

SWMHS VISITS ASHLAND

An Introduction to a Chemical Engineering
Plant

PEOPLE WE MET

- David Bamford – Plant Manager
- Alexander Massie – Production Manager
- Paul Kirkpatrick – Production Engineer



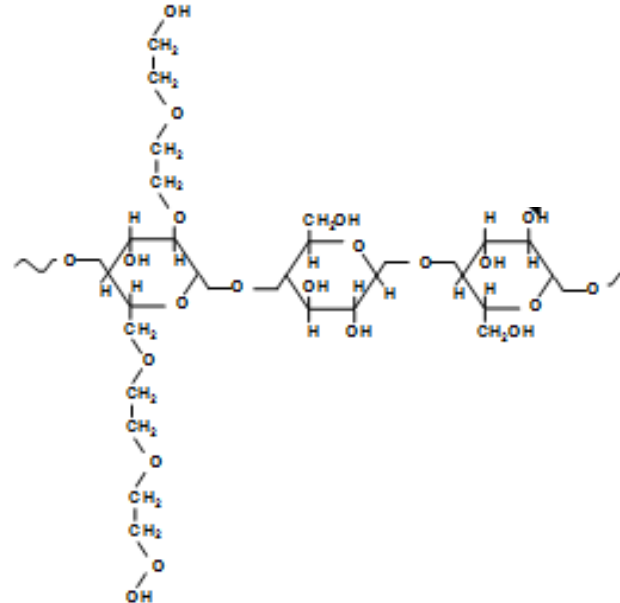
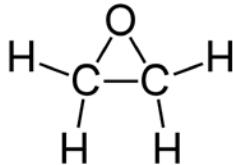
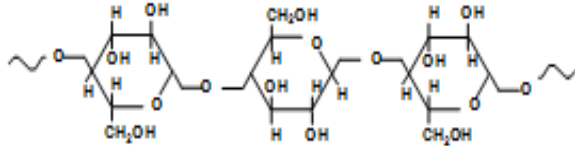
ASHLAND HISTORY

- International Company
- Parlin plant has been in operation since 1914
- Operates 24/7, 365 days a year
- Produces hydroxyethyl cellulose (since 1975)

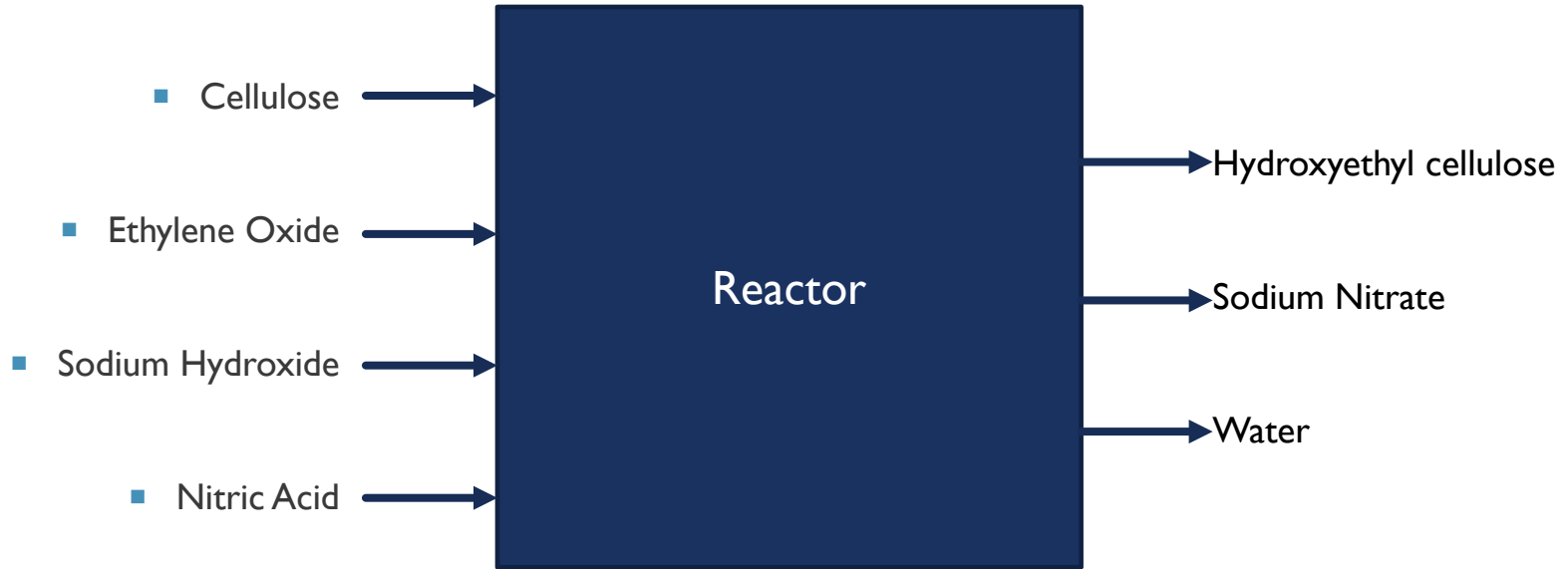


WHAT IS HYDROXYETHYL CELLULOSE?

- Hydroxyethyl Cellulose (HEC) is a paint thickener
 - Keeps paint from splattering/dripping when applied
- Cellulose + Ethylene Oxide = HEC

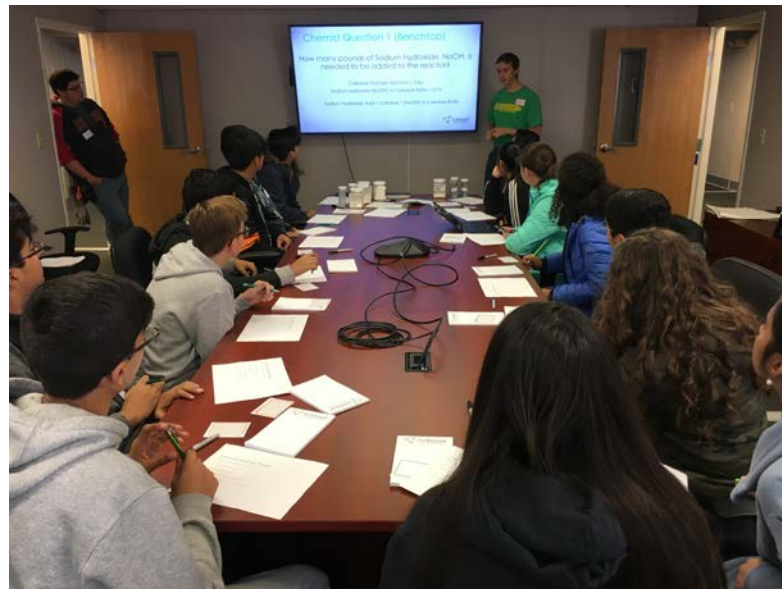


HYDROXYETHYL CELLULOSE REACTION



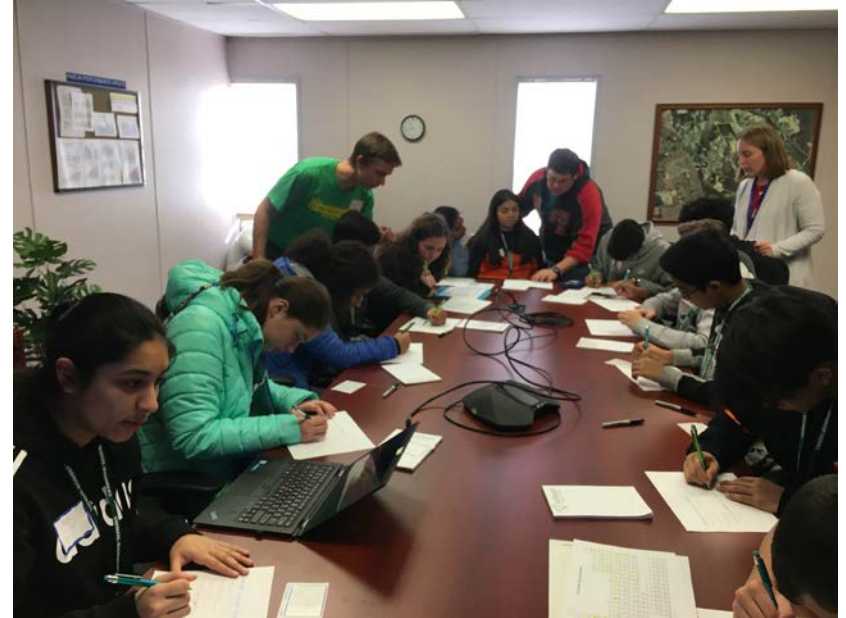
WHAT WE DID – CHEMIST QUESTIONS

- Small Scale Calculations – Applied stoichiometry learned in class
 - Given the cellulose add per reaction (5 lbs), used the NaOH to cellulose ratio to determine the NaOH necessary per reaction
 - Using the neutralization reaction of NaOH and HNO_3 , determined the quantity of HNO_3 necessary per reaction
 - Using the law and the conservation of mass and the known efficiency of ethylene oxide, calculated the quantity of Hydroxyethyl Cellulose (HEC) produced during each reaction



WHAT WE DID – ENGINEER QUESTIONS

- Large Scale Calculations – Thinking like an Engineer
 - Calculations scaled up the actual amount of cellulose added per reactor (5000 lbs)
 - Calculated the actual amount of HEC that can be produced from the plants 3 reactors in a day and a year, given a 10 hour reaction cycle
 - Calculated the amount of profit made by the production of HEC in one year
 - Calculated the additional product and profit that could be made by dropping the reaction time to 9 hours



SITE TOUR

- What we saw
 - Cellulose cutters
 - Reactors
 - Control room
 - Chemistry Lab – sample testing
 - Packaging
- What we didn't see
 - Product washing – most of the plant is dedicated to 'washing' the sample and separating it from the other products



STUDENT SURVEY RESPONSES

- Was this trip what you expected?
 - “No because I did not expect to be doing the same type of work that I had previously been doing in my own chemistry class.”
 - “No, because instead of just taking a simple tour we actually learned about what was going on. We learned how the chemistry we learn in class applies to real world situations which was very surprising. Additionally, we actually learned a lot of information about what was going on in the factory.”
- What did you like best about this trip?
 - “I liked learning about how the chemistry we do in class applies to the real world.”
 - “I enjoyed touring the plant and getting an insight on the different jobs at hand in the chemistry industry.”
- What did you enjoy least about this trip?
 - “What I liked least about the trip is the fact that it was so short. I would've stayed the whole day if I could!”
 - “I disliked the fact that we did not go 'everywhere' in the plant.”
- 97% of students reported the trip increased their interest in chemistry and engineering.
- Students reported that they wanted to learn more about the cleaning process of the HEC and the product testing done in the lab
- “I thoroughly enjoyed the experience. It was really cool to see Chemistry in the real world and helps us as students to look at what we are learning in a different way. “
- “I think that it was a fun learning experience that did not bore me. I would like for thank the team for their time and consideration. Hopefully, we do something like this again in the future. “

THANK YOU!

We would like to thank everyone at Asland, especially Paul and Alex, for an amazing trip!

Thank you to Ms. O'Connor for organizing this trip with Dave at Ashland.

And a special thank you to Dr. Labbe and the Board of Education for approving this great experience!



AshlandTM
always solving