MAY 2022 | ISSUE NO.2

CSEA NEWS & VIEWS

The Official Newsletter for the California Society of Environmental Analysts

WELCOME BACK!

Welcome to the second edition of the California Society of Environmental Analysts newsletter!

The CSEA Board of Directors encourages each of you to participate actively. Become a member! Share ideas and thoughts. Ask questions - none is too small or too dumb. All of us, every member, has asked a thousand questions in and around the laboratory, and if smart, will ask a thousand more.

Read on to learn more about our organization's history and mission, meet some key members of our analyst community, and gain some practical guidance for analysts.

BACK TO BASICS

Written by Rachel Van Exel, CSEA Vice President

Whether you're a new analyst or a seasoned pro, it's important to understand why we do what we do. Specifically, today I'd like to highlight the importance of understanding reporting limits. When a customer shares their requirements, it's most helpful if they share the source of the requirement and as we need to understand what that means in terms of reporting results. This happened to me once: the customer had a limit of 15 mg/kg. I reported a sample result of 11 mg/kg, only to find myself in an internal debate with coworkers as to whether any value under 15 mg/kg was to be reported as not detected. I later learned from the customer that the limit was a regulatory maximum level they could not exceed, and that results less than the limit were acceptable since they provided evidence that the sample result did not exceed the regulatory maximum. Many customers in our industry need our reporting levels to meet regulatory limits, but we only truly know if we ask. So, let's be sure to ask so we all "know the why" and meet our customer's needs.

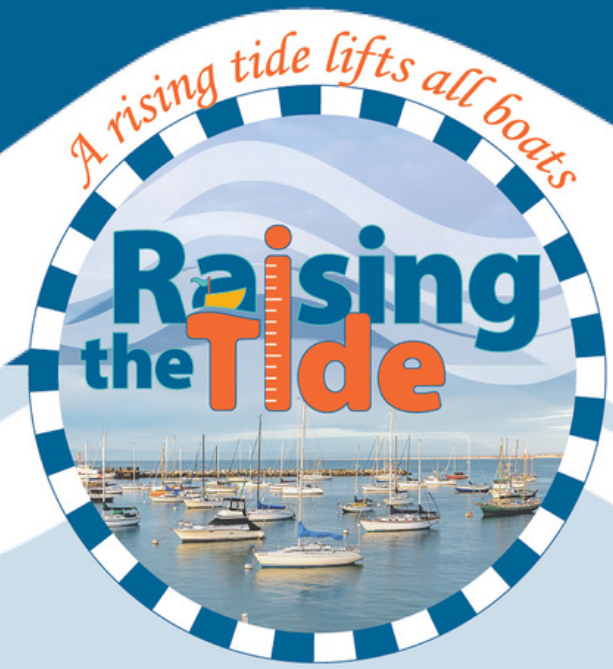
INSIDE THIS ISSUE:

SAVE THE DATE!

The California Environmental Laboratory Accreditation Program (ELAP) is excited to announce the second ELAP Conference

MAY 31 - JUNE 3, 2022

Registration information will be available soon.
Visit the ELAP Conference Page often to stay informed of the latest updates.



2022 ELAP Conference featuring CSEA

ELAP is partnering with the California Society of Environmental Analysts (CSEA) to bring the laboratory community back together to engage in conversation, facilitate impactful networking, and, of course, provide you with informative and interesting presentations from some of the country's most inspiring environmental professionals.

The conference theme, Raising the Tide, encapsulates our goals for continuous improvement in a diverse laboratory industry. The first day will feature programming by CSEA, designed collaboratively to advance laboratory analysts and highlight their work. Information will be posted to the ELAPCon webpage as it becomes available.

ELAP
Environmental Laboratory Accreditation Program
STATE WATER RESOURCES CONTROL BOARD

CHECK US OUT!

CALIFORNIA Water Boards

New feature!

Analyst Highlight

WE MET UP WITH ROCKSTAR ANALYSTS TO SEE WHAT PUSHES THEM TO EXCEL

Paul Raya has worked as an Environmental Specialist at Orange County Sanitation District for 4 years.

Paul Raya
Environmental Specialist at OC Sanitation District

Hello, my name is Paul Raya and I'm an Environmental Specialist with the Orange County Sanitation District. I've been working at OC San for approximately 4 years now, first as an Environmental Technician and then recently as an Environmental Specialist in Analytical Chemistry. Prior to this I worked for 2 years as a Laboratory Assistant for the Las Virgenes Municipal Water District. This pathway I took in being an analyst in the water quality and wastewater treatment field stemmed from a tour I took at the Hyperion Water Reclamation Plant. I was inspired by all the sampling and testing involved to both maintain a treatment plant and ensure environmental protection.

Overall, it's the environmental impact aspect of my work that drives me as an analyst. I've been involved with environmental work for some time now. It began when I performed a focused Atmospheric Research study at the La Brea Tar Pits where my team was able to quantify the impact of the tar seeps on LA County's air pollution. It was this work that laid down the foundation for my career as I knew I wanted to apply my analyst skills and background in Chemistry to both help protect the environment and help improve it for the future.

It has been an amazing opportunity to work and learn at the lab at OC San. Since I've been here, they've allowed ample opportunities for cross training within the various groups. In time I was able to advance and broaden my skill sets which in turn allowed me to help more in the lab. It's this level of teamwork that keeps my lab so successful. There is constantly so much work to get done and it wouldn't be possible to perform it all if not for the consistent cooperation between the analysts. We can rely on one another to be as efficient as possible to meet all our deadlines and produce accurate results.

Since I became an analyst in the water quality and wastewater field, I have loved being able to see day-to-day how all the testing being preformed directly impacts the treatment plants efficacy and subsequently the protection of the environment. The work we do in this field is very important to both public health and the world around us. As an analyst I get to help produce and report out all associated results to help ensure we are meeting our reporting limits and that the treatment process is running smoothly. In the future, I hope to continue to take advantage of all the learning opportunities here at OC San to further broaden my skills as an analyst.

HISTORICAL ANALYSES

CSEA BOARD MEMBER

Robert E. Benz

Remembering the why, how, and when can facilitate appreciating what you do today. As laboratory analysts, this can be especially true. It is all too easy to forget the history. Embracing the work which occurred prior enables even the most mundane laboratory task to become a fascinating glimpse into the analytical past.

> *"The story about BODs leads to a perfect example of history making the mundane interesting as it is a fantastic analytical example to tease apart from a historical perspective..."*
>
> - Robert E. Benz
> CSEA Board Member /HORIZON Lab Systems/CliniSys

Firstly, I could not pretend to throw stones. I was equally as guilty as any bench chemist of not recognizing the history behind the analyses I performed. I embraced new technology as quickly as I could implement it. My introduction to a more historical perspective I credit to my former lab director. One morning, when I had just moved to become the wet chemistry manager from the volatiles department, I was informed the dissolved oxygen probe was not working for reading BODs (biochemical oxygen demand).

Then, minutes later, I was informed the backup had not been stored properly and was non-functional. My lab director, and luckily still good friend, simply stated we better get going on setting up a Winkler titration as all the other probes were in the field. At this, he handed me an old copy of Standard Methods. Fortunately, though previously unbeknownst to me, we were certified for the titration, and I can confirm the Winkler method worked great. So it was that I began reading Standard Methods every morning upon stepping into the lab for the first 15-20 minutes. This simple reading exercise again opened new doors and garnered my interest in antiquated chemistry text to match that I already had in biology. The story about BODs leads to a perfect example of history making the mundane interesting as it is a fantastic analytical example to tease apart from a historical perspective as many of us have run it, some of us have used both DO probes and Winkler titrations to determine the oxygen content, and now many employ automation. For starters, BOD is a bioassay procedure that measures the aerobic biological and chemical breakdown of degradable organic material present in a given water source. It is funny. If you ask many environmental analysts "Do you run any bioassays?" they'll immediately say "No." But, if you ask them do you run any BODs, they'll respond, "By the hundreds!" I digress.

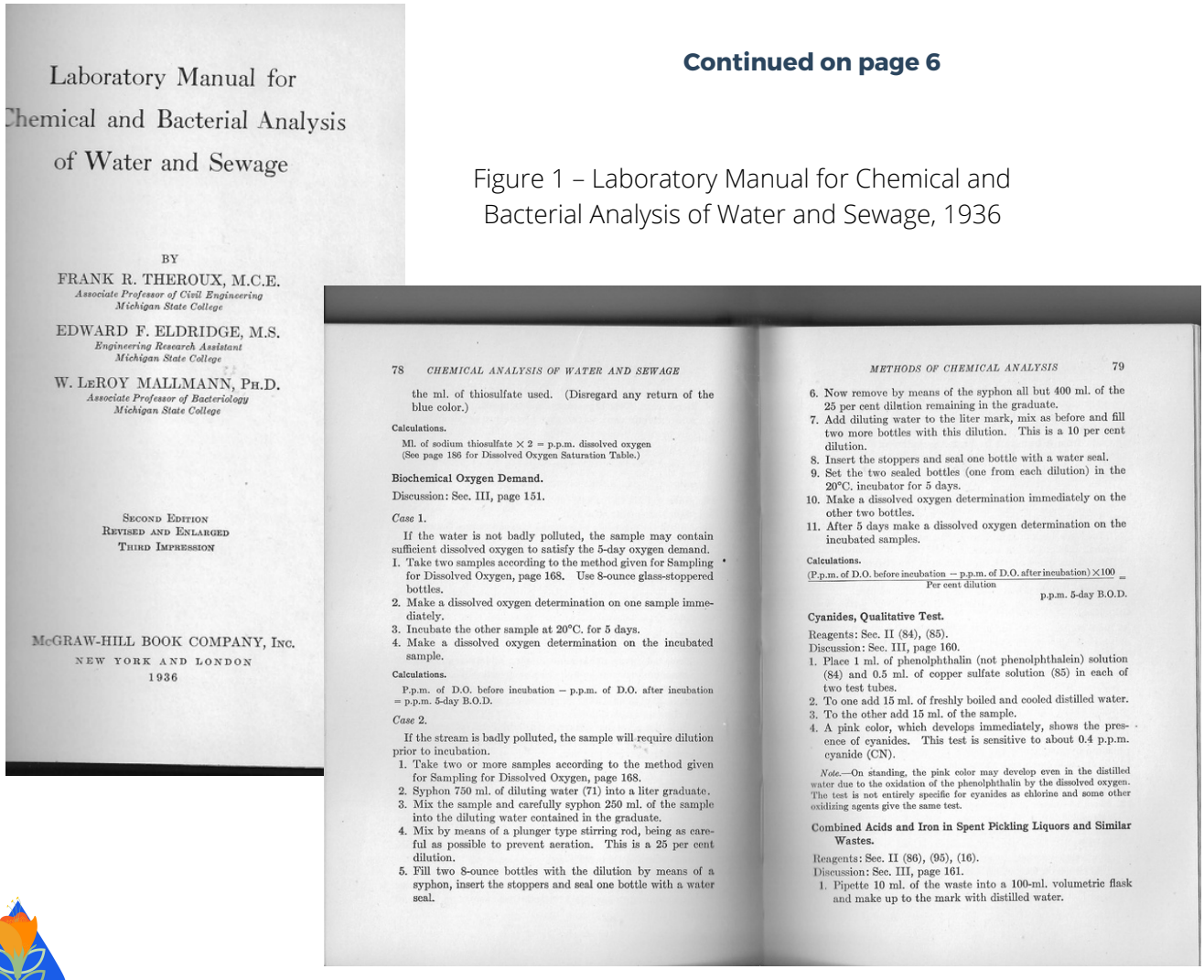
Continued on page 5.

HISTORICAL ANALYSES (CONTINUED)

BOD5 became a published method in 1908 for the definitive test of organic pollution of rivers under the Royal Commission on River Pollution and the Royal Commission on Sewage Disposal. The standard temperature at which BOD testing was carried out was first proposed by the Royal Commission of Sewage Disposal in its eighth report in 1912 at 65 ˚F. This was later standardized at 68 ˚F and then 20 ˚C. When comparing the latest BOD Method 5210B in the Standard Methods for the Examination of Water and Wastewater to older text such as that found in Analysis of Water and Sewage by Theroux, Eldridge and Mallmann from 1936, it is very noticeable how little has changed.

Both initially and years following, the proposed 5 days was tested. The Royal Commission of Sewage Disposal proposed 5 days as an adequate test period for rivers in the UK. Longer periods were investigated in North America, ranging between 1 day and 20 days in the mid-20th century. However, in terms of approximations, 68% within 5 days provided the most usable option. This 5-day protocol provided acceptably reproducible results emphasizing carbonaceous BOD has been endorsed by the U.S. EPA since The Federal Water Pollution Control Act Amendments (Clean Water Act) became law in 1972. The creation of the National Pollutant Discharge Elimination System (NPDES) established BOD5, TSS, fecal coliform bacteria and pH as conventional pollutants.

Continued on page 6



Laboratory Manual for
Chemical and Bacterial Analysis
of Water and Sewage

BY
FRANK R. THEROUX, M.C.E.
Associate Professor of Civil Engineering
Michigan State College
EDWARD F. ELDRIDGE, M.S.
Engineering Research Assistant
Michigan State College
W. LEROY MALLMANN, PH.D.
Associate Professor of Bacteriology
Michigan State College

SECOND EDITION
REVISED AND ENLARGED
THIRD IMPRESSION

McGRAW-HILL BOOK COMPANY, INC.
NEW YORK AND LONDON
1936

78 CHEMICAL ANALYSIS OF WATER AND SEWAGE

the ml. of thiosulfate used. (Disregard any return of the blue color.)

Calculations.

Ml. of sodium thiosulfate × 2 = p.p.m. dissolved oxygen
(See page 186 for Dissolved Oxygen Saturation Table.)

Biochemical Oxygen Demand.

Discussion: Sec. III, page 151.

Case 1.

If the water is not badly polluted, the sample may contain sufficient dissolved oxygen to satisfy the 5-day oxygen demand.

1. Take two samples according to the method given for Sampling for Dissolved Oxygen, page 168. Use 8-ounce glass-stoppered bottles.
2. Make a dissolved oxygen determination on one sample immediately.
3. Incubate the other sample at 20°C. for 5 days.
4. Make a dissolved oxygen determination on the incubated sample.

Calculations.

P.p.m. of D.O. before incubation − p.p.m. of D.O. after incubation = p.p.m. 5-day B.O.D.

Case 2.

If the stream is badly polluted, the sample will require dilution prior to incubation.

1. Take two or more samples according to the method given for Sampling for Dissolved Oxygen, page 168.
2. Syphon 750 ml. of diluting water (71) into a liter graduate.
3. Mix the sample and carefully syphon 250 ml. of the sample into the diluting water contained in the graduate.
4. Mix by means of a plunger type stirring rod, being as careful as possible to prevent aeration. This is a 25 per cent dilution.
5. Fill two 8-ounce bottles with the dilution by means of a syphon, insert the stoppers and seal one bottle with a water seal.

METHODS OF CHEMICAL ANALYSIS 79

6. Now remove by means of the syphon all but 400 ml. of the 25 per cent dilution remaining in the graduate.
7. Add diluting water to the liter mark, mix as before and fill two more bottles with this dilution. This is a 10 per cent dilution.
8. Insert the stoppers and seal one bottle with a water seal.
9. Set the two sealed bottles (one from each dilution) in the 20°C. incubator for 5 days.
10. Make a dissolved oxygen determination immediately on the other two bottles.
11. After 5 days make a dissolved oxygen determination on the incubated samples.

Calculations.

$$\frac{\text{(P.p.m. of D.O. before incubation} - \text{p.p.m. of D.O. after incubation)} \times 100}{\text{Per cent dilution}} = \text{p.p.m. 5-day B.O.D.}$$

Cyanides, Qualitative Test.

Reagents: Sec. II (84), (85).
Discussion: Sec. III, page 160.

1. Place 1 ml. of phenolphthalin (not phenolphthalein) solution (84) and 0.5 ml. of copper sulfate solution (85) in each of two test tubes.
2. To one add 15 ml. of freshly boiled and cooled distilled water.
3. To the other add 15 ml. of the sample.
4. A pink color, which develops immediately, shows the presence of cyanides. This test is sensitive to about 0.4 p.p.m. cyanide (CN).

Note.—On standing, the pink color may develop even in the distilled water due to the oxidation of the phenolphthalin by the dissolved oxygen. The test is not entirely specific for cyanides as chlorine and some other oxidizing agents give the same test.

Combined Acids and Iron in Spent Pickling Liquors and Similar Wastes.

Reagents: Sec. II (86), (95), (16).
Discussion: Sec. III, page 161.

1. Pipette 10 ml. of the waste into a 100-ml. volumetric flask and make up to the mark with distilled water.

Figure 1 – Laboratory Manual for Chemical and Bacterial Analysis of Water and Sewage, 1936

HISTORICAL ANALYSES (CONTINUED)

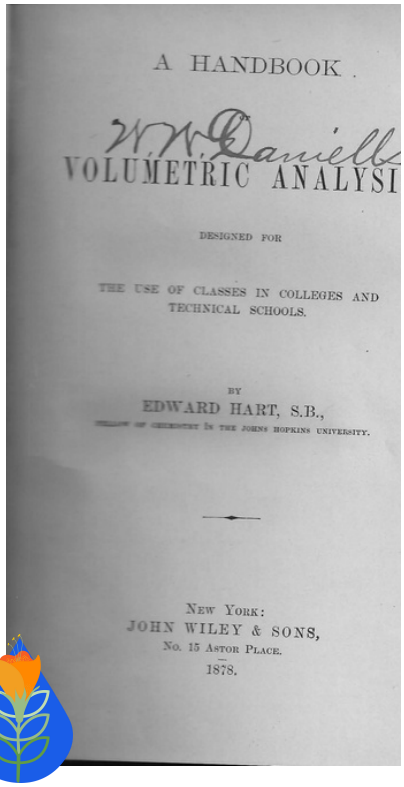
Want to take a guess at the first state to begin issuing BOD5 performance evaluation samples prior to the EPA issuance of the first Water Pollution Quality Assurance Study (WP001) in 1978? California.

Of course, no BOD testing can occur unless there is a means for determining dissolved oxygen. A number of methods for determining dissolved oxygen in water exist, note Fig 2 for a historical perspective, however, the Winkler test became the method of choice. The Winkler test was developed by Ludwig Wilhelm Winkler while working at Budapest University on his doctoral dissertation in 1888. The Winkler titration, with modifications over time, can be found in Standard Methods all the way up until the APHA (American Public Health Association), 2015. Standard Methods for the Examination of Water and Wastewater-. No: 4500-O C. Winkler Method, Azide Modification, American Public Health Association, 22nd Edition. Today, most use Standard Methods 4500-O G. Membrane Electrode Method for determining dissolved oxygen. The invention of the dissolved oxygen probe can be linked to Dr. Leyland Clark working with YSI scientists in 1956. This was a polarographic electrode. The galvanic electrode was developed later, but it measures DO the same way as the polarographic sensor.

And, now you have gone down the rabbit hole. You started out with BOD as run today, dove back to 1908 and then further to 1888 for the Winkler method and jumped back to the year 1956. You have now glimpsed some of the history of BOD and dissolved oxygen determinations. But surely now you've realized a stone has been left completely unturned. What about the most basic bit, oxygen itself? When was that discovered?! Who discovered it?

Continued on page 7

Fig 2 – Volumetric Analysis, 1878



A HANDBOOK

VOLUMETRIC ANALYSIS

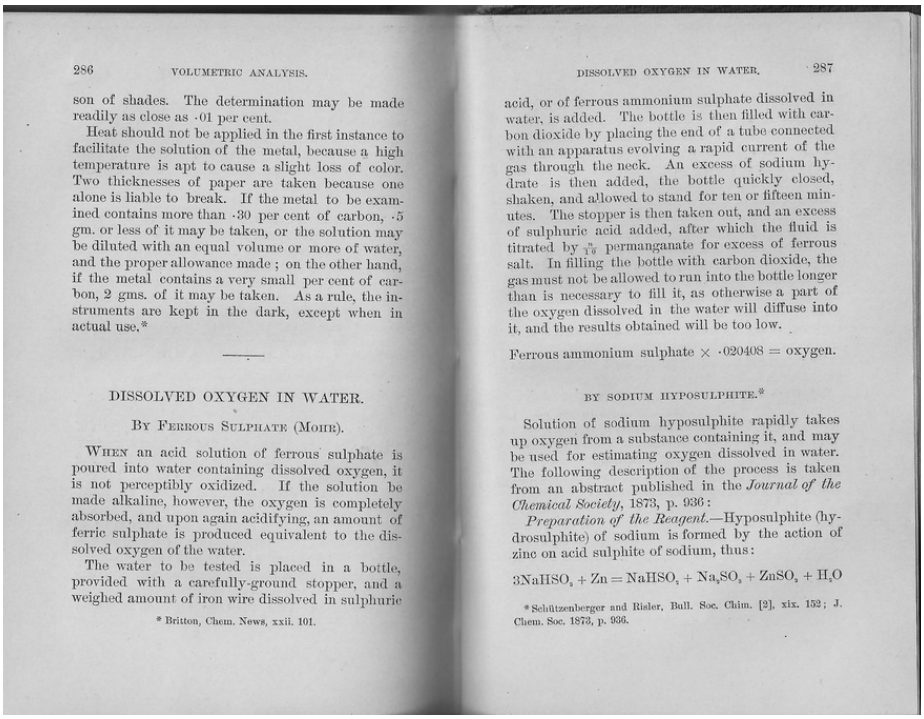
DESIGNED FOR

THE USE OF CLASSES IN COLLEGES AND TECHNICAL SCHOOLS.

BY

EDWARD HART, S.B.,

NEW YORK:
JOHN WILEY & SONS,
No. 15 ASTOR PLACE.
1878.



286 VOLUMETRIC ANALYSIS.

son of shades. The determination may be made readily as close as ·01 per cent.

Heat should not be applied in the first instance to facilitate the solution of the metal, because a high temperature is apt to cause a slight loss of color. Two thicknesses of paper are taken because one alone is liable to break. If the metal to be examined contains more than ·30 per cent of carbon, ·5 gm. or less of it may be taken, or the solution may be diluted with an equal volume or more of water, and the proper allowance made; on the other hand, if the metal contains a very small per cent of carbon, 2 gms. of it may be taken. As a rule, the instruments are kept in the dark, except when in actual use.*

DISSOLVED OXYGEN IN WATER.

BY FERROUS SULPHATE (MOHR).

WHEN an acid solution of ferrous sulphate is poured into water containing dissolved oxygen, it is not perceptibly oxidized. If the solution be made alkaline, however, the oxygen is completely absorbed, and upon again acidifying, an amount of ferric sulphate is produced equivalent to the dissolved oxygen of the water.

The water to be tested is placed in a bottle, provided with a carefully-ground stopper, and a weighed amount of iron wire dissolved in sulphuric

* Britton, Chem. News, xxii. 101.

DISSOLVED OXYGEN IN WATER. 287

acid, or of ferrous ammonium sulphate dissolved in water, is added. The bottle is then filled with carbon dioxide by placing the end of a tube connected with an apparatus evolving a rapid current of the gas through the neck. An excess of sodium hydrate is then added, the bottle quickly closed, shaken, and allowed to stand for ten or fifteen minutes. The stopper is then taken out, and an excess of sulphuric acid added, after which the fluid is titrated by $\frac{n}{10}$ permanganate for excess of ferrous salt. In filling the bottle with carbon dioxide, the gas must not be allowed to run into the bottle longer than is necessary to fill it, as otherwise a part of the oxygen dissolved in the water will diffuse into it, and the results obtained will be too low.

Ferrous ammonium sulphate × ·020408 = oxygen.

BY SODIUM HYPOSULPHITE.*

Solution of sodium hyposulphite rapidly takes up oxygen from a substance containing it, and may be used for estimating oxygen dissolved in water. The following description of the process is taken from an abstract published in the *Journal of the Chemical Society*, 1873, p. 936:

Preparation of the Reagent.—Hyposulphite (hydrosulphite) of sodium is formed by the action of zinc on acid sulphite of sodium, thus:

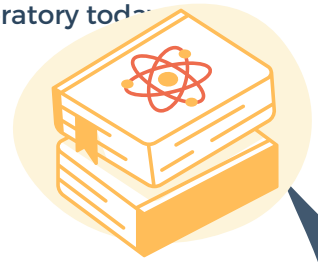
$$3NaHSO_3 + Zn = NaHSO_3 + Na_2SO_3 + ZnSO_3 + H_2O$$

* Schützenberger and Risler, Bull. Soc. Chim. [2], xix. 152; J. Chem. Soc. 1873, p. 936.

HISTORICAL ANALYSES (CONTINUED)

Oxygen was isolated by Michael Sendivogius, a Polish alchemist and philosopher before 1604 and noted as a life-giving substance. It is commonly believed that the element was discovered independently by Carl Wilhelm Scheele in Uppsala, Sweden in 1773 or earlier and again by Joseph Priestley in Wiltshire, England in 1774. Priority is often given for Priestley because his work was published first. Priestley, however, called oxygen "dephlogisticated air" and did not recognize it as a chemical element. The name oxygen was coined in 1777 by Antoine Lavoisier who first recognized oxygen as a chemical element.

While knowing the history might not make you functionally a better analyst, knowing the history does make you a more complete analyst and gives depth and meaning to tasks you do daily. From the word chemistry itself, quite a story there, to the creation of the first generation of LIMS in the early 1980s, there is a fascinating history behind everything we do in the laboratory tod



Like this content & want to see more articles like this in our newsletter? Contact us & let us know what content you want to see in our next edition!

THE VALUE OF CHECKLISTS

Written by Carolyn Ruttan
CSEA President

At one point or another we have all used checklists, from to-do-lists, to aids in ensuring complex applications are not missing required elements, they are our memory-jogger. A quick and easy way to avoid mistakes, because, after all, we are human, i.e., not perfect. Perhaps the most telling example of the use of a checklist was promulgated by Atul Gawande. He proved in his surgical profession that checklists could **SAVE LIVES**. In this newsletter I am providing the link to an Atul Gawande Ted Talk on checklists because the talk is so relevant to the analytical profession. (See Resources, page 12)

For the upcoming ELAP/CSEA conference we invited Atul Gawande to speak on checklists. He respectfully declined, his time is now being used to lead USAID's global health initiative on the pandemic and war fronts. We will invite him at a later date. Meanwhile, we will have a talk on checklists by myself. I suggest that the use of checklists could prevent a mishap, rework, or data being provided to clients that is unreliable. It is only a tool but one worth developing and using every time we are going to do the same thing over and over again OR try something we've never done before. Please listen in to my checklist talk at the ELAP/CSEA e.

TOP 3 ASSESSMENT FINDINGS

OUR EXPERTS TALK ABOUT THE TOP 3 COMMON ELAP ASSESSMENT FINDINGS

Written by Tony Francis PhD., CSEA Board Member

California ELAP has recently partnered with Third-Party Assessment agencies to evaluate your laboratory's compliance with current standards and regulations for accreditation. Laboratories should view these assessments as an opportunity for improvement, not as a time for someone to just point out things that are wrong with the laboratory's operations. I began performing assessments for ELAP a little over a year ago and I have observed some themes with the deficiencies cited. Here is a list of the Top 3 Assessment Findings (based on my own and other assessors' experience).

3

The laboratory not running proficiency test (PT) samples in the same manner as routine environmental samples. I have often observed PT samples run in batches with extra quality control samples, run in duplicate or triplicate, or with PT samples from previous studies.

2

Laboratory records do not contain sufficient information for the historical reconstruction of sample data. These findings involve missing information for traceability such as the identification of equipment, reagent and standard lot numbers (or other traceable identification), and time critical steps. The goal is to have the records speak for themselves.

1

ELAP requirements not included, or referenced, in the laboratory's quality manual. Current ELAP regulations include Technical Manager notifications, PT procedures for "not acceptable" results, and specific PT prohibitions. These items can be found in Title 22, CCR, § 64812.00 (f), § 64802.15 (h)and (j), and § 64802.15 (b)(2) and (3), respectively.

CALIFORNIA STATEWIDE TOXICITY PROVISIONS

CSEA BOARD MEMBER

Katie Payne

The process to introduce uniform whole effluent toxicity requirements for the State of California began more than a decade ago. After much debate and discussion, the State Water Resources Control Board unanimously voted to adopted the California Statewide Toxicity Testing Provisions in December of 2020.

The final resolution and Provisions language are still pending review and approval from the California Office of Administrative Law and USEPA, but the provisions are expected to take effect soon.

These Provisions are specifically for Inland Surface Waters, Enclosed Bays, Estuaries, and Coastal Lagoons. They do not apply to ocean waters yet, but they are expected to be a topic for potential incorporation into the California Ocean Plan in the next three years.

One of the biggest broad-sweeping changes to come out of the Provisions is the application of the TST, or the "test of significant toxicity", as the single statistical analysis for toxicity data. Dischargers will be regulated on the in-stream waste concentration (or IWC) as compared to the laboratory control, and the results are reported as Pass or Fail.

If you'd like to learn more about how the Statewide Toxicity Testing Provisions might impact you, you can reach out to CSEA Board Member Katie Payne (katie.payne@enthalpy.com).

Is there something you'd like to see in the next CSEA newsletter? Let us know! info@calanalysts.org

calanalyst Vendor CORNER

The following businesses are vendor members associated with The California Society Environmental Analysts (CSEA). If you are interested in becoming a member with CSEA please join on our website. You can learn more at calanalysts.org/vendors.

A2LA WorkPlace Training (AWPT) is a non-profit organization dedicated to providing the highest-quality professional training and consulting services in the fields of management systems, conformity assessment, and precision measurement.

Visit A2LAWPT Website

email: mwade@A2LAWPT.org

SyringeFilter.com, LLC was established by two owners that work in and with laboratories closely, having well over 40 years of combined experience.

Noting the need for assorted syringe filters in many labs, they developed a way to manufacture a fine quality product at a very reasonable price.

Visit SyringeFilter.com Website

email: sales@syringefilter.com

From water/environment labs to government public health labs to private clinical labs, HORIZON is designed to be the LIMS of choice for any size lab. If you collect, process and test samples, HORIZON is your lab's solution.

Visit HORIZON Website

email: sales@horizonlims.com

AA2LA, the American Association for Laboratory Accreditation, is dedicated to the formal recognition of competent testing and calibration laboratories, medical laboratories, biobanking facilities, inspection bodies, product certification bodies, proficiency testing providers, and reference material producers.

Visit A2LA Website

email: jkeyser@a2la.org

IAS is a nonprofit, public-benefit corporation that has been providing accreditation services since 1975. IAS accredits a wide range of companies and organizations including governmental entities, commercial businesses, and professional associations.

Visit IAS Website

email: iasinfo@iasonline.org

Become a vendor of The California Society of Environmental Analysts today!

THE CSEA MISSION

Share ideas, experience, and resources to advance professional development for lab analysts so that they can provide the analysis and interpretation of environmental data of the highest quality.

THE CSEA VISION

- Commit to continuous enhancement of the validity of environmental data
- Promote the integrity and ethics of the profession from collection and analysis to interpretation and reporting of environmental data
- Strengthen customer trust in analytical data
- Develop mutually beneficial relationships among professionals through networking
- Provide a forum for the exchange of information representing lab analysts' interests
- Raise public awareness of the profession
- Enhance communication between the lab analysts' profession and policy-makers
- Represent the California lab analyst at the national level with subjects such as accreditation
- Increase the resources available to improve a lab's efficiency, ability, and cost effectiveness
- Act as a liason between regulatory agencies and membership
- Provide mentoring to members
- Evaluate new analytical methods and procedures

Connect with the CSEA Community!

calanalysts.org

calanalyst Resources & LINKS

Some useful resources to keep your finger on the pulse on industry news, updates and more! If you are a CSEA member, don't forget to check out the CSEA Membership Forum to share, learn and discuss topics exclusive to the environmental analyst community.

PODCASTS

The Conformance Cast: A Podcast by A2LA WorkPlace Training
Available on Spotify, Apple Podcasts and Audible.

ARTICLES

Helium Shortage Tips
https://www.calanalysts.org/post/helium-shortage-tips

VIDEOS

The Importance & Value of the Checklist
TED talk by Dr. Atul Gwande, author of the book Checklist Manifesto
https://m.youtube.com/watch?v=55Nc8nccPa0

Seas of Plastic
TED Talk by Capt. Charles Moore of the Algalita Marine Research Foundation
https://www.ted.com/talks/charles_moore_seas_of_plastic

Have a resource to share?
Email us at info@calanalysts.org