MAY MEETING: DESIGNING POLYMERIZATION REACTION SYSTEMS

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Dow Chemical Company

WEBEX MEETING NUMBER 635 888 409 (further directions on page 5)

THURSDAY, 26 MAY 2016

9:00 pm EDT, 8:00 pm CDT, 7:00 pm MDT, 6:00 pm PDT;

UTC/GMT 0100 27 May 2016

VLS is pleased to present the encore to the critically acclaimed article "Designing Polymerization Reaction Systems" that appeared in the February 2016 issue of *CEP Magazine*. Together, the authors Carlos Villa, Shrikant Dhodapkar, and Pradeep Jain have 65 years of professional experience at Dow Chemical Company, where their numerous achievements include more than 60 papers, and over 30 patents. Villa has a a BS in chemical engineering from the Universidad Pontificia Bolivariana in Medellin, Colombia, and a PhD from the University of

Wisconsin – Madison; Dhodpakar and Jain both have BTechs from the Indian Institute of Technology; Dhodpakar also has an MS and PhD from the University of Pittsburgh; and Jain has an MSChE from the University of New Mexico.

Villa

Dhodpakar

Jain

IN THIS ISSUE: NEW DIRECTIONS

This issue had the theme of "new directions" even before 2016 VLS Chair Daniel Sujo resigned earlier this month, citing growing professional and domestic responsibilities. So VLS is heading in new directions it did not anticipate! We do appreciate the service that Daniel has given us and hope he will remain as active as his other duties will allow in the future.

Our new Chair, Experience Nduagu, explores the internal and external influences that have driven his career in new directions. Amanda Scalza, Past Chair, reflects on the pros and cons of new directions and their influence on process safety. Neil Yeoman begins a two-part series on his new directions in processing when he was a fresh chemical engineering graduate.

Noah Meeks, former VLS chair, has sent us an announcement for the Lawrence K. Cecil Environmental Award, with interesting information about Mr. Cecil. VLS members should consider nominating a deserving colleague (or self-nominating) for the Cecil Award.

In my article, I briefly reflect on the variety of opportunities for electronic interactions offered by the AIChE..

-- Jennifer I. Brand, Editor

FROM THE CHAIR: WHY WE SEEK NEW DIRECTIONS

Experience Nduagu

How internal and external forces influence new career directions – A personal story

As an engineer, I think that something like Newton's First Law can be applied to human behavior – inertia keeps us moving in the same direction, unless we are acted upon by a force of some sort. For humans, those forces can be either internal drives or external influences; either can cause us to change career directions. When we make these changes, we don't know if the change will be slight or dramatic; we don't know if these are temporary detours or a whole new course. Sometimes it is even hard to tell whether the force comes from outside or within. Nevertheless, change and new directions are in order.

For example, I have taken new directions that were as a result of external promptings which urged me to recognize and answer a strong inner drive to help others. As an undergraduate student, I really did not know where my chemical engineering training would lead me. Then, in my last year, 2002, I started my 6 months' undergraduate industrial training at the Port Harcourt Refinery Ltd., in Alesa Eleme, Rivers State, Nigeria. I looked forward to adding to

my academic knowledge by actually working with the unit operations and processes in oil refining, where I thought I wanted to start my career after graduation. However, I soon began to question whether a refinery job after graduation was what I really wanted. I was appalled by the environmental damage all around me: withered grasses, corroded metallic surfaces, acid rain, and the many respiratory problems of the refinery workers. People in the surrounding communities suffered health issues, too, but they seemed unaware that their health problems might be linked to industrial pollution. I began to wonder, "Do I want to be a part of the problem or a solution?" By the end of my first month at the refinery, I made up my mind: my chemical engineering career would focus on solving environmental and human health problems.

It seemed clear to me that what is now known as green engineering, or pollution prevention by incorporating energy efficiency and emission reduction into process design, was the path to preventing this pollution in the first place. So I became passionate about this type of process design as a career where I could mitigate environmental burdens and improve the quality of life for workers and for the surrounding communities.

However, an external force beyond my control brought about yet another change in direction. In Nigeria, new graduates are required to do a year of national service in another part of the country. In our diverse land, this usually means living and working surrounded by people of different tribes, languages, and cultures. Coming from southeastern Nigeria, I was assigned a job teaching secondary school science in Katsina State, a poor province situated in the northwest, where living standards and educational levels are far below the norm in Nigeria. (For example, UNESCO estimates a literacy rate of 23% in Katsina, compared to roughly 60% for Nigeria as a whole.)

In theses conditions, teaching alone was not enough for me; I felt a passion to help the youth there in a tangible way. Not being experienced at this, I decided to optimize the efficiency of my efforts by volunteering for a local non-profit organization specializing in development education and advocacy programs. What an adventure! I became a youth educator, community mobilizer, and advocate. After only a year of volunteer work, the organization offered me a job doing this work I loved. So I turned my talents to initiating and coordinating programs on adolescent reproductive health and HIV/AIDS awareness, child rights, youth development, and environmental campaigns. I enjoyed seeing how my work helped young people, but, after a few years, the inner drive to use my chemical engineering skills for environmental and human health became stronger. However, due to my experiences in Katsina, I know I will continue my youth and community development work, but as part-time, lifelong, extra-curricular work.

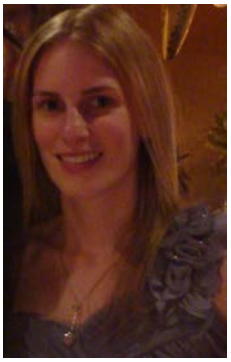
My vision of a career as an environmentally responsible chemical engineer led me to graduate and

postgraduate studies and research. Whereas some of my colleagues spent lots of time deciding on research topics or simply decided based on the availability of funding, I knew from the start what I research wanted, so I was ready when the opportunities for M.Sc., Ph.D. and postdoctoral studies knocked. My refinery experience inspired my dreams, and more than a decade later, my passion for this pursuit has not waned, even though my directions have changed a few times along the way.

In retrospect, my career journey reveals some key lessons. The most important to me is that career paths can reflect how internal and external forces influences our decisions to remain on our original career path or to change career directions, slightly or dramatically. As we embark on our careers, we need to sensitive to external prompting that may point to new directions. It is possible to resist such external promptings if our minds are completely made up to continue on our current career paths. That is fine, especially if we are happy with the current career path, meaning that our internal drivers are stronger than the external influences. However, in cases where we have some doubts about the prospect of our original career paths, it may be worthwhile to explore new directions. The goal in taking a new direction is to ultimately arrive at a point where your career is synonymous with fulfillment and happiness.

FROM THE PAST CHAIR: SAFETY AND CHANGE

Amanda Scalza



Every day we are faced with a choice: continue doing things the way they've always been done, or try something new. Routines have their benefits: I don't need to be worried about getting lost if I take the same route to work every day; my operators probably won't miss a sample if they take them in the same order every day. While routine has value, it also breeds complacency. How often have you heard someone say "that (accident, fire, etc) can't happen here because…" Changing this mindset will take time, but is essential for a safe, sustainable business.

While change is a great thing, it also has the potential to create new hazards. A majority of industry accidents have a contributing cause related to management of change. Is it really like for like? What happens if the vendor changes? It can be simple to remember to create management of change documentation when you are spending capital, but what if I am simply changing the tuning of a valve, and that new tuning causes the valve to close faster or slower? A paperwork nightmare, you might think. In reality, management of change is not about the paperwork. The form you will fill out is different everywhere

you go, the protocol as well. Management of change is really about having a chance to stop and think, rank the risks against the reward, and talk to your stakeholders about the impact of that change. Without these steps, filling out the form is without meaning.

Success in safety is a goal with no finish line. We will walk on the tightrope of "risk" every day, whether in a manufacturing site or a laboratory, whether at work and at home. Safety is a process of continually creating awareness. How long has that new sign been up in your neighborhood, or your work place before you noticed it? How long was it before that sign became part of the scenery once again? Taking a fresh look at your surroundings can prevent accidents, one near miss at a time.

THE WORLD OUT THERE: INSTANT COFFEE 1957

Neil Yeoman

One obvious problem the VLS has is that its members don't get to see each other face-to-face. To compensate for this we need to take advantage of the one thing that other local sections do not have, geographic diversity, which is some ways may be a more profound type of diversity than any of the others people normally discuss. People from different parts of the country, indeed, different parts of the world, can have very different kinds of experiences which some people might be willing to share. We cannot do so over the dinner table but maybe we can do so in this newsletter. My first contribution to this effort follows.

My first "permanent" job was with the Maxwell House Division Research Department of General Foods Corporation (a company that no longer exists. although many of its parts still do under other ownership) in Hoboken, New Jersey. The year 1957 wasn't a good one for new chemical engineers living in the NYC area. Maxwell House was hiring a couple of chemical engineers to help with a new (rather exotic) process it was implementing in the manufacture of Instant Maxwell House Coffee. Before I tell about the new process I need to tell a little about the coffee business, at least as it was in 1957.

Maxwell House had five major products (and several minor ones): Maxwell House (regular) Coffee, Instant Maxwell House Coffee, Sanka (decaffeinated) Coffee, Instant Sanka Coffee, and the caffeine it accumulated by the decaffeination process that produced the two Sanka products. At that time Maxwell House dominated the US coffee market, with, if I recall correctly, about 60% of the total purchased in the US.

The process for making regular coffee included cleaning the beans, blending, roasting, grinding, and packaging. For Sanka there was a decaffeination step between blending and roasting. For making an instant coffee (called a soluble coffee in

the industry) there was extraction and drying between grinding and packaging. The blending, roasting, and grinding steps were different for the different coffees. For some of the minor products there were other differences. One minor product, for example, included the addition of chicory to satisfy the tastes of the local area it served.

Blending was an art, and new blends were always being considered. In 1957 coffee beans came mostly from Brazil with smaller amounts coming from other part of Latin America, mostly from highland farms, and from Africa. The highland beans were the most costly and perceived to be the best and the African beans were the least costly and perceived to be the least desirable. There were distinct differences. The research department was divided into two laboratories, a process development lab and a product development lab. I was in the former and study of blends was in the latter so my exposure to blending was from afar. Interestingly, and related to another issue the VLS has discussed, the product development lab professionals were mostly chemists, a fair number of whom were women while the professionals in the process development lab were all male chemical engineers. Each lab had about a dozen professionals and some technicians, but except for the section in which I ended my time there I do not know what the technician counts were. There were two sections in each lab.

The extraction process for soluble (instant) coffee produced a syrupy aqueous solution of material from the roasted and ground (R&G) beans that was dissolved by the hot water used in the extraction. The extraction took place at temperatures well above the atmospheric boiling point of water and the effluent from the extraction step contained materials that are not dissolved when regular coffee is made. Instant coffee is not only coffee in a different form than regular coffee it is a different mixture of materials. In 1957 that syrupy solution was dried in spray dryers, which creates an additional difference, and part of the basis for expansion of the research function that drove my being hired.

The extraction step is best visualized as six columns arranged in a circle as around the face of a clock, one each at 12, 2, 4, 6, 8, and 10. Each column is about 30 inches in diameter and about 20 feet high. At time zero the column at 12 is empty and the other columns are filled with R&G coffee beans with varying amounts of their soluble materials removed. Hot water is entering the bottom of the column at 10, flowing up through column 10, overflowing column 10 and going to the bottom of column 8, then up through 8 and so on around the clock counter-clockwise until it exits the top of column 2 as the syrupy product of the extraction. Immediately after time zero the following happens in the order indicated: (1) column 12 is filled with fresh R&G beans, (2) the liquid from the top of column 2 instead of being the product of the step is routed to the bottom of column 12, (3) hot water is introduced to the bottom of column 8, (4) the overflow from column 10

is blocked, (5) the hot water to column 10 is stopped, (6) with column 10 now isolated a ball valve in a large line at the bottom is opened and the spent grounds content discharged to a receiving tank below. Column 10 is thereby emptied. When column 12 is filled and the overflow becomes the product of the extraction step the status of the six column system is the same as it was at time zero except that it has rotated 60 degree counter-clockwise. That takes about 30 minutes. The process continues with the end points moving around the clock counter-clockwise to a different column every 30 minutes until three hours after time zero the system is exactly as it was at time zero.

When a can of regular coffee is opened the smell of coffee fills the air. Not so with instant coffee, and the difference was deemed important by the marketing people. The reason is the heavy processing involved in making instant coffee, especially the drying step. The aroma fractions that people enjoy smelling are swept away by the air used in the drying step, or so it was believed in 1957. But the drying step is obviously needed and spray drying had strong marketing value. If the Instant Maxwell House of 1957 was examined carefully it was seen not to be powder in the usual sense but composed of tiny hollow spheres which, when called "flavor buds," boosted sales. Only spray drying could produce "flavor buds." Maxwell house was big on things like that believing, probably correctly, that its slogan "Good to the last drop" was one of the major reasons it dominated the market, another being the color and design of the Instant Maxwell House Coffee jar.

In "Instant Coffee 1957, Part 2," scheduled for next month's VirtuAIChE VLS newsletter, I will describe the somewhat exotic process step I and a few others were hired to help implement, a step to make it so that when a jar of Instant Maxwell House is opened the consumer experiences that aroma of fresh coffee that opening a can of regular coffee creates. Please retain this newsletter and reread the above before reading "Instant Coffee 1957, Part 2" next month.

Academia & Industry

In the September 2015 issue of VirtuAIChE then chair-elect Daniel Sujo introduced the issue of the academia industry disconnect. In my October 2015 letter I promised to offer some comments on that subject in a future letter but circumstances didn't work out that way. That was fortunate. Recent dialogue in AIChE Engage and commentary in one of the references cited has refined my thinking, which I plan to offer the month after next. If anybody would like to offer commentary prior to that please send it to mailto:virtualtreasurer@aiche.org.

Climate Change

As can be noted by this and my April columns I sometimes use AIChE Engage as a starting point for the subjects I cover. It cannot be avoided. AIChE Engage is addressing a wide variety of topics of

specific interest to chemical engineers and to ignore it would be wasteful of a useful resource. As part of the discussion on sustainability the subject of climate change has emerged. It is a subject about which there has been much discussion and about which there will be a lot more. If the climate science community is correct it is one of the most complex, difficult, and vexing issues with which humanity will have to deal and if dealing with it needed chemical engineering skills will be a significant part of the action. I will pick this up in a future issue of this column.

FROM THE EDITOR: AICHE ONLINE

AIChE offers many mechanisms for chemical engineers to interact electronically. We can ENGAGE and ChENECT and of course, we can become members of the Virtual Local Section, or just subscribe to the *VLS Newsletter*. Much of this electronic activity of these various venues can be followed on Twitter, Facebook, Linkedin, Youtube, Flickr and Slideshare, as well as the AIChE website.

ChEnected describes itself as "a unique online community created for and by young professional chemical engineers. Presented by AIChE, ChEnected is where chemical engineers can read, view, contribute, and engage with everything Chem-E. On ChEnected, Engineers [sic] discuss chemicals, process safety, energy, sustainability, and bioengineering." Although ChEnected aims to focus on YPs, it is useful to all. It is professionally maintained, with the main content provided by selected contributors, often with professional communications credentials. The links to AIChE events, career, and other resources are up-to-date and extensive. Members can comment after appropriate logins.

According to its website, "AIChE Engage is a new, mobile-friendly platform that connects AIChE members with each other and their chemical engineering communities." Currently trending discussion includes hardware discussions (mostly on valves and pumps) requests for volunteers, safety and management issues, and broader issues, (PE licensure, climate change, activist takeovers of chemical companies). Some of our members are active participants and the discussions can be quite lively but, as far as I have seen, quite civilized even when there are quite divergent views.

So, with all these means of interaction, do we need a Virtual Local Section as well? Or a newsletter? My answer to both is "yes". Our speakers and our in-person meetings are two obvious membership benefits. But the newsletter? It is too old-fashioned? "No", would be my reply. The articles represent more contemplative expressions of writers views and experiences. For the contributors, there can be other benefits besides a willing audience: building writing skills with editorial feedback pre-publication, and a broader range of topics for the targeted VLS

audience. Contributing is also a way to test the waters to see if you are interested in more active participation in the VLS activities.

LAWRENCE K. CECIL ENVIRONMENTAL AWARD

Noah Meeks

The Environmental Division is soliciting nominations for the Lawrence K. Cecil Environmental Award, and in this short article we will review both the award information as well as the history behind the Division founder and his eponymous award. It is good for us to connect with the stories and personalities that have built the profession, the Institute, and the Division. Special thanks to Dick Siegel for his personal recollections and archived Division newsletters; he writes, "Larry was a great man, a brilliant water reuse expert and someone we should all look up to as the Founder of the Division."

The 2016 Lawrence K. Cecil Award is the most prestigious environmental award within AIChE and is given by the Environmental Division in recognition of an individual's outstanding chemical engineering contribution and achievement in the preservation or improvement of the environment. Larry was the first recipient of the award in 1972.

It is awarded to a member of the Institute considered on the basis of one (or more) of the following criteria:

1. Considerable record of contributions to the environment through the application of chemical engineering for a period of at least fifteen (15) years of sustained professional activities

2. Application of chemical engineering principles and technology in research into environmental problems and/or in development of innovative engineering solutions of these problems

3. Significant contribution in design, construction, operation, management, or consulting related to environmental protection facilities or enterprises.

4. Considerable record of service in the activities of the AIChE Environmental Division.

Nominations or additional questions should be submitted to Environmental Division 2nd Vice Chair, Leslie Shor Leslie.Shor@uconn.edu. Additional information and nomination forms can be found at the Division website: http://www.aiche.org/community/awards/lawrence-k-cecil-award-environmental-chemicalengineering.

Lawrence K. "Larry" Cecil was born in 1895 and graduated from University of Illinois with the Bachelor's in Chemistry in 1924. His professional career with Infilco, Inc., spanned 35 years and ended with his retirement in 1961. After retirement until his death in 1981, he was a professional consulting chemical engineer, and donated significant time to public and professional service in water pollution issues.

Larry was a native of Homer, Illinois, and left college during World War I to become a chemist in a base hospital lab. In 1923, he moved to Oklahoma and was named state chemist and director of laboratories. He joined International Filter Co, in 1926.

It is strange for us to think, but at the time of his retirement there was no EPA (not organized until 1970). When the EPA was formed, air, water, and solid waste were separate entities, but these were brought together under the newly formed AIChE Environmental Division. Larry was the driving force for the Division's founding and represented the water pollution field, having chaired the AIChE Water Committee since 1964.

Selected papers were published in the environmental field for many years as Symposium Series Papers, and eventually became the basis for Environmental Progress which was founded by Larry, and he was Editor-in-Chief for many years.

Personally, Larry and his wife Jennie were married 64 years and he noted after 50 years together, "I love her more every day, and she gets more beautiful all the time." It was this love for each other which spilled over into his general love for people of all ranks, and his relaxed confidence and optimism. Perhaps it was this trait that empowered his courage, which 1973 Division Chairman A. Roy Price observed in 1967. In his own words on the occasion of Larry's death, he recalled a water pollution workshop co-sponsored by AIChE and the Houston League of Women Voters:

"The Houston League at that time was notorious for being one of the most outspoken critics of industry, engineers, and scientists in the country. Larry knew this, yet he threw down the gauntlet and let his small banks of followers directly into what many considered 'the enemy camp'."

After retirement, Larry did professional consulting in the areas of water pollution and reuse. The proceeds from this consulting were then used to travel through the country visiting with scientists and engineers and keeping abreast of emerging topics. This hard work, even in retirement, greatly expanded the nascent field of environmental chemical engineering and left a lasting legacy. Conference sessions organized by Larry were remembered as being very successful, owing to his broad connections and life-long learning.

Larry was also an advocate for environmental remediation efforts. He and his wife returned to Illinois in 1973, and his library was donated to the University in 1978. He sponsored a song and essay contest to bring attention to a remediation project for polluted campus stream known as the Boneyard Creek. Some of this may have been personal, for it was on the banks of Boneyard that he proposed to Jennie decades before.

Dick ends on this note about Larry, and perhaps the current and future leaders could use the same techniques!

"One of the best anecdotes I remember about Larry was how he got people involved. Back then there was only snail mail. So, every now and then one would

receive a letter from him saying "thank you for volunteering to...." and of course that was the first you had ever heard of the task! He was also great in running our dinners: each person was forced...spouses included...to stand up at some point and give a 60 second statement of who you were and why you were at the dinner/active in ED."

Left to right are Robert Jaske, Division Secretary-Treasurer; Dr. A. Roy Price, 1973 Division Chairman; Larry Cecil; Robert B. Filbert, AIChE Council Liaison; Ted Weaver, 1973 AIChE President; Tom Tomkowit, 1972 AIChE President; and Dr. Gary F. Bennett, 1972 Chairman of the Environmental Division. *(see story on next page)*

ATTENDING A VLS MEETING

- **Join by internet:**
  - https://aiche.webex.com/mw3000/mywebex/default.do?siteurl=aiche
  - Search for VLS or by meeting number 635 888 409 (March) 634 167 017 (April)
- **Join by phone:** Access code: 634 167 017
  - 1-866-469-3239 Call-in toll-free number (US/Canada)
  - 1-650-429-3300 Call-in toll number (US/Canada)
  - Global Call-in numbers
  - Toll-free calling restrictions

Attendance at a Virtual Local Section Meeting is open to AIChE Virtual Local Section Members, AIChE members, and other interested people.

PDH CREDIT FOR VLS MEETINGS

LAURA J. GIMPELSON, P. E.

Attendees of the Virtual Local Section Meetings can receive up to 1 hour of professional development credit that meets the continuing education requirements of most state professional engineering registrations. To receive the certificate documenting your attendance, send an email to the VLS secretary, Laura Gimpelson, at virtualaiche@gmail.com.

Include the following information in your email:

1. Name of the Presentation and Speaker
2. Attendee's name as listed on the registration certificate
2. Attendee's registration number and state/providence of issuance

The certificate, in pdf format, will be issued within 30 days of the receipt of the request.