#ref #ret

1 | Lets go.

1.1 | Story of Haber | rough notes

- **Haber invented the Haber-Bosch process, responsible for artificial nitrogen fixation**
- used in fertilizers, incredibly important
  - lack of fixed nitrogen is actually one of the obstacles that origin of life theories hypothesize around
  - N2 makes up around 70% of the air we breath, but is crazy hard to fix into usable nitrogen because of its strong triple bond
- Without the process, a third of the world would be unfed
- Process: $N2 + 3H2 -> 2NH3 \quad \Delta H^\circ = -91.8$ kJ/mol
- *But, Haber was an *evil* guy. *
  - led the German chemical warfare teams in WWI
  - He invented poison gas used in world war one - And, thus, created Haber's rule: $c \times t = k$ - c: concentration, t: time to breath given an effect to produce, k: constant based on the poison itself
    - Also created poisons used in pesticides
    - And created the poison gas the Nazi's used to murder his own relatives
  - Wife committed suicide after a fight with Haber….
- **Caused so much pain and suffering, was an evil person. And yet, is responsible for the life of a third of the human race**
  - how do we think about this? how does morality handle a situation like that?
  - dark, but interesting story, interesting context, interesting science!

1.2 | Part two! (of part one)

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Assignment 1b - Research the context and the science: Research and write
some notes/analysis to help you cement your understanding of

1) the context of the time period, place, and set of people of your moment;

and 2) the science of your story. Make sure you know the details of the arguments
and claims, for this really makes a good history of science story. Some of
them are absurd; some of them seem absurd, and are genius!
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1.2.1 | Context

- **Haber**
  - trained as organic chemist
  - switched to physical chem
    - mainly industrial processes
  - wrote a book, `Experimental Investigations on the Decomposition and Combustion of Hydrocarbons`
  - also wrote: `The Theoretical Basis of Technical Electrochemistry`
  - worked on nitrobenzeins, the hydrogen oxygen fuel cell, and the glass electrode, then wrote `"The Electrolytic Processes of Organic Chemistry`
  - got intrested in thermodynamics, wrote `The Thermodynamics of Technical Gas Reactions`
  - then he worked on nitrogen fixation! got a nobel for it
- **WWI**
  - entirely devoted research and resources to germany during wartime preparation
  - nitrates could be used in explosives
  - pioneered chemical warfare, chlorine gas, ect.
  - became Chief of Germany's Chemical Warfare Service
  - **General**
    - their was a period of high tension before ww1, eventually set off by the assination of franz ferdinand
    - germany was growing rapidly, caused a security dillema
      - everyone has massive armies sitting and building, which in turn caused others to build armies before wartime
    - in germany, their was a sentiment of wanting to be in the spotlight
    - also, general consensus was that war was inevitable when a state grows, but also good for states.
    - during the war, trench warfare made poisan gas incredibly effective

1.2.2 | The actual process

- **Overview**
  - using high pressures and catalysts
  - fixing nitrogen from the air with hydrogen to produce amonia
  - inside container normally made form rthenium or iron
    - temp of >425c, psi > 200
  - converted to fluid ammonia
- **Closer look**
  - N_2 + 3 H_2 $\rightleftharpoons$ 2 NH_3 $\Delta H = -92.28$ kJ ($\Delta H\_298K = -46.14 mathrmkJ/mol$)![$N_2 + 3\ H_2$ $\rightleftharpoons$ 2
  - exothermic, of course
  - equilibrium const: $K_{eq} = \frac{p^2(NH_3)}{p(N_2) \cdot p^3(H_2)}$

1.3 | **First draft.**

idea: yin yang, with infographic

1. yin: Invented the Haber-Bosch Process
   Process of taking nitrogen in the air and ”fixing” it
   $N_2 + 3\ H_2 \quad \rightleftharpoons \quad 2\ NH_3 \qquad \Delta H = -92.28$ kJ $(\Delta H_{298K} = -46.14$ kJ/mol$)$
   This way, it can be used in fertilizers
   Previously, the main source was bat guano, which was treated like gold
   Arguably one of the most important inventions ever
   50% of the worlds food production is reliant on it
   Billions of lives are reliant on it
   Haber won a Nobel Prize for it
2. yang: During WWI, used the same process for explosives
   Led the team pioneering chemical weapons
   Invented chlorine gas, causing horrible horrible deaths and extending the war
   Was thought of as a war criminal
   When he went home, his wife thought he was immoral and they fought
   He ignored her and threw a party. Overnight, she took her own life.
   Their son found his dead mom in the morning, and Haber left him alone and went to work.
   His son later also committed suicide
   Later on, the same chemical weapons he discovered were used by the Nazis
   It was also used to kill many of Haber’s own family members in the gas chambers

1.4 | **Reflection thingy**

My peer reviewer did not leave a significant quantity of actionable constructive criticism. Most of the questions were answered with ”yes.” The feedback that I did act on was giving names to the categories of the text. I also, as suggested, changed the background imagery and the yin yang symbolism. I think thiss feedback was valuable and made the final product better in the end.