



## Table of Contents

Page 1 – Khemia Software 2018 Plans

Page 2 – Programming list from one programmer

Page 3 – EPA Requirements for Reporting Significant Figures

Page 3 – Current conference list

Page 4 – Starting BOD off on the right foot

Page 4 – Omega new feature

Page 5 – The #1 Mistake Laboratories Make After Receiving a “Not Acceptable” PT Evaluation

Page 5 – Calibrate Newsletter

Page 6 – Khemia Software’s user’s group

Page 6 – Lab Facts Corner (filter porosity)

Page 7 – NEMC LIMS Session

Page 7 - Evaluation of Temperature Performance at Various Locations for the COD Block Heaters

Page 7 – Environmentally Conscious Donation

Page 8 – Microscopy Corner

Page 8 – Newsletter 101!

### Something New!

Welcome to our inaugural newsletter! While we do our best to keep clients informed of the happenings at [Khemia](#), often too much is left out, forgotten and/or jumbled in other conversations. In hopes to better our communication with you, we are introducing our biannual newsletter. In doing so, I am speaking to other vendors and consultants I know well so that we can include some interesting, lab-based articles in addition to our LIMS specific articles. We hope that many in your laboratory will enjoy and read this.

Please do give your feedback as this newsletter is written for you. We are happy to entertain ideas, reach out for specific articles and develop the newsletter format in the future. But, we won’t know unless you tell us! Please send any feedback to me, Robert Benz, at [rbenz@khemia.com](mailto:rbenz@khemia.com). Also, we would be delighted with any articles or photos that you might like to submit!

### Khemia Software – A Rundown of 2018 Plans

We have a number of things happening at Khemia right now and are looking forward to 2018. Our 2018 goals span the gamut from enhanced client communications to continuing improvements of the software. 2017 was a year where we introduced many changes, including adding a new internal programmer/developer and additional business support staff. Another change is the addition of this newsletter to both keep our clients informed of what is going on at Khemia, as well as adding some pertinent information about laboratory operations.

**Omega 12** – One important piece of news that we are excited about is the release of our newest version, Omega 12. Omega 12 has been developed on Access 2016 platform, the newest version from Microsoft. Our goal is to begin testing Omega 12 on Access 2019 upon its release (most likely at some point in mid-to-late 2018) in order to be ready for whenever a client laboratory chooses to upgrade to it. All new installations as of January 1<sup>st</sup>, 2018 will be Omega 12.

For those who may not be familiar with [Microsoft](#) Access history, from Access 97 to Access 2010, the file format was mdb/mde, which used various versions of MS Jet database engines. Starting with Access 2007, Microsoft introduced a new file format, accdb/acdde. In Access 2007, 2010 and 2013, both mdb/mde and accdb/acdde file formats were supported. Beginning with Access 2016, only the newer accdb/acdde formats are supported.

We plan on offering Omega 12 as a 32-bit and a 64-bit platform. Currently, Omega 12 is being offered in 32-bit. The development of the 64-bit platform is underway. If 64-bit is chosen by a client in the future, this would likely mean that Microsoft Office would need to be re-installed in 64-bit mode rather than the current 32-bit mode in order to accept

Omega 12. Omega 12 in 64-bit will also be prevented from being run on old instrument workstations running non-64-bit architecture. Some clients may eliminate this problem by running a Remote App configuration to deliver Omega to their users rather than installing on the desktop. This approach's viability depends on the speed of your internet connections, network configuration and server capacity, however, a few of our clients are setup in this manner using RT (Runtime) versions of Access.

Khemia will support Omega 11 and Omega 12. Omega 11 will only be functional on Access 2010 because of the aforementioned file formats (it will remain mdb/mde). Omega 11 updates will continue as normal during the transition and no cut-off date has been discussed at this point. Some developments will occur moving forward in Omega 12 that are not made backwards compatible, however, there are no current instances of this to report. In a future newsletter, we will discuss software development life cycles and the need to keep current for security/platform reasons.

Omega 12 will move forward with updates spaced out on a bi-annual basis. Omega 12 is in an accdb/accbe format and will not function on Access versions below 2016. This may affect customized side modules that many of Khemia's clients have developed and depend on. It would be advisable to discuss any concerns you may have well in advance of upgrading to Omega 12.

The new programming architecture of Access 2016 has required a great deal of work and we have installed several copies of Omega 12 to date. We do expect some minor issues with previously programmed customizations and one-off applications. The expected release of V12 to existing clients is in early to mid-2018 so as we have time to resolve issues ahead of implementation.

***A snippet of current programming task by one of our programmers:***

*Current programming task by Olga Nadgorny – The following list not in any particular order as multiple components are worked on, handed over for testing, revised, tweaked, etc. If you do not see a request, it could be in the hands of another programmer and/or in some way tied to one of these changes.*

- 1. Finalize new MDL functionality*
- 2. Equipment calibration feature completion/redesign*
- 3. Corrective Action Report(CAR)/Nonconformance Report (NCR) changes requested by several clients*
- 4. Migration of some Access query sets to stored procedures on server*
- 5. Sample Tracker improvements; various requests and integrate with barcodes and automate some sample tracking steps (when loaded into prep/analytical, create the sample tracking records of who and when handled)*
- 6. Improve daily briefing report*

One very important note, Office 2016 is cannibalistic and will not allow you to have another version of Office on the same computer and function correctly. Earlier versions of Office, through Office 2013, would allow you to run different versions on the same PC (if installed correctly) side by side. This is (often) no longer the case. This is simply an FYI for those looking to move to Access 2016 when Omega 12 is available or for a test copy.

Customized reports/EDDs and Add-Ons will need to be reviewed, tested and verified when moving to Omega 12/Access 2016. Microsoft has changed the database engine again, with the newer versions of Access, and has depreciated several features with every new version. It is important to verify syntax and datatypes and functions that may have been used during custom development of Omega 11 on Omega 12.

We at Khemia are very excited about this platform upgrade to Access 2016 and beyond. It will allow for more timely development using new tools not available in older versions of Office and we will strive to keep Omega current with all future Office products going forward.

\*Please note that Access 2007 and Access 2013 both have changes in the engine that were dropped by Microsoft in the next version of Access. As such, we do not recommend using or trying to use either one. We have seen problems for clients with both versions. As such, we recommend Access 2010 for V11 and Access 2016 for V12.

Additionally, regarding Access, while Omega 11 will run on Access 2000 and newer, only Access 2003 and above support Unicode characters used in a recent change for units. All Omega clients should make a concerted effort to be on the newest and appropriate copy of Access for your version of Omega. Khemia will be dropping full support for Omega based on older or incorrect versions of Access, though this will come with a great deal of warning and be posted to all of our clients well in advance.

**Browser Based LIMS** – We are excited to let you know that we have a development team working on a yet to be formally named .NET platform LIMS. The development began in late 2015 and is fundamentally based on Omega. It is scheduled for release this time next year. Please bear in mind that it might come out in staged releases – small lab/limited test, mid-size lab with more, but limited tests, etc.

For those of you under service contract, you may switch to the browser-based platform when it is market ready. Please remember, each platform in its respective architecture has inherent strengths and weaknesses. We will allow clients to evaluate which option suites them and the ramifications of that choice; either to stay with Omega (client/server) or switch to the browser-based platform. Both Omega and the web-based LIMS will be supported ongoing.

## EPA Requirements for Reporting Significant Figures

Author: Edward F. Askew PhD, President, [Askew Scientific Consulting](http://askewscientific.com) ([easkew@askewscientific.org](mailto:easkew@askewscientific.org))

It has been said that an analytical result is only as good as the sample collected. While this is true for the analytical determination method, the corollary to this statement is the accuracy and precision of the reported result is only as good as the significant figures reported. For all college graduates that have taken even an entry level chemistry course, the idea of “Significant Figures” has been presented as a sterile math-based exercise that has no “real world” use in an operating environmental laboratory. In fact, as most laboratories utilize semi-automated analyses or automated analyses, the bench analyst, QC manager and laboratory management assume that whatever the instrument, computer or LIMS reports, that is the result with the everything reported being significant. But, that is not correct in any way, shape or form.

To clarify this misconception and provide guidance from the laboratory management on down to the bench chemist, we need to start at the beginning. First, you must seek a peered reviewed reference that has defined Significant Figures. Basic Chemistry and Analytical Chemistry text books provide excellent examples of this mathematical function. For more detailed explanations, Part 1050 B of Standard Methods for the Examination of Water and Wastewater (22<sup>nd</sup> Edition) provides detailed examples of the mathematical functions and results, but also the following caveat: “*To avoid ambiguity in reporting results or in presenting directions for a procedure, it is customary to use “significant figures.” All digits in a reported result are expected to be known definitely, except for the last digit, which may be in doubt. Such a number is said to contain only significant figures. If more than a single doubtful digit is reported, the extra digit or digits are not significant.*” This statement clearly identifies the degree of certainty in reporting a result based on the degree of uncertainty of “All Values” used in determining the final result. This area will be covered in greater detail in a subsequent newsletter article.

### **Current Conference List – 2018 (so far)**

**Jan. 22-25** – TNI ([www.nelac-institute.org](http://www.nelac-institute.org))  
in Albuquerque, NM

**Jan. 26** – MWAA  
([www.midwestwateranalysts.org](http://www.midwestwateranalysts.org)) in  
Kenosha, WI

**May** – Lab Tech Day in Raleigh, NC

**May 23-25** – FSEA ([www.fsea.net](http://www.fsea.net)) Spring  
Meeting and Technical Session

**Aug. 6-10** – NEMC ([www.nemc.us](http://www.nemc.us)) in New  
Orleans

**Aug. 16** – WEASC Laboratory Workshop in  
Columbia, SC

**Oct.** – FSEA Fall Meeting

*In addition, various direct client and prospect visits will be made throughout the year. If you happen to know of a good, local conference that you think we should attend, please let us know! We are always looking for smaller, more local/regional conferences*

However, “Significant Figures” and “Regulatory Reporting Results” for EPA compliance reporting now require additional clarification. It is possible to have a result that has three significant figures to the right of the decimal point. Examples of this are provided in: [“Procedures for Rounding-Off Analytical Data to Determine Compliance with Maximum Contaminant Levels Present in NIPDWR, WSG 21, Joseph A. Cotruvo, Ph.D.”](#); Chemical and radiological data may be treated in like manner. Analytical results for mercury of 0.0016 would round off to 0.002 while 5.4 pCi/l of combined radium-226 and radium-228 would round down to 5 pCi/l.

This memo addresses regulatory results that require Less Significant Figures as the regulatory limit sets the final reported results. But, any regulatory result cannot have less than the required significant figures nor can the rounding rules be violated. In fact, EPA Office of Water felt that WSG 21 was so significant that a clarification [letter](#) was released by Michael Shapiro, PhD on July, 11 2017 that reiterated that WSG 21 applied to all water and wastewater programs and referred the Standard Methods Part 1050 B for additional information. So, in conclusion, any analytical result that is to be reported to an internal or external client needs to be reviewed for the correct significant figures.

## Starting BOD Off on the Right Foot

Author: David Smith, Technical Director at [Environmental Express](#) ([DavidS@envexp.com](mailto:DavidS@envexp.com))

Biochemical Oxygen Demand (BOD) is a test that can give even the most seasoned analyst a severe case of anxiety. Due to the microbiological nature of the test, there are many factors that can go wrong. Because the test incubation (five days) lasts longer than the holding time (48 hours), any of those factors can result in unreportable data on an unrepeatable sample. Many BOD analysts have resorted to quite complex procedures, bordering on superstitions, to ensure that everything goes according to plan during the analysis. There are some simple ways to help start your BOD analysis and give yourself a better opportunity to successfully complete the test.

### ***Omega – New Feature!***

*Khemia is putting the final touches on a new feature to be released soon, an MDL module. This module will allow a lab to comply with the revised MDL determination rule published in 2017. It will be able to determine MDL S (spiked) and MDL B (blanks) and support multiple instrument data on multiple dates/batches. By user selection of data points, it will even calculate the MDL using the previously approved guidelines.*

The water used in BOD is named differently depending on when in the process it is involved; source water and dilution water. Source water is the water to which you will add nutrients and ensure ample dissolved oxygen content for the incubation and feeding of microorganisms. Once that has all happened it becomes dilution water. The best way to give yourself a high success rate in BOD is to start off with a good foundation, your source water. Good quality source

water does not necessarily have to be the cleanest, ultra-pure, reverse osmosis, deionized water that you can generate. The real requirements for the water are that it be free of microorganisms, be free of potentially toxic constituents, i.e. dissolved heavy metals, and have no organic matter to cause oxygen depletion.

Generating laboratory quality deionized water (sometimes referred to as DI water) can be expensive for a lab. A typical BOD analysis with just a few samples can easily use three to four liters at a time, while a full batch of 20 samples may use 30 liters or more. While you can use your lab quality water, many analysts have had good success purchasing water from a commercial source, such as a grocery store. Make sure that the water is labeled ‘Steam Distilled’ and always run a blank check on the water prior to using it in your analyses. If you are using your laboratory reagent water system for your source water, you will almost always need to take extra care to aerate it properly and you will often need to utilize a disinfectant step prior to using the water. The resin exchange beds can be a source of bacterial contamination. UV light will be effective in treating the water without leaving behind residual chemicals to be neutralized.

After identifying a good supply of source water, you want to make sure to keep it in good condition. A good practice is to fill your dilution water container with the proper amount of water the night before. Put the container in your incubator, uncovered overnight, to allow the water to equilibrate at the right temperature and have a good starting amount of dissolved oxygen. While these steps won't erase all your potential BOD problems, they will at least let you start properly. If problems still arise they will usually be identifiable by the effect they have on the test.

## The #1 Mistake Laboratories Make After Receiving a "Not Acceptable" PT Evaluation

Receiving a "Not Acceptable" evaluation for a parameter in a Proficiency Testing study is no fun – but it happens! When it does, we'd like to share some best practices that will help you get back on track in the safest way possible. [Phenova](#) services the PT requirements of thousands of laboratories and the number one mistake we see following a Not Acceptable evaluation is a rush to "re-do" the test.

In an effort to quickly achieve an acceptable result for the missed parameter, it is common for a laboratory to want to perform a supplemental PT study as soon as possible. The problem is, rushing to perform another test can often result in a second failure, putting the laboratory in an even more precarious position, unnecessarily.

Don't Rush!

Immediately after receiving a Not Acceptable PT result, it is tempting to begin making some assumptions as to why the parameter was missed. Picking the most likely assumption, applying a quick fix, and ordering another PT sample may seem to be the most logical and efficient path. Be careful! In many cases first assumptions can turn out to be correct – but in some cases, there are hidden issues at play that go unnoticed.

The safest approach is to make just one assumption – that the true root cause for missing the parameter is unknown, and that there is a mystery to be solved. Making this assumption immediately gets you in to "detective mode" rather than "fix-it mode," and detective mode is where you want to be.

[Pittcon 2018](#) – While Khemia does not have a booth at Pittcon this year, several of us will be there walking the conference. Just contact us and we will happily schedule some time to visit!

### Calibrate Newsletter?

*Interested in trying out the Calibrate Newsletter from Catalyst Information Resources, LLC ([www.catalystinforesources.com](http://www.catalystinforesources.com))? Calibrate is published weekly by Jerry Parr, whose professional affiliations include being the Executive Director for TNI, a Board Member for ACIL and ELAB and an Advisory Board Member for multiple organizations. The goal of the newsletter is to keep environmental laboratory professionals from becoming overwhelmed by the mountains of regulations and other information they need to be aware of in an ever changing, complex industry. The Calibrate newsletter is current and concise and something I read every Monday morning to begin my week.*

*If you are interested, just send an email to [rbenz@khemia.com](mailto:rbenz@khemia.com) titled Calibrate and I will get you signed up free for 6 weeks. If you would like to see an older copy, just let me know and I will happily forward one or two.*

Rushing to fix a PT evaluation and ending up with second unsatisfactory result is such a common occurrence that we have developed a 20-page Corrective Action Guide to assist our customers in avoiding the trap. The guide outlines easy-to-follow steps to take, and provides tools and printable checklists to use to ensure that your detective work uncovers the true root cause of a missed PT.

As part of our service, and to help laboratories ensure a successful corrective action process, Phenova offers a free QC standard for laboratories to test their theories on, or to assist them identifying potential root causes. In addition to providing our customers with a free QC standard to aide in their investigation, we also offer technical support. Sometimes an outside perspective can assist in nailing down an elusive suspect.

The next time you are faced with a Not Acceptable PT evaluation, follow these 10 steps for best results:

1. Avoid the rush to “re-do”
2. Assume the true root cause is a complete mystery – go in to detective mode, not fix-it mode
3. Enter in to a structured Root Cause Investigation to uncover potential hidden issues
4. Seek outside opinions if you have difficulty nailing down a root cause
5. Develop a Corrective Action Strategy based on the root causes you’ve identified
6. Test your findings and corrective action strategy with a QC standard to ensure success
7. Implement your proven corrective actions
8. Perform your corrective action PT study with confidence, knowing you fixed the issues
9. Develop a Preventative Action Strategy to lock in the improvements you’ve made
10. Implement a Continuous Improvement process utilizing PT and QC standards to help guide you

If you would like to have more details and tools to help you in this process, we would love to send you our comprehensive PT Corrective Action Guide. We have received a lot of positive feedback on it and we believe it is a valuable reference in assisting our customers in taking the right steps to safeguarding their PT performance.

Email us at [PTservice@phenova.com](mailto:PTservice@phenova.com) to request your digital or printed copy! For any additional information, please contact Phenova Client Services, 6390 Joyce Dr., Golden, CO 80403 at (303) 940-0033 or [Info@phenova.com](mailto:Info@phenova.com).

## Lab Facts Corner

How is pore size determined for the filter membranes used in laboratories?

There are four basic methods:

1. Visual examination using scanning electron microscopy, where a small section of membrane is appropriately treated, put in the microscope, and evaluated, using appropriate imaging software.
2. Porosimetry is a physical method where liquid is forced into the membrane under pressure and the penetration profile is analyzed mathematically to determine pore size.
3. Particle challenge uses particles of defined size to determine the minimum size that can be retained by the filter.
4. Bubble point method, where a membrane is placed in a housing, with liquid placed on the top side of the membrane. Water is used for hydrophilic membranes and alcohols can be used for hydrophobic membranes. Gas pressure is applied on the underside of the membrane, and is gradually increased over time. When a constant flow of rising bubbles is observed on the top side of the membrane, the gas pressure has reached bubble point.

Depending on the membrane itself and its proposed porosity, any one of the above methods may be used, however, the bubble point method is the most common.

[A more in-depth discussion can be read in the “Overview of Main Techniques Used for Membrane Characterization”](#) by Bartosz Tylkowski and Iren Tsibranska published in the *Journal of Chemical Technology and Metallurgy*, 50, 1, 2015, 3-12.

This article was submitted by SyringeFilter.com LLC ([www.syringefilter.com](http://www.syringefilter.com)). For any additional questions, syringe filter samples or a copy of the cited article, please just send over an email! If you would like to purchase, use the discount code “KHEMIA” at checkout and received 20% off your order.

### [Khemia Software User’s Group on LinkedIn:](#)

*We started this up back in 2015. I strongly encourage all of you to join, ask questions and interact with one another. As a group, between Khemia and its clients, there is a massive knowledge base on all aspects of the laboratory business. Please do search for “Khemia Software User’s Group on LinkedIn and ask to join! I will try to do my part and post notes, tips, etc. more often. That’s one of my New Year’s resolutions!*

## NEMC: Laboratory Informatics Session

For over eight years now, I have run the LIMS – now Laboratory Informatics – Session at NEMC ([www.nemc.us](http://www.nemc.us)). We always have a number of terrific talks from various LIMS vendors, clients and consultants. NEMC 2018 will be held in New Orleans on August 6-10<sup>th</sup>. Please drop by, come to our session and say hello! Any questions regarding the LIMS session, please just send me, Robert Benz, an email at [rbenz@khemia.com](mailto:rbenz@khemia.com). Also, as I am always looking for speakers, whether it be this year or for next, think about giving a talk!

## Evaluation of Temperature Performance at Various Locations for the COD Block Heaters

For the COD test (EPA Method 410.4), the heating block must achieve and maintain a temperature of 150°C for 2 hours. A central port has traditionally been provided in heating blocks for temperature measurement and the controller adjusted if the reference thermometer showed variation.

However, to ensure the temperature objectives were being met at other positions in the block, additional ports should

be checked. In the case of the SmartBlock™, four additional temperature ports are provided. If these ports do not exist, then measure the block temperature directly allowing for slight variations, if consistent and uniform, from the central temperature measurement port as a temperature measurement port is generally a slender port to snugly fit a thermometer. This should be done at four different geographical positions around the block.

A NIST certified thermometer must be used or compliance purposes. Ideally, two NIST certified thermometers are used so as a direct comparison may be made from the central position port to reference ports/vessels in the “north”, “south”, “east”, and “west”.

### **Environmentally Conscious Donation**

*Every year I make a few small contributions to what I feel are environmentally friendly, good organizations. These have included Mote Marine Laboratory & Aquarium ([www.mote.org](http://www.mote.org)), the Washington Trails Association ([www.wta.org](http://www.wta.org)), jLee Foundation for the Arts & Sciences ([www.jleefoundation.org](http://www.jleefoundation.org)) and Friends of the Smokies ([www.friendsofthesmokies.org](http://www.friendsofthesmokies.org)). Likewise, Khemia has made donations to Mote Marine Laboratory & Aquarium, the jLee Foundation for the Arts & Sciences and the Washington Trails Association – see our blog for details. Whether hiking, scuba diving/snorkeling or camping, there is nothing better than being outdoors in a pristine area. And, I'll confess, if I am away from the office, it is often because I am off camping in the Smokies with my son.*

*This year, please send some recommendations to organizations you feel are valuable and Khemia will make a donation to one of them before year end.*

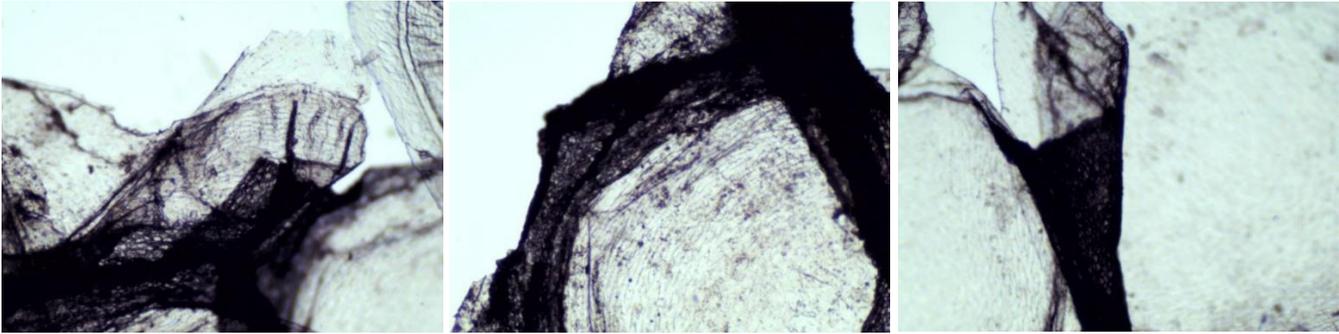
COD blocks typically use one of two styles of temperature controllers – an On/Off or a PID controller. On/Off controllers have been extremely common in heating blocks, particularly older blocks and some newer models. PID controllers have a much tighter bandwidth at setpoint and allow for much smaller variations in temperature. With a PID-type controller, a variation around 0.5°C is normal though 0.5 to 1.0°C is common. Blocks are typically “tuned” at 150°C during the first “burn-in” run after manufacture.

Heating blocks should come with a certificate of analysis (CoA) from the manufacturer. This along with all temperature checks should be safely recorded and stored so as they may be shown to an auditor of the laboratory at any time.

This article was written by Mark Gilbert from Columbia Analytical Instruments ([www.caisc.com](http://www.caisc.com)). For more information regarding proper block temperature testing techniques or for product information about SmartBlock™ line of products for COD or metals digestion please contact Mark at [mgilbert@caisc.com](mailto:mgilbert@caisc.com) or (803) 732-5118.

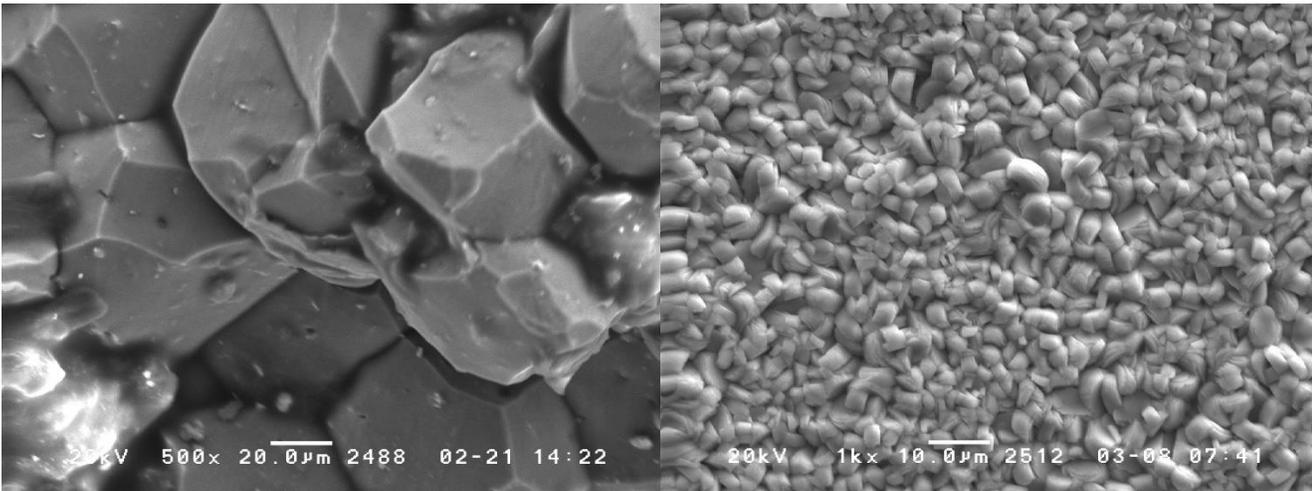
## Microscopy Corner

Take a look at the images below (and, I'll apologize – these were taken off my microscope at the house and the camera unfortunately adds 4X). Any guesses?



These images are from the shed skin of a Kenyan Sand Boa (*Gongylophis colubrinus*).

Needless to say, of much higher quality are the images below from [RTI Laboratories](#)' Materials Testing Division:



500X – Fracture surface showing intergranular fracture along grain boundary of a high strength low-alloy steel sample (stabilizer bar).

1000X – Calcium Modified Zinc Phosphate conversion coating (also known as Scholzite crystal) on steel. Used to convert steel surfaces for bonding to rubber (such as in bonding rubber to metal in bushings).

## Newsletter 101!

Want to get this newsletter but not on the mailing list? Great! Just send me an email at [rbenz@khemia.com](mailto:rbenz@khemia.com) and ask to be placed on the email list. Getting it but do not want to? No problem! Our apologies. Just asked to be removed.

Want to submit an article? That would be terrific! Please let me know and send over a rough draft. Suggestions? We'd love to hear them!

Robert BENZ, Director of Sales & Marketing, [LinkedIn](#) | [Blog](#)