

September Section Meeting: Bio-Derived Isobutanol Production and Uses

Gevo is a leading renewable chemicals and advanced biofuels company. This presentation will discuss Gevo's overall process for converting bio-feedstock to isobutanol with bio-reactions along with the potential uses of isobutanol for creating plastics, gasoline, and jet fuel. Topics to be covered include:

- Advantages of isobutanol versus ethanol in gasoline
- Isobutanol derived Iso-octane & Iso-octene as a gasoline blending component in USA and Europe
- Isobutanol derived Jetfuel
- The Laverne facility
- The South Hampton Resources facility
- Are the feedstocks food or non food (corn stover, MOG)

The kickoff of our AIChE Program year with the Rockies game on Friday, 9/15 was a big hit with 63 total tickets sold!!

- 19 professionals
- 22 students from CSM
- 12 students from CSU
- 9 students from CU

September Section Meeting

Topic: Bio-Derived Isobutanol Production and Uses

Date: Tuesday, September 26

Time: 5:30 – Networking
6:00 – Dinner
6:30 – Presentation
7:15 – Q & A

Location: [Gevo Inc.](#)
[345 Inverness Dr South, Englewood](#)

Gevo's office is located in a business park. After turning off Inverses Drive South, head east to third and last building to find Gevo's office. Meeting will take place in the conference room

Menu: Illegal Pete's or Qdoba

Cost: \$20 Members
(w RSVP) \$25 non-members
\$15 Students / Unemployed

RSVP REQUIRED by Friday, September 22 (early RSVPs are greatly appreciated!) You may RSVP via email at rockyaiche@yahoo.com indicating your name, phone number, and number of attendees and pay at the meeting. Or you may RSVP and pay online using [PayPal on our meeting link](#).

*Add \$5 for attending meeting without RSVP

2017 SCIENCE FAIR NEWS

The 62nd Annual Colorado Science and Engineering Fair has come to an end. Your judges: **Michael Mutnan, Rebecca Spearot, and Doug Brown;** have decided upon the winners after due deliberation of the projects and interviews with the students. Our Section confers upon each winner a certificate, check and invitation to our May meeting.

The winners are¹:

SENIOR HIGH DIVISION

1st Place Prize \$100.00

Project Title: Ferro-Solution? Can Iron Nanoparticles Help with Oil Spill Clean-up?

Individual/Team Leader's Name: Michael Savala

School & City: Monte Vista High School, Monte Vista

Sponsor's Name: Loree' Harvey

Category: Environmental Sciences

Abstract— The goal of this project is to test if iron nanoparticles can help clean up man-made disasters such as oil spills, and compare it to other conventional techniques that have been used in past oil spills. In this project, I simulated an oil spill using 30 mL of vegetable oil placed onto water with aquarium salt added (to simulate sea water), and investigated the following clean-up techniques; absorbent materials such as sawdust and shredded paper, ferro-solution (iron oxide and citric acid to act as a surfactant) and skimming (using a simple teaspoon). Each technique was tested a total of five times and was mixed on a non-heated stir plate for fifteen minutes to simulate movement of the sea and ocean. It was found that sawdust was the most efficient technique performed, removing an average of 24.8 mls. This was followed by skimming (18.4 mls), then ferro-solution (13.8 mls), and finally shredded paper (5.0 mls). I also noticed that the longer the sawdust and ferro-solution stayed in the water the more oil it removed. The shredded paper was the least effective since it would quickly sink and fail to absorb much oil. Even though it was my third-highest oil removal technique, I believe that ferro-solution still has a lot of potential as an oil removal method. I believe that with more time and testing I could get the correct ratio of citric acid volume to oil volume to make the surfactant more effective in binding with both the oil and nanoparticles.

SENIOR HIGH DIVISION

2nd Place Prize \$75.00

Project Title: Going Bananas: Using Banana Peels in Polymerization Reactions to Produce Thermoplastics

Individual/Team Leader's Name: Brendan Gould

School & City: The Classical Academy, Colorado Springs

Sponsor's Name: Linda Cummings

Category: Chemistry & Biochemistry

Abstract— The purpose of this investigation was to determine if banana peels can be used to make polymers that will be commercially functional and environmentally friendly. If the concentration (0.01 molar, 0.05 molar, 0.1 molar) of hydrochloric acid and sodium hydroxide used in a polymerization reaction were varied, than the polymers' tensile strength would increase as the concentration increases, and the elongation to failure would decrease.

This experiment involved making polymers with different concentrations (0.01M, 0.05M, 0.1M) of hydrochloric acid and sodium hydroxide and measuring the tensile strength (psi) and elongation to failure (mm). There was no control used for this experiment. The maximum force held and the cross sectional area of each sample were measured and converted into tensile strength by multiplying them together.

The data collected did not support the original hypothesis. These findings lead to the conclusion that changing the concentration of hydrochloric acid and sodium hydroxide used in a polymerization reaction does not significantly affect the tensile strength and elongation to failure of the polymer produced. There were slight differences in the data, however, when a T – test was performed, random error overlap occurred, meaning that the differing results could be caused by human or procedural error. Therefore, it is reasonable to conclude that changing the concentration of hydrochloric acid and sodium hydroxide used in a polymerization reaction does not significantly affect the tensile strength and elongation to failure of the polymer produced.

JUNIOR HIGH DIVISION

1st Place Prize \$100.00

Project Title: Depuration Kinetics of Activated Carbon With Ion Exchange Resins, Poly Filter Pad, and Freshwater Bivalves in Aqueous Solutions Contaminated with Heavy Metals

Individual/Team Leader's Name: Nathaniel Brim

School & City: The Classical Academy, Colorado Springs

Sponsor's Name: Candus Muir

Category: Environmental Sciences

Abstract— Zinc is an essential heavy metal, but in the environment it is most often linked with cadmium. Toxic levels of zinc and cadmium cause lethargy, cancer, kidney failure and death in fish and invertebrates. Consumer demand for NiCad batteries, solar cells, and plastic products is contributing to an alarming increase in cadmium levels worldwide with up to 13,000 tons of cadmium entering our aquatic ecosystems every year. Ion-exchange and membrane filtration are common methods used to remove heavy metals from effluent but are costly and inefficient. I was curious if mussels would be an organic, cost-effective alternative. Mussels filter 80 gallons/hr, can live for 100 years, and can tolerate high levels of zinc. I decided to test whether mussels, poly-filter pad, or activated carbon with ion-exchange resins would be more effective at removing zinc from contaminated water.

Three of each filtration method were added to tanks with prepared zinc solutions(0.75ppm) leaving a control without filtration. I collected 90 water samples at fixed periods over 72hours. Samples were tested on a GBC932+Atomic-Absorption-Spectrophotometer determining zinc levels at each interval. After three days, results revealed that mussels removed 87% of the zinc, poly filter pad removed 0%, and activated carbon removed 100%. Some areas of Monument Creek contain zinc levels 75% higher than Colorado Department of Health(CDH) Water Quality Standards. This investigation demonstrated that freshwater bivalves and activated carbon could bring zinc levels into compliance to protect our rivers and streams demonstrating the need for further research into these amazing creatures.

JUNIOR HIGH DIVISION

2nd Place Prize \$75.00

Project Title: Plop-Plop Fizz-Fizz: How Does Surface Area and Temperature Affect Chemical Reaction Rates?

Individual/Team Leader's Name: Dustin Medina

School & City: Corwin International Magnet School, Pueblo

Sponsor's Name: Linda Medina

Category: Chemistry & Biochemistry

Abstract— The purpose of my science fair project was to find out how the chemical reactions rates of Alka-Seltzer tablets dissolving in water were affected by surface area and temperature. My hypothesis for this project was if the powdered Alka-Seltzer tablet is added to 30°C water, then the chemical reaction rate will be faster than any other temperature or particle size tested.

The constant variables in my experiment were the amount of water and Alka-Seltzer used, and the size of the glass used. The independent variables were the temperature of the water and the surface area of the Alka-Seltzer tablets. The dependent variable was the time it took for the Alka-Seltzer tablet to dissolve in water.

The results of the experiment were that whole tablets took an average of 26.69-53.9 seconds to dissolve; half tablets took 22.12-49.24 seconds; quarter tablets took 21.56-49.19 seconds, and powdered tablets dissolved in the fastest average times of 10.46-22.94 seconds. The results also showed that when using the powdered tablet with 20°C water, the reaction times were 21.09-24.68 seconds, 30°C water was 13.43-15.34 seconds, and 40°C water was 10.04-10.64 seconds. The results show that my hypothesis should be considered false because although the powdered tablet was proven to have a faster reaction time, the water at 40°C had a faster reaction time than the 30°C water. If I were to do this experiment again, I would like to test different liquids to dissolve the Alka-Seltzer in and compare the reaction time with this experiment's results.

CONGRATULATIONS TO OUR WINNERS AND THANK YOU JUDGES

1 Abstracts copied from CSEF database found at "csef.colostate.edu", Judges hotlink, CSEF Abstract Database

Send your email address to mmoes@ekiconsult.com to receive this newsletter electronically!

AIChE Meetings

- 2017
- Oct 12-13 [9th AIChE Southwest Process Technology Conference](#)
Moody Gardens
Hotel and
Convention Center,
Galveston, TX
- Oct 27-30 [2017 Annual AIChE Student Conference](#)
Minneapolis Hilton
Minneapolis, MN
- Oct 28-29 [2nd Bioengineering & Translational Medicine Conference](#)
Minneapolis, MN
- Oct 29-Nov 3 [2017 AIChE Annual Meeting](#)
Minneapolis, MN
- Dec 4-6 [Int'l Conference on CRISPR Technologies](#)
Raleigh Convention
Center, Raleigh, NC
- Dec 13-15 [Int'l Conference on Epigenetics and Bioengineering](#)
The Palms Hotel and
Spa, Miami, FL

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Rocky Mountain AIChE News is published eight times a year by the Rocky Mountain section of AIChE. Opinions expressed herein are those of the authors and are not necessarily those of AIChE nor the officers of this section.

The objectives of AIChE are to advance chemical engineering in theory and practice, to maintain a high professional standard among its members, and to serve society, particularly where chemical, engineering can contribute to the public interest.

AIChE Rocky Mountain is a public non-profit 501(c)(3) organizations and thus any and all donations are tax deductible.

Rocky Mountain AIChE News Publication Schedule

October 2017 issue

Articles due Wednesday, October 4
Publish on Friday, October 5
Meeting on Tuesday, October 17

MEETING SCHEDULE

The Rocky Mountain District of AIChE generally meets the third Tuesday of every month, September through November and January through May.