

May Section Meeting: Good Ozone, Bad Ozone – What’s the Difference?

If we are trying to protect the ozone layer, why do we have an ozone action day when the ozone levels are high? In this talk, Anna and Hari will discuss how ground-level (bad) ozone is formed, what it means for the Denver metro area to be “nonattainment,” and how this impacts both residents and industry in the area.

Anna Unruh is a senior consultant for Trinity Consultants’ Denver office where she assists clients with their air quality permitting, dispersion modeling, and compliance needs. She has worked with clients in multiple industries including cement manufacturing, aggregate processing, oil and gas, and electric power generation in Colorado, Wyoming, Texas, and Nebraska. Anna received her BS in Chemical Engineering from the University of Kansas in 2012.

Hari Krishna Bharadwaj is a consultant at Trinity Consultants’ Denver office and for the Chemical Sector Services group. Over the last three years, he has worked with clients from a variety of industries including oil and natural gas production/processing/transmission, refineries, and specialty chemical production facilities. Mr. Bharadwaj holds a Bachelor’s degree in Chemical Engineering from Anna University, India and graduated from the University of Cincinnati in 2012 with a M.S. in Chemical Engineering, where his research was on CO₂ capture from coal combustion flue gases.

Volunteer for Rocky Mountain AIChE Program Chair for 2016-2017

Please consider volunteering for an officer position! We are in need of a Program Chair volunteer for the 2016-2017 program year to arrange the eight monthly section meetings, with the help of the other officers, from September through May. Please contact Cindy Fischer at cindy.fischer@Q.com or 303-988-3611 for more information.

May Section Meeting

Topic: Good Ozone, Bad Ozone – What’s the Difference?

Speakers: [Anna Unruh](#) and [Hari Krishna Bharadwaj, Trinity Consultants](#)

Date: Tuesday, May 17

Time: 6:00 Networking
6:30 Dinner
7:15 Introduction of Science Fair Winners
7:30 Presentation

Location: [Denver Police Protective Association Event Center](#)
2105 Decatur St, Denver 80211

Menu: Qdoba Mexican
If you have special dietary needs, please communicate those to AIChE when you RSVP.

Cost: \$20 Members
(w/RSVP)* \$25 Non-members
\$10 Students/Unemployed

Please **RSVP by Friday, May 13** (early RSVPs are greatly appreciated!) You may RSVP via email at rockyaiche@yahoo.com indicating your name, phone number, 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*

2016 STATE SCIENCE FAIR WINNERS

by Michael Mutnan

On April 7, 2016, the following represented the AIChE Rocky Mountain Section as judges for the 61st Annual Colorado Science and Engineering Fair on the Colorado State University, Fort Collins campus.

Michael Mutnan, Rebecca Spearot, Dave Maloney, and Doug Brown. Rebecca and Dave were requested by Science Fair Staff to judge for another group who could not make the event.

The following are the winners for the Junior and Senior Divisions:

Project Title: Capturing Sulfur Dioxide: Chemically or Biologically?

Individual/Team Leader's

Name: Sophie Dellinger

School & City: Summit Charter Middle School, Boulder

Sponsor's Name: Valerie Keeney

Category: Environmental Sciences

Division: Junior

Abstract— Sulfur dioxide (SO_2) is an air pollutant released into the atmosphere from the exhaust of oil refineries and power plants. It is toxic to living organisms and is known to cause acid rain. This project was aimed at testing a biological method (plants) against a chemical method (sodium hydroxide) to capture SO_2 thereby possibly decreasing air pollution without generating unrecyclable chemical waste. Sulfur dioxide gas (15-27 ppm) was generated by mixing hydrochloric acid with sodium sulfite. The SO_2 generating solution was placed in an enclosed terrarium in the presence of a plant or sodium hydroxide pellets. SO_2 levels were measured in air samples taken from the terrarium at given times over the course of 240 minutes and analyzed by a Sensidyne SO_2 colorimetric gas tube detector.

SO_2 loss graph fits a linear function with sodium hydroxide and a logarithmic curve with the plants. The raw data rank the Lavender as the fastest at absorbing SO_2 (23 minutes) followed by the Petunia (37 minutes), the Geranium (65 minutes) and the Succulent (128 minutes). In the presence of the sodium hydroxide pellets,

the SO_2 reached zero at 44 minutes. When taking into account the leaves surface area, the most effective plant remains the Lavender, closely followed by the Petunia, then the Succulent and the Geranium. However, SO_2 absorption is not directly proportional to the surface area of the plant, suggesting a more complex mechanism of absorption.

These experiments show that it is possible to use plants to capture sulfur dioxide. For practical applications, it would be important to determine the plant tolerance to SO_2 over a sustained period of time and the metabolic outcome of the absorbed SO_2 .

Project Title: Desalinization Evaporation

Individual/Team Leader's

Name: Aubrie Lewis

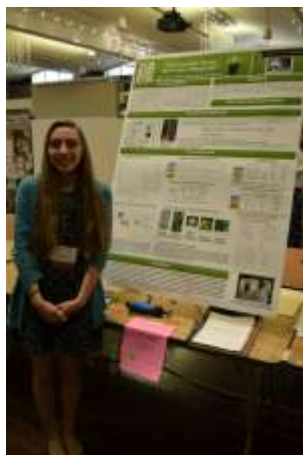
School & City: Olathe Middle School, Olathe

Sponsor's Name: Darcie Lewis

Category: Environmental Sciences

Division: Junior

Abstract— Scientists are always looking for ways to desalinate water for the world's population. Desalinization is important because it is the process of converting salt water into drinkable water. The earth is covered with about 70% total water of that less than 2.5% is freshwater. By 2025 two thirds of the world's population will be out of fresh water. With the abundance of salt water and lack of freshwater this is a very important study for the world's survival. Which method of desalinization is quickest and is more energy efficient? This project looks at two methods of desalinization, pressurized and heat. Starting with the same amount of salt water for each method, time, wattage and salt content were recorded. My hypothesis was that pressurized desalinization would be faster, use less wattage and a better way to desalinate the water than that of heat desalinization. The experimental results showed both methods, pressure and heat to be effective ways of desalinizing salt water while supporting my hypothesis that pressurized desalinization uses less wattage and is quicker than that of heat desalinization.



Project Title: Anaerobic Digestion of Used Coffee Grounds to Generate Electricity

Individual/Team Leader's Name: Sophia Markuson DiPrince

School & City: Central High School, Pueblo

Sponsor's Name: Thomas Murray

Category: Energy

Division: Senior

Abstract— The purpose of this experiment is to determine if the amount of yeast will affect how fermenting coffee grounds produce electricity. To perform this experiment, I made several fuel cell systems to make the power that worked similar to a battery. Each fuel cell included used coffee grounds, water, varying amounts of yeast, and carbon paper. The object was to test which amount of yeast would produce the most electricity. My hypothesis was that more yeast would generate more electricity, but this statement was not supported by the data. In fact, the data demonstrated that yeast is not necessary in the fermentation process of used coffee grounds for the production of electricity. The control with no yeast produced more electricity than some of the other systems that had yeast. But, a small amount of yeast definitely aided the coffee grounds in producing electricity. The system with only ½ teaspoon of yeast was significantly better at electricity production than any of the other systems.



Project Title: Energy Efficient, Applicable Window Coverings

Individual/Team Leader's Name: Lindsay Golding

School & City: Edison High School, Yoder

Sponsor's Name: Angela Golding

Category: Engineering

Division: Senior

Abstract— Each of us has the responsibility to conserve energy in whatever way we can and I attempted to create a vinyl-reflective curtain; translucent from the inside so I could see out without having to pull back the curtain; and would reduce the temperature of a room by 10 to 20 degrees as compared to glass alone or a room darkening curtain. This new application would be an effective and decorative means of keeping any interior



room cooler than with regular curtains.

My improved design kept the room considerably cooler than current curtain options. Compared to a standard room darkening curtain, the vinyl-reflective curtain kept the room up to 18 degrees cooler, and compared to the glass alone it kept the room up to 16 degrees cooler. The sheer curtain/vinyl curtain combination kept the room up to 14 degrees cooler. My prototype met nearly all of the design criteria (I only made an 18 degree and not a 20 degree improvement) and I now have a curtain to maintain cooler temperatures along with providing decoration.

The vinyl reflective curtain is definitely more energy efficient than using either of the other options. The curtain I designed allows UV rays to penetrate and brighten a room, while at the same time reflecting the heat which keeps the room cooler. In the future this window covering can be applied to any real world use such as homes, businesses, and even recreational vehicles, so that people have alternatives to wasting energy through air conditioning.

AICHE Rocky Mountain ASM Judging

by Rebecca Spearot

Rebecca Spearot (BVNA) and David Maloney (CH2M), both Rocky Mountain AICHE members, volunteered to judge for the ASM International Rocky Mountain Chapter at the recent 61st Annual Colorado Science and Engineering Fair.

The criteria set by ASM for the award were as follows:

- materials related project
- creativity or novelty (project wasn't pulled out of a book or off the internet)
- level of effort (students went above the minimum level of work required)
- students understand their project and display a passion or interest in the subject

The Award went to Nathaniel Brim, a 7th grader from The Classical Academy in Colorado Springs. His project "Effects of Zinc and Magnesium Dissolution in Cathodic Protection Systems on the Environment" was well presented, thorough and contained excellent research. Additionally, Nathaniel was eager to explain his research and had ideas for the next phase of his project.

AIChE Meetings

2016

- June 7-9 [2016 Process Development Symposium](#)
Boston, MA
- July 14-15 SPS '16 – Waste Valorization: Using Renewable Co-Products as Feedstocks
Lowell, MA
- July 18-21 2016 Synthetic Biology: Engineering, Evolution & Design (SEED)
Chicago, IL
- Sept 18-22 61st Annual Safety in Ammonia Plants and Related Facilities Symposium
Denver, CO
- Oct 23-26 Int'l Conference on Stem Cell Engineering 2016
Ontario, Canada

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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

September 2016 issue

Articles due Wednesday, September 7
Publish on Friday, September 9
Meeting on Tuesday, September 20

MEETING SCHEDULE

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