unforgettable and horrifying scenes here in this spare and sombre memoir of this experience of the hanging of a child, of his first farewell with his father who leaves him an inheritance of a knife and a spoon, and of his last goodbye at Buchenwald his father's corpse is already cold let alone the long months of survival under unconscionable conditions. Already have an account? Log in. Trouble signing in? Retrieve credentials. Sign Up. A fast-paced account of the earlyth-century quest to develop synthetic fertilizer. Science writing of the first order. Pub Date: Sept. Malthusian doomsayers did some rough math between food and people and predicted we were headed for mass starvation. So, how to get more nitrogen to the crops. Well, there was naturally forming saltpeter. For example, in the mud flats of the Ganges River.

That's why Britain decided it best to take over India. But other countries had the same needs. Which is where birdpoop comes in. There were islands just off the west coast of South America that were covered in bird guano. Soon, mountains of the shit were being unloaded in European ports. Of course, in that great American tradition, islands were claimed that had no guano and were not deserted. Midway Island, Baker, Johnston, Howland and other islands and atolls were all acquired under the Guano Islands Act, which, by the way, is still in effect. Eventually, after a few wars and such, the birdpoop was all gone. Wars were fought here, too - The Nitrate Wars - and is the reason that Bolivia is now land-locked. We breathe it in and out all day. The problem is, the nitrogen in the air is inert and can't be used to fertilize.

It's like being on a boat in the ocean and still unable to get a drink of water. So, taking a deep breath, this

book is about the two men who managed to take the nitrogen from the air and make it usable. And make it usable they did. Fritz Haber was able to turn nitrogen in the air into ammonia. Carl Bosch made it work at the industrial level. The world has plenty of food now thanks to these two men. And it was Bosch who went on to manufacture synthetic gas and rubber, without which Hitler would have been out of business in eight months.

Too, it was Haber, a Jew, whose research into chemical insecticides was further developed by other researchers into a poison gas called Zyklon B. Also covered here, if rather quickly, is the deleterious effect of all that fertilizer on the environment. The true understanding of that remains inchoate. I highly recommend this book. Oh, I put all that acidic stuff around them but the leaves yellowed and browned and soon I was replacing a withered bush. I always had wood chips around the rhododendron beds, mushroom manure around the flower beds. Then I learned that in their first year, wood chips suck the nitrogen right out of the soil. Well, I planted a delphinium in an open spot in the rhododendron bed and it refused to grow. I moved it to the flower bed, away from the wood chips, and it immediately thrived. So, last year I did not put wood chips in the rhododendron beds, using the mushroom manure instead.

And my rhodys are smiling. The nitrate fields in that desert were in parts of Peru, Chile and Bolivia. The richest section was located in Peru, but the Chileans were the better miners. So Peru let the Chileans in and they dominated the population in that area. Eventually, a misguided Peruvian dictator decided to raise taxes on the Chileans, who protested to Chile, which came in and kicked the Peruvian ass. Sound familiar to Hitler's pretext for coming to the aid of put-upon Germans in Czechoslovakia?

I'll let you know how my agricultural experiments go next year. View all 10 comments. Apr 30, Cliff Hostetler rated it really liked it Shelves: history. It's surprising how interesting a book about fertilizer can be. More specifically, this book tells the story of the Haber-Bosch process used to manufacture synthetic nitrogen fertilizer by turning atmospheric nitrogen into a form that can be used by plant life. It's true, from half to one third of the people alive today simply wouldn't be here if it weren't for synthetic fertilizers because there wouldn't be enough food—even if everybody ate low on the food chain.

But there's another side to the Haber-Bosch process. It allowed World War I to last about two years longer than it would have otherwise because it can also be used to make gun powder and explosives. Germany had no access to the raw materials needed to make more explosives without the Haber-Bosch process and without it they simply would have exhausted their supplies. Since Germany had limited access to alternative sources it's hard to imagine how they could have fueled their mechanized army otherwise. This book also contains an interesting human interest story about the chemist Fritz Haber and engineer Carl Bosch as their careers first received international praise and recognition only to die later as broken men. Fritz Haber was awarded the Nobel prize in for development of the chemical process, and Carl Bosch was awarded the Nobel prize in for overcoming the engineering problems posed by the large-scale, continuous-flow, high-pressure technology.

Fritz Haber's story is particularly tragic since he was Jewish. He was an enthusiastic proponent of the use of poison gas during World War I. He found himself to be a man without a country when the Nazis took over. He died a broken man in Switzerland. Carl Bosch was an engineer and business man first and tended to be disrespectful of Nazi politics. He began to drink excessively, his health began to fail, and he lost interest in living. Before he died he confided to his son that he foresaw the destruction of Germany.

There's also an ecological side to this story. View all 7 comments. Nov 07, Max rated it it was amazing Shelves: science. Hager gives us a compelling history of two men we might not be familiar with: Fritz Haber and Carl Bosch. By the end we know these men were very important. Their accomplishments changed the world. In decades mass starvation would prevail as natural fertilizer stocks were exhausted.

Upon their depletion Hager gives us a compelling history of two men we might not be familiar with: Fritz Haber and Carl Bosch. These fertilizers along with improved sanitation and antiseptic medicine were rapidly increasing world population. The population was more urban and eating more meat. Fewer farmers had to produce more. The nitrates were also being used to make explosives. In Germany, Fritz Haber developed a process to make ammonia from air. Ammonia is easily converted into fertilizer or explosives. Ammonia consists of nitrogen and hydrogen. Nitrogen in the air is in a tightly bound molecule N₂ unusable by the human body and many of our important crops. Nitrogen is in every cell in our body. Combining N₂

with hydrogen to make ammonia creates fixed nitrogen, nitrogen our bodies and crops can use. Natural fertilizers are formed by bacteria that fix nitrogen. The successful dye maker BASF had mastered large scale processes and was looking for a new product to ensure its future.

BASF reached a deal with Haber. But it was their young brilliant engineer Carl Bosch who relentlessly solved problem after problem that brought the project to fruition. Pure hydrogen had to be produced cheaply. Containment vessels that could contain high temperatures and pressures twenty times that of a steam locomotive boiler had to be built. Bosch assembled a huge team to develop the new catalyst, super strong containment vessels and myriad new technologies and by could produce tons of ammonia a day.

The Haber-Bosch system was born. In he completed a new factory in Oppau that produced tons per hour and huge profits rolled in. In , WWI began. The envisioned quick German victory soon evaporated. The BASF plant became critical to the German war effort as a source of explosives first and foremost and fertilizer second. But the plant in Oppau was on the west side of the Rhine and on May 27, was targeted by French planes in the first aerial industrial bombing of the war. Though the canvas and wood planes and small bombs were primitive, lucky hits could disable the plant. Bosch, now in charge at BASF, made a lucrative deal with the German government to build a huge plant tucked well inside Germany at Leuna. The new plant would convert the ammonia it produced into nitrate for explosives. It opened in April and by the end of the war was producing , tons per year all of which went to the German military.

The plant was essentially a single integrated machine two miles long and a mile wide. The Leuna plant may well have extended the war for a year. Haber, long divorced from active involvement with BASF, turned militaristic. He had achieved prominence leading the prestigious Kaiser Wilhelm Institute of Physical Chemistry and Electrochemistry. Haber was a Jew who had converted to Christianity for social acceptability and career advancement. Even so in Germany he was still considered a Jew and second class citizen. This may have added to his desire to prove himself a German patriot. He became a science advisor to Kaiser Wilhelm. He immediately began working on poison gas. He took responsibility not only for making it but its initial deployment.

Kaiser Wilhelm gave him the Iron Cross after the first successful use in battle. Now primarily a nitrate company rather than a dye company, its secret processes were eyed by the world. Its Oppau plant was occupied by the French. Bosch agreed to help France build a plant in order to be allowed to operate his business in Germany freely. Soon the British got plans. The Haber-Bosch system secret was out. Bosch also faced labor unrest from trade unionists and leftist groups. However the great German inflation helped. The large debt the company incurred to the German government to build the Leuna plant was quickly repaid. Similarly the favorable exchange rate fed profits from substantial foreign sales. In a few years BASF was humming. After the war Haber was investigated as a war criminal but not prosecuted. He returned to run his chemistry institute with his scientific standing intact.

In Germany he was a hero. Despite misgivings about his poison gas work, in he was awarded the Nobel Prize for his development of synthesizing ammonia. Haber, still the super patriot, continued to help the military and began looking for ways to help Germany pay off its reparations. He subsequently spent years trying to figure out how to extract gold from sea water. Unfortunately all he proved was that prior estimates greatly exaggerated the tiny amount of gold in sea water. Bosch next turned his eyes on synthetic gasoline production. Realizing the rest of the world would soon be competing in the synthetic fertilizer business, Bosch wanted the next big idea. Making gasoline from coal was extremely complicated and expensive, but it was the type of challenge Bosch embraced and he took it on.

The investment required was huge. Bosch also wanted international partners to invest in the project and also to remove the stigma of IG Farben as a German company. But what would prove to be a huge oil strike in Oklahoma had just been made. Soon oil would be much cheaper than synthetic fuel could be manufactured. Then came the stock market crash followed by the depression. But in a new dangerous development took place. Hitler became chancellor. Bosch was concerned, Haber was in shock. Hitler quickly declared Jews could not work in government positions. Thus Haber himself would be included except for his preeminent status. He resigned anyway. Jews, who made up a disproportionately large segment of the German scientific community, began leaving Germany in droves.

This concerned many other German scientists such as Max Planck who approached Hitler and found him

uncompromising. Haber moved to Cambridge. His health was failing and he was distraught over what had become of Germany and his lifetime of trying to be accepted as a true German. He was also remorseful over the outcome of his personal life which included two failed marriages. Chaim Weizmann talked him into moving to Palestine. Sadly he only made it to Switzerland before his heart condition worsened and he died in 1934. Bosch was torn. But he saw reality and he saw that the Nazis were very interested in synthetic fuel and synthetic rubber to boot. While he found the Nazis repugnant Bosch put business ahead of principle. Fearing Bosch would continue to antagonize the Nazis, the IG Farben board kicked Bosch upstairs to a position managing the board but without any operational responsibility. Any remaining Jews or undesirables were ousted or left and IG Farben became one with the Nazi government.

Sidelined, Bosch turned to alcohol and suffered from depression. He died in April 1930. The Leuna plant was the target for 22 massive allied bombing raids in the war. The 18,000 tons of explosive they dropped on it were the equal of the Hiroshima bomb. The plant was heavily fortified and well defended by the Germans. Allied bomber losses were heavy. Albert Speer said after the war that if the plant had been taken out entirely, the war would have ended eight weeks later. The Haber-Bosch process is still vital today. It was the biggest deal the Chinese communist government had made since it began. Chinese starvation and malnutrition receded into the past. Hundreds of huge Haber-Bosch plants around the world are operating. Numerous large pipelines carry their ammonia to market. So endemic is synthetically fixed nitrogen that today half of the nitrogen in our bodies comes from a Haber-Bosch plant. View 2 comments. Jul 10, Catherine Read rated it really liked it.

This was such a fascinating book. I loved the history lesson on how physical chemists in Germany learned to fix nitrogen and supply the world with enough fertilizer to feed the growing masses worldwide. Carl Bosch engineered the process on a large scale to produce ammonia out of air and convert it into fixed nitrogen fertilizer. Between This was such a fascinating book. About The Alchemy of Air A sweeping history of tragic genius, cutting-edge science, and the Haber-Bosch discovery that changed billions of lives—including your own. Also by Thomas Hager. Product Details. Inspired by Your Browsing History. The Demon Under the Microscope. Thomas Hager. Rocket Men. Robert Kurson. Stephen Fried. Empires of the Sky. Alexander Rose. Empires of Light. Dark Tide. Stephen Puleo. Plagues and Peoples. William McNeill. Jay Burreson and Penny Le Couteur. The Wizard of Menlo Park. Randall E. The Great Quake. Henry Fountain. Stephen Hawking. Leonard Mlodinow. The American Plague.

Molly Caldwell Crosby. Sailing True North. Honor in the Dust. The Knife Man. Broad Band. Claire L. David Oshinsky. The Mercury

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Administrator Shah: This book reminds us of the serendipity of scientific inquiry. It's about the invention of fixed nitrogen fertilizer, a single invention that dramatically improved food production and helped support the massive population growth that took place over the last 70 years. When people think about fertilizer, "world changing" may not be the first phrase that comes to mind. But fertilizer has made modern life possible. In retrospect, it's one of the most important technological innovations of the 20th century. How countries apply nitrogen-based fertilizer varies. Where it is overused it can have significant negative consequences for local ecosystems. In some countries, like China, they use almost kilograms of fertilizer per hectare. While in the United States, the number was 60 or 70 kilograms per hectare a few years ago. And then there are the countries that use virtually no fertilizer. In sub-Saharan Africa or dry-land South Asia — where most of the world's poor farmers struggle to produce enough food to feed their families — they use about 8 kilograms per hectare.

Where fertilizer is not used, you see children going to bed hungry every night and an increase in the number of children who are stunted over 30 or 40 years ago. If children don't get adequate nutrition, their brains don't develop; and they can't learn and contribute to society to the extent of their capacity. So the story of the application of fertilizer and the disparities of that application tell the story of both environmental and human consequences.

Get Involved: Use the comments section of this blog post to share your answers, or tweet them to us at fallsemester. Skip to main content. 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. Named one of the Best Books of by Kirkus Reviews "Make[s] the scientific process as suspenseful as a good whodunit. 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. 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 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.

Today hundreds of factories convert atmospheric nitrogen to ammonia in order to manufacture the artificial fertilizers that make modern-day agricultural yields possible. Around the turn of the century, the world faced a shortage of the fixed nitrogen needed to provide food for a growing population. Bosch developed the process, and Haber designed bigger industrial plants. By , the Haber-Bosch factory at Leuna—a primary target for U. 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. Start earning points for buying books! Discover the Must-Read Books of Add to Bookshelf. Read An Excerpt. Aug 18, ISBN Add to Cart. Buy from Other Retailers:. Sep 09, ISBN Paperback —. About The Alchemy of Air A sweeping history of tragic genius, cutting-edge science, and the Haber-Bosch discovery that changed billions of lives—including your own. Also by Thomas Hager. Product Details. Inspired by Your Browsing History. The Demon Under the Microscope. Thomas Hager. Rocket Men. Robert Kurson. Stephen Fried. Empires of the Sky. Alexander Rose. Empires of Light. Dark Tide. Stephen Puleo. Plagues and Peoples. William McNeill. Jay Burreson and Penny Le Couteur.

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