

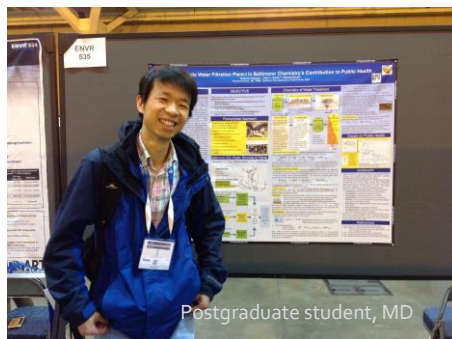


## OUR STORY...

On Sunday March 18<sup>th</sup>, ACS members from around the world arrived at New Orleans for the ACS National Meeting on Food, Energy & Water. I was one of 21 Maryland section members attending this meeting. We presented a poster on treatment and purification of water. The Poster was under the Technical Sessions of the Environmental Division *ENVR: Chemistry of Drinking Water Distribution systems & Infrastructure* (March 21<sup>st</sup>, Hall D at the Ernest N. Memorial Convention Center). The organizers of the session stated that understanding the chemistry of water infrastructure is imperative to the control of water quality and the delivery of reliable water supplies. To this extent the poster we presented included the infrastructure of a well-designed water treatment plant in Baltimore, Maryland. The Montebello Water Filtration Plant-I has been providing high quality, clean drinking water for more than one hundred years. Our poster reflects one of the most

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successful outreach activities of the Maryland section. It is the result of several tours given to high school chemistry students and their teachers on treatment and purification of surface water at local water treatment plants. The title: *Montebello Water Filtration Plant-I in Baltimore: Chemistry's Contribution to Public Health*.



One of the Maryland section goals includes reaching out to the community especially high school students and their teachers to share chemistry knowledge and its applications. We want to make them aware of the processes of water treatment and the chemistry involved in the process; make students conscientious of the importance to maintain water resources clean in the area and their impact on public health, and finally we want their help in communicating the importance of clean drinking water to the community.

**The Maryland local section began celebrating Earth-Day with a tour at the Montebello Water Filtration**

# Successful Activities

Maryland Section 2018

255<sup>th</sup> ACS National Meeting, NOLA

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MARCH 18-22 EVENT

**Plant-I in Baltimore since 2015.** The tour begins with the history of Baltimore in the 1800 a early1900's, the health issues at the time and how the water treatment plant was conceived, developed and finally built in 1915.

The chemistry involved in the process of water purification has applications to several STEM disciplines taught in high school. The tour has impacted students, teachers and administrators favorably. The community has embraced this tour, for the important information, the contribution to society and public health, **but most important, for the opportunity given to students to experience chemistry application in their own city**; an excellent opportunity to learn first-hand about water resources, the chemistry involved in water purification and how it impacts public health. Numerous comments from student state that they were unaware of this plant (although their school or their home is nearby) and what Baltimore city does to provide clean drinking water to its 1.800 million residents.

From these tours the idea of the poster was born and after discussing details of the research with scientists at the national conference we are studying the possibility of drawing high school chemistry lessons from it and expand on the chemistry involved in each step of the water treatment and purification processes.

Baltimore city was affected by deadly diseases in the 1800's and early 1900's. The research, done about the causes of cholera, dysentery, typhoid etc. that killed so many people at the time especially children under the age of five, encountered the solution in clean potable water. As we start explaining the process of disinfecting water from pathogens, microbes and viruses causing disease, it is like going through the first course of inorganic chemistry. The physical processes of separating matter from liquids, the forces that keep molecules together, the chemical elements that will be used to accomplish specific effect such disinfection with chlorine. The quantities required for each step of



the water treatment, etc. It is exciting! Each step of the treatment of water from the rivers until it reaches our homes contains generous doses of chemistry. These steps are:

- 1- **Disinfection** with chlorine (by adding sodium hypochlorite,  $\text{NaClO}$ )
- 2- **Coagulation** to remove pathogens and suspended matter
- 3- **Flocculation** (by adding, Aluminum Sulfate,  $\text{Al}_2(\text{SO}_4)_3$ )
- 4- **Sedimentation** (a physical method in large clarifier tanks)
- 5- **Filtration** (physical method using Rapid Sand Filtration, RSF)
- 6- **Fluoridation** (by adding  $\text{H}_2\text{SiF}_6$  hydrofluorosilicic acid for caries prevention.
- 7- **Post chlorination** to continue disinfection in water as it travels through city metal-conduits,
- 8- **pH adjustment** (by adding lime, calcium oxide,  $\text{CaO}$  to prevent corrosion of pipes).

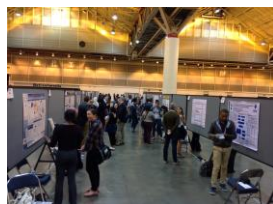
It looks simple at first but if we stop and think of the chemistry involved, the physical processes and what type of test water undergoes in each step of the treatment, we can discuss an entire chemistry course as is taught in high school 9-12 grades. It is fascinating! As we examine each step from the design of the tanks where the water will be treated, the regular test that have to be performed at each step of the process, the numerous changes that may occur and have to be solved before continuing the treatment, etc. all have application to technology, engineering and mathematics. In terms of public health, mortality due to waterborne pathogens, declined drastically since 1930 due to clean drinking water!

It was with so much pleasure that we brought this poster to scientists at the 255th ACS National Meeting. We wanted to make scientist aware of what we do in Maryland, to obtain advice from experts in the field, to get more ACS members involved in Maryland local section and in continuing our interest in developing chemistry lessons and laboratory experiments derived from treatment and purification of water for high school students.

## POSTER IMPACT

Approximately 21-25 visitors visited the poster. Some visitors were looking for the poster since they have already checked it out in the abstracts listed in the conference program.

- 5 connections with graduate students in chemistry related fields: chemical engineering
- 4 connections with graduate and undergraduate students who were presenting similar research
- 2 connections with chemist working in industry
- 1 future collaborator from UMBC!



*The poster was visited by many young chemists, professors and professional people from chemical organizations.*

This poster was possible thanks to the



collaboration of Dr. Paul J. Smith from UMBC & former Chair, Maryland Section and Richard Nuss, Laboratory Director & Tour Guide at Montebello Water Filtration Plant-I. DPW

## Other interesting Events:

### March 18<sup>th</sup> SE03- Woman Chemists of Color Networking event:

designed to empower women on being more assertive in negotiations and learning to say "no" at their work place. The discussion focused on salary information, changing jobs, getting internships and helping young chemist to realize they are at crucial times of their careers and to make sure their mentor was working in their interest. Other topics were: "I am a PhD, what do I do now?" and "how can we make sure our grant is successful?" The discussion involved opportunities for Project SEED grants, formalized mentor programs, peer/peer, and faculty and student relationships; as well as information on COACH workshops during the conference.

### Future Events:

**April 8<sup>th</sup>.** In addition to the poster presentation at the NOLA meeting, we will have a second presentation during the Student Awards Ceremony on Sunday April 8<sup>th</sup> at Notre Dame of Maryland University. Several travel awardees will explain their research poster before lunch (11:30 A.M. – 12:15 P.M.) all are welcomed!

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