56th CANADIAN MINERAL ANALYSTS CONFERENCE AND EXHIBITION

PROGRAM AND ABSTRACTS

KAMLOOPS, BC

8-12 SEPTEMBER 2024

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Chairpersons' Message

On behalf of the 2024 Canadian Mineral Analysts Conference Committee, we would like to welcome you to the 56th Annual Canadian Mineral Analysts Conference held in beautiful British Columbia! We hope you enjoy your time at the Conference and look forward to meeting you. This conference is a great opportunity to learn about current advances in our field, network with colleagues and support initiatives of the CMA.

We are excited to host the Conference in our City as Kamloops is an ideal location for a mining related Conference. The City has a mining history going back over 100 years. We have many skilled mining personnel, independent laboratory workers as well as suppliers that call Kamloops their home. Our City is host to a number of mining related Conferences each year. You may even have attended the CMA Conference in Kamloops in 2017. If so, welcome back – we look forward to reconnecting with you!

We have made a few changes this year while planning the Conference. Sustainability measures have been included in a number of areas and we hope this has a positive impact on your experience. You will notice a significant reduction in paper usage for the Conference as we have provided the Conference Program in a digital form. Gifts for both technical talks and delegate bags have been included with sustainability in mind. The CMA Organizing Committee additions to the bags are reusable and, ultimately, compostable. Our tour to the BC Wildlife Park was planned specifically to involve conservation and sustainability.

There is a diverse selection of technical talks, including presentations from students at our local university, Thompson Rivers University. We hope you enjoy the workshops, technical talks, tours and social events that have been planned for you. Thank you to the exhibitors and sponsors of the conference. Your support is fundamental to the success of the CMA conference. We encourage you to visit the exhibitor booths, talk to sponsors of the CMA, and learn more about what these companies have to offer you and your company.

Lastly, thank you to the Organizing Committee, including members from New Gold's New Afton Mine and ALS Kamloops Metallurgy, for all of your efforts to ensure this year's Conference is a success.

Simone Bawtree
Site Manager
ALS Kamloops Metallurgy

Brenda Tremblay
Analytical Laboratory Manager
ALS Kamloops Metallurgy

Message from the Honourable Josie Osborne

Minister of Energy, Mines and Low Carbon Innovation

The 2024 Conference of Canadian Mineral Analysts.

On behalf of the Province of British Columbia, I am pleased to welcome you to the 2024 Conference of Canadian Mineral Analysts.

I want to acknowledge the organizers for their hard work on this incredible conference and every one of you for your commitment to building a sustainable and prosperous mineral exploration and mining sector in Canada. I also want to express my thanks to the City of Kamloops for opening its doors as a host.

B.C.'s mineral exploration and mining industry plays a vital role in the economic development of the province, providing more than 35,000 good family-supporting jobs for people in communities across the province. Last year mineral-exploration expenditure in the province was $643.5 million, 94.1% higher than in 2018 and mining production value is forecast to be up 57% from 2018. Looking over the past five years - exploration spending has totaled $2.8 billion with mining production at over $60 billion.

British Columbia is well-positioned for the transition to a clean future, responsibly producing some of the critical minerals and metals that are essential to fight climate change. We are already a strong contributor to global critical mineral supply chains, representing 54% of Canada's copper production. As Canada's only molybdenum producer. B.C. hosts over half of the critical minerals on Canada's critical minerals list including advanced exploration and development projects with copper, nickel, molybdenum, zinc, and others.

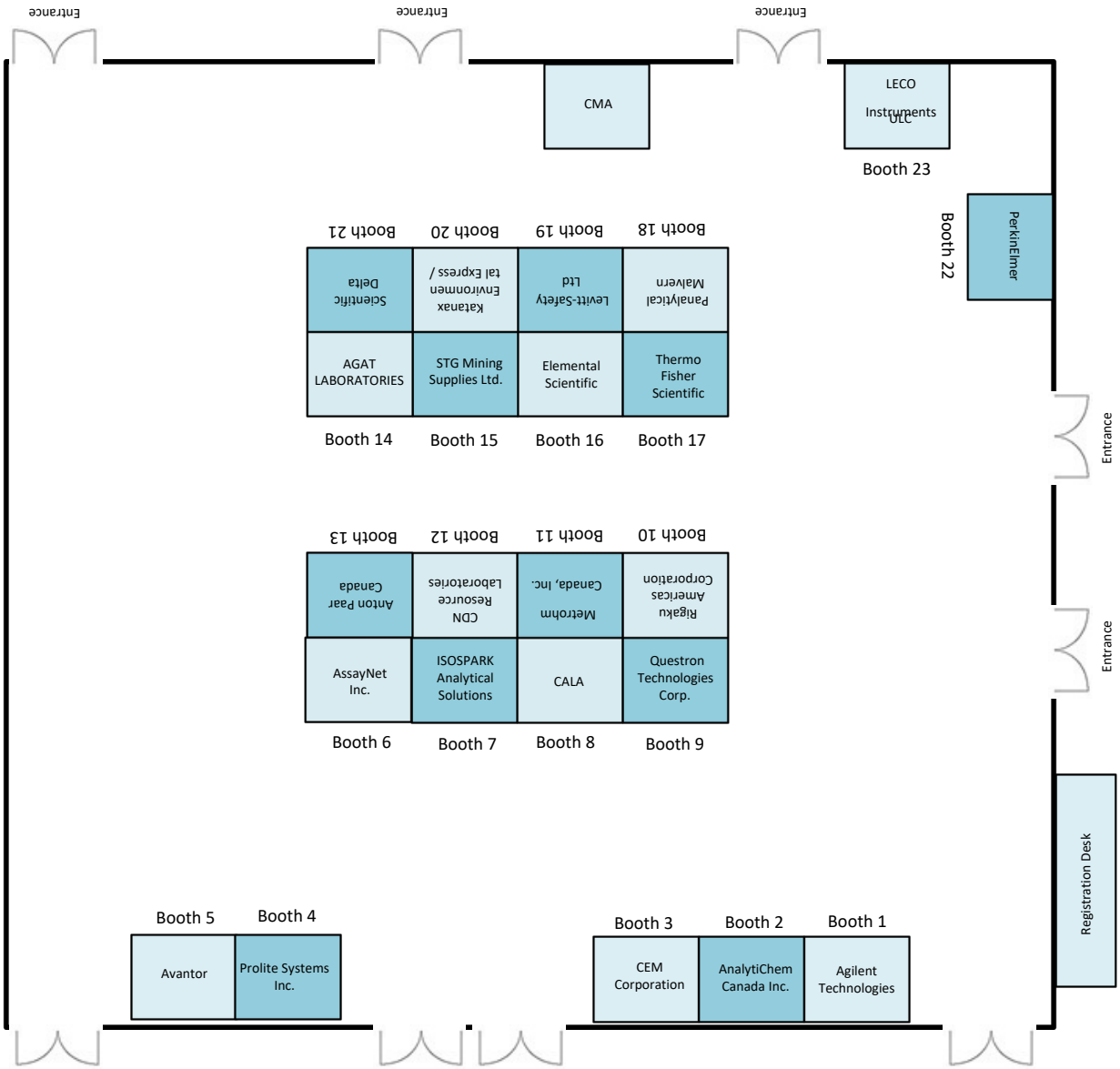
Our efforts are working, and we are committed to continue to emphasize British Columbia's position as a global leader. I believe with your expertise, innovative mindset, and visionary approach and through strong partnership and collaboration with First Nations, B.C.'s mineral exploration and mining sector has a strong and vibrant future. I am looking forward to seeing what we can achieve together.

Sincerely,

Josie Osborne

Minister Energy, Mines and Low Carbon Innovation

FLOOR PLAN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EXHIBITOR DESCRIPTIONS

AGAT Laboratories

https://agatlabs.com/

AGAT Laboratories is a highly-specialized Canadian company providing analytical services worldwide. With 43 locations coast to coast, we are the largest privately-owned laboratory network in Canada. AGAT's operations encompass 14 scientific divisions that provide full-service solutions to the Environmental, Energy, Mining, Industrial, Transportation, Agri-Food and Life Sciences sectors.

Aligent Technologies

www.agilent.com

Agilent Technologies leads the industry with robust, reliable instruments that provide the ability to analyze, confirm and quantify substances of interest. Our workflow solutions enable you to maintain stringent practices from sample preparation, through analysis, to final report. When combined with our informatics architecture, large quantities of data can be managed while preserving the integrity and security of the results. Agilent offers a complete line of GC, LC, MS and Spectroscopy instruments and technologies, as well as the related consumables

AnalytiChem

https://analytichem.com/

WThe AnalytiChem Canada manufacturing facility located in Baie D'Urfé, Québec is ISO 9001 registered and ISO 17025 & 17034 accredited. From this manufacturing center of excellence, we bring to our customers a range of high-quality, specialized products for analytical chemistry.
Our core expertise includes the manufacture of:

- Inorganic reagents and standards
- Oil-based standards (Conostan)
- Injection molding of acid resistant plastic products (DigiTUBE)
- Sample preparation equipment manufacturing (DigiPREP and SNRG Block)
- Glass and quartz manufacturing
- The machining of plastic and metal components.

Anton Paar

https://www.anton-paar.com/ca-en/

Anton Paar's diverse range of highly precise and robust laboratory and process measurement systems allows you to develop, monitor and control countless quality parameters in minerals and raw materials – from their chemical structures and composition to their macroscopic processing behavior. Essential additions in this field are Anton Paar's solutions for synthesis and sample preparation prior to analysis

AssayNet Inc.

www.assaynet.com

AssayNet is a robust and highly scalable client/server laboratory information management system (LIMS) designed specifically for mining laboratories. Conforming to ASTM level II specifications, it manages the entire laboratory workflow from sample reception, logging, and preparation to analysis and reporting. AssayNet features an intuitive, menu-driven interface that is easy to learn yet rich in features, providing access to a complete quality control (QC) program, quotations, invoicing, stock levels, inventories, and sample storage. By automating processes and integrating with instruments, AssayNet ensures reliable, efficient operations, optimizing costs and maximizing sample throughput, making it ideal for mine laboratory technicians, quality control, and management.

Avantor

https://ca.vwr.com/mining

Avantor, through its channel brand VWR and its own brands Anachemia and Klen, has long been your trusted global partner for a broad range of products and service solutions for mining laboratories.

We are the #1 manufacturer of fire assay flux, we manufacture high-purity chemicals, and we provide you access to thousands of chemical products, analytical instruments, equipment, safety supplies, lab consumables and furniture.

We have established a distribution network that reaches hundreds of mining labs and facilities across the world, with our own teams or specialized partners.

CALA Inc.

https://cala.ca/

CALA is an internationally recognized leader in providing the highest-quality accreditation of laboratories. Our commitment to objectivity and data integrity gives CALA-accredited laboratories lower risk and competitive advantage by ensuring that their customers receive data that can be trusted. We provide a unique combination of rigour, deep expertise and exceptional customer service that leads the way in ensuring that CALA-accredited laboratories are among the best in the world. All CALA services are designed and delivered to inspire excellence in laboratories; to promote a better understanding of laboratory test results by laboratory clients; and to earn the confidence of Regulators

CDN Resource Laboratories

https://cdnlabs.com/

CDN Resource Laboratories produces Certified Reference Material (CRMs) for the global mining industry.

CEM Corporation

https://cem.com/

CEM Corporation is a science-based technology company that has provided sample prep solutions for analytical analysis for almost 40 years. CEM manufactures systems that perform sample preparation for both gas and liquid chromatography as well as optical emission spectroscopy. CEM is proud to introduce the new BLADE microwave digestion system for ICP/MS and OES sample preparation. The BLADE is an automated sequential digestion system that will perform a complete digest in mere minutes. From routine to extreme samples, CEM's line of digestion equipment, including our popular MARS system and the BLADE, will digest it all. Stop by our booth to learn about simplifying your sample prep.

Delta Scientific

https://www.delta-sci.com./

Delta Scientific, is a Canadian-owned and operated distributor of high-quality lab products, specializing in supplying a wide range of products including chemicals, consumables, equipment, and ICP & ICP-MS standards, for use in multiple industries. Committed to exceptional customer service and tailoring solutions to fit your needs, we are proudly ISO 9001:2015 certified.

Elemental Scientific

https://www.icpms.com/

Elemental Scientific is the world leader in online impurities monitoring for semiconductor manufacturing, sample introduction and automation systems for detection of trace elements in liquid and solid samples. Our extensive portfolio will enhance the productivity and performance of any model of ICP or ICPMS instrument with advanced automation and accessories.

Enviromental Express / Katanax

https://katanax.com/

Environmental Express® is your trusted partner for innovation, development, and manufacture of sample collection, preparation, single-use consumables, and analysis equipment used in water, soil, and air regulatory compliance testing and other applicable markets. Our Zefon® portfolio of air quality products includes a full assortment of MSHA-approved wearable solutions designed for sampling and monitoring respirable crystalline silica in coal dust, as well as additional air sampling devices for other OSHA and NIOSH-regulated industrial hygiene applications. Safe, reliable, and capable of producing up to 30 samples per hour, our Katanax® line of fully automated electric fluxers utilize fusion technology for sample preparation of metals for XRF and ICP analysis to support high-throughput laboratory operations.

ISOSPARK Analytical Solutions

https://www.isospark.com/

Operates throughout North, Central and South America with a head office located in Montréal, Canada. Our company exclusively represents the SPECTRO and EDAX brands of AMETEK's material analysis division, the Los Gatos Research and FT-IR groups of ABB and ELEMISSION, a leader in Laser Induced Breakdown Spectroscopy [LIBS]. We are also the exclusive representative of QATM, a renowned manufacturer of equipment and consumables for materialography and a channel partner for ELTRA, a leading manufacturer of elemental analyzers, both divisions of Verder Scientific. We have recently joined with FINK & PARTNER, providing [FP]-LIMS analysis management software solutions for all industries, as well as with Advanced Material Solutions (AMS) to distribute the most advanced acoustic resonance NDT inspection systems.

LECO Instruments ULC

https://www.leco.com/

The one thing all laboratories need to be successful is results they feel confident in. Since 1936, millions of samples worldwide have been analyzed using LECO instruments for elemental analysis, thermal analysis, metallography, and mass spectrometry. Our comprehensive solutions for improving productivity include working with you to find the right equipment for the type of analysis you are doing — and providing you with the training, application support, and service you need to keep your lab running at its best.

Levitt-Safety Ltd

https://www.levitt-safety.com/

Levitt-Safety Ltd. is a leading Canadian provider of life safety products and services, dedicated to protecting people and the environment for over 85 years. With a broad portfolio that includes fire suppression, personal protective equipment, environmental safety solutions, and emergency response services, Levitt-Safety is committed to delivering the highest quality products, expert advice, and exceptional customer service. The company serves a wide range of industries, including manufacturing, oil and gas, mining, and healthcare, ensuring workplaces across Canada are safe, compliant, and prepared for any emergency.

Levitt-Safety is the exclusive distributor of Prevor Toxicology's cutting-edge safety products in Canada, bringing their world-class chemical decontamination solutions to Canadian industries. This partnership combines Levitt-Safety's deep understanding of the Canadian market with Prevor's expertise in chemical safety, offering businesses unparalleled access to essential tools for managing chemical risks. Through this exclusive distribution agreement, Levitt-Safety is proud to provide its customers with access to Prevor's advanced solutions, helping to safeguard employees and reduce the impact of chemical incidents across the country.

Malvern Panalytical

https://www.malvernpanalytical.com/

Our mining and geology customers value Malvern Panalytical's complete offerings of instrumentation, expertise and smart technologies for all steps of your mining process - from exploration to final product analysis. Lower grade ore deposits, sustainable energy and volatile market conditions pushes the mining industry towards predictive, sustainable and agile analytical solutions to improve safety, increase efficiency and develop new services and business models. Come to booth #27 to discover how we provide the complete analytical chain – sample preparation, certified reference materials, highest quality instrumentation, and the expertise to help you every step of the way with your mineralogical challenges.

Metrohm

https://www.metrohm.com/

Metrohm is one of the world's most trusted manufacturers of high-precision instruments for laboratory and process analysis. Our instruments and methods allow customers to work in a more accurate, reliable, environmentally compatible, and cost-effective way – helping them to be more successful than their competitors. Metrohm offers a comprehensive portfolio of analytical technologies ranging from titration and ion chromatography to near-infrared and Raman spectroscopy, as well as several other techniques.

Metrohm Canada is located in Mississauga and has local sales and service representations across the country. Our facility includes a laboratory and warehouse which greatly enhances our ability to support our customers from a technical perspective (analysis of customer samples) and from a supply chain management perspective (parts, consumables, instruments).

PerkinElmer

https://www.perkinelmer.com/

PerkinElmer is an industry leader in applied markets, providing laboratories globally with analytical instruments, accessories, services, and solutions that they need to succeed. Our solutions accelerate scientists' ability to detect, monitor, and manage contaminants and toxic chemicals impacting our environment through the development of innovative technologies and services – and by helping our customers meet their most complex challenges – we're improving human and environmental health.

Prolite Systems Inc.

http://www.prolitepiping.com/

Prolite Systems Inc. is a Canadian based international thermoplastic manufacturer, custom fabricator and distributor specializing in dual laminates and many other types of plastic industrial and municipal corrosion resistant process equipment. Our custom fabrication facilities affords us to be the leader in design of thermoplastics, dual laminates, fume hoods, acid scrubbers, piping and tanks. Our services include everything from design and manufacturing, to transport and installation.

Questron Technologies Corp.

https://questron.ca/

Questron Technologies Corp., founded in 1999, is a Canadian-owned engineering firm that specializes in automating sample preparation for analytical labs globally. Leveraging expertise in mechatronics, material science, and chemistry, Questron designs and manufactures advanced, easy-to-use scientific equipment, including the Vulcan Workstation, QWave Microwave Sample Digestion System, and QBlock hot blocks. We collaborate directly with leading laboratories to create customized solutions that address their unique challenges, ensuring that our products are safe, reliable, and efficient. At Questron, we are committed to advancing scientific inquiry by providing top-notch tools and services to the global scientific community.

Rigaku Americas

https://rigaku.com/

Since its inception in 1951, Rigaku has been at the forefront of analytical and industrial instrumentation technology. Today, with hundreds of major innovations to their credit, the Rigaku group of companies are world leaders in the fields of general X-ray diffraction, thin film analysis, X-ray fluorescence spectrometry, small angle X-ray scattering, protein and small molecule X-ray crystallography, Raman spectroscopy, X-ray optics, semiconductor metrology, X-ray sources, computed tomography, nondestructive testing and thermal analysis.

STG Mining

https://stgmining.com/

STG Supplies is a multinational group specialized in equipment, supplies, and services for mining laboratories.

Thermo Fisher Scientific

https://www.thermofisher.com/

IWe keep science moving forward by offering over 2.5 million products and extensive support services to the research, production, healthcare, and science education markets. Count on us for an unrivaled selection of lab, life sciences, safety, and facility management supplies—including chemicals, equipment, instruments, diagnostics, and much more—along with exceptional customer care from an industry-leading team that's proud to be part of Thermo Fisher Scientific

WORKSHOPS

WORKSHOP 1

SAMPLING THEORY

Norman O. Lotter

Ph.D., P.Eng.

September 9, 2024

8:00 AM - 11:30 AM

Seminar will cover the following topics:

- ✔ Definitions of Terms.
- ✔ Formulation and use of Minimum Sample Mass Models for various ore forms and metallurgical products (SAG mill feed, drill core, ball mill feed, flotation concentrate, final tailings).
- ✔ The rules of unbiassed sample extraction.
- ✔ The Semivariogram to demarcate autocorrelated and independent time, plus other useful features such as the estimation of fundamental error of sample extraction
- ✔ The Safety Line to govern the required crushing and grinding at what sample topsizes to ensure safe, representative delivery of the analyte to the chemist

Apart from these lectures, there will be a series of selected tutorials on Excel, attendees please bring a laptop

WORKSHOP 2

TRAINING IN THE LABORATORY

CALA

September 9, 2024

1:00 PM - 4:00 PM

Lab staff and management often find themselves thrust into the role of trainer, often with little or no experience in how to effectively train.

Whether it is training new staff in everything they need to know, or training existing staff on new equipment or procedures, how we conduct the training has a direct impact on how well the trainees perform.

This half-day session will look at the importance of planning for the required outcomes, approaches to successful training, and how to assess whether your trainees are competent.

TECHNICAL SESSIONS

Tuesday September 10 | 2024

Time	Presenter	Co-author	Title	Organization
7:00	*Hilltop*		*Breakfast*	*SPONSORED BY: Bruker*
8:00	*Host*		*Opening Remarks*	*TECHNICAL PROGRAM SPONSORED BY: Brogan Fire & Safety*
8:10	Norman Lotter		Minerals as Semicondiuctors	FlowSheets Metallurgical Consulting Inc.
8:30	Marie-Ève Provencher	Alexander Komelkov Ivan Rodriguez Duran	X-ray fluorescence & sample preparation by fusion: A winning alternative to conventional wet chemistry for base metal sulfides analysis	Malvern Panalytical
8:50	Sandeep Kumar	Sandeep Kumar Chady Stephan	Advances in Nexion ICP-MS Technology for Mining Application	PerkinElmer Scientific Canada ULC
9:10	Brad McBain	Craig Hamlyn	QC Walk-Through and Case Histories with OREAS CRMs	AnalytiChem
10:00	*Ballroom*		*Coffee Break*	*SPONSORED BY: LECO Instruments ULC*
10:30	Dr. Suhas S Narkhede		Pre-Analytical workflow automation for raw material analysis for Batteries.	Questron Technologies Corp.
10:50	Longbo Yang		Optimizing Your ICP-OES Workflow with the New Agilent Advanced Dilution System (ADS2).	Agilent
11:10	Justin Pellerin		A change in principle: Adopting an active washing solution to improve lab safety	Levitt-Safety
12:00	*Hilltop*		*Lunch*	

TECHNICAL SESSIONS

Tuesday September 10 | 2024

Time	Presenter	Co-author	Title	Organization
1:00 PM	Luc Dionne	Sabrina Antonio Jeff Gross	Innovations in trace elemental analysis to support the analysis of complex matrices	Thermo Fisher Scientific
PM	Tasneem Idris	Dr. Kingsley Donkor Tharusha Jayasinghe	The Separation and Signal Enhancement of Five Selected Xanthates using Capillary Electrophoresis	Thompson Rivers University
1:40 PM	Sarah Seymour	Dr. Kingsley Donkor	Determination of Heavy Metals in Cosmetic Foundations by ICP-MS	Thompson Rivers University
2:00 PM	*Ballroom*		*Coffee Break*	*SPONSORED BY: AnalytiChem Canada Inc.*
2:30 PM	Craig West		Improving Sample Digestion for Lithium and Black Mass	ColdBlock Technologies Inc.
2:50 PM	Sandeep Kumar	Aaron Hineman Chady Stephan	Rare Earth Element analysis using Nexion 5000 ICP-MS system	PerkinElmer Scientific Canada ULC
3:10 PM	Jessica Whitehouse		Investigation of the Suitability of Dispersive Liquid-Liquid Microextraction and GC-MS to Determine Disinfection Byproducts in Real Samples	Thompson Rivers University
3:30 PM	Aaron Okano	Dr. Kingsley Donkor	Analysis of Edible Oils using Raman Spectroscopy and Principal Component Analysis	Thompson Rivers University
3:50 PM	Oleksandra Kovalenk	Dr. Kingsley Donkor	Determination of Heavy Metals in Eye Drops by Inductively Coupled Plasma-Mass Spectrometry	Thompson Rivers University
4:10 PM			End of Technical Talk Day 1	

TECHNICAL SESSIONS

Wednesday September 11 | 2024

Time	Presenter		Title	Organization
7:00 AM	*Hilltop*		*Breakfast*	
8:00 AM	Ema Gitej		Ease of Accreditation to ISO/IEC 17025	CALA Inc.
8:20 AM	Allan Ball	Marie-Ève Provencher Ivan Rodriguez Duran	Revontium: A compact XRF solution for mining and mineral industry	Malvern Panalytical
8:40 AM	Elena Kuznetsova	Dr. Kingsley Donkor	Capillary electrophoretic simultaneous separation of bisphenol analogues.	Thompson Rivers University
9:00 AM	Connor Johnson	Dr. Kingsley Donkor Megan Martin	Determination of Trace Metals in bee pollen by ICP-MS	Thompson Rivers University
9:20 AM	Kayla Hermiston	Dr. Kingsley Donkor	Determination of Cannabidiol (CBD) in Cannabinoid-Based Food Products by UV-Visible Spectrophotometry	Thompson Rivers University
10:00 AM	*Ballroom*		*Coffee Break*	*SPONSORED BY: STG Mining Supplies Ltd.*
10:10 AM	Kraig Kmiotek	Brett Lane Dariana Martinez	Enhancing Mining Efficiency and Sustainability with Online XRF Technology	Metrohm
10:30 AM	Sandeep Kumar	Aaron Hineman Chady Stephan	Laser ablation with PerkinElmer Atomic Spectroscopy	PerkinElmer Scientific Canada ULC
10:50 AM	Gursevak Uppal	Dr. Kingsley Donkor Carla Figueroa	Detection of Cannabidiol and Cannabigerol by LC-MS for Kinetic Studies	Thompson Rivers University
11:10 AM	Devansh Sharma	Dr. Kingsley Donkor	Investigation of Heavy Metal Accumulation in Homegrown Cannabis Plants Using Microwave--Assisted Digestion and ICP--MS	Thompson Rivers University
11:30 AM			End of Technical Talk Day 2 - Vote for Best Talk!	*BEST TECHNICAL PAPER SPONSORED BY: STG Mining Supplies Ltd.*
12:00 PM	*Hilltop*		*CMA Business Lunch*	

Minerals as Semiconductors

Presenter : Norman Lotter
FlowSheets Metallurgical Consuliting Inc., ON

Floatable sulphide minerals are semiconductors i.e. they can either accept or donate electrons in an electrochemically active system. Generally any economic mineral is either a type p semiconductor (positively charged surface) or a type n semiconductor (negatively charged surface), however some minerals are double semiconductors, e.g. chalcopyrite, and display both type n and type p properties, which makes such minerals very easy to float. In the context of floatable minerals, the geological history of an orebody brings about variation in the forms of sulphide minerals, where it is common to see “doping”, i.e. the introduction of a foreign element into that sulphide, such as arsenic in pyrite. Doping greatly increases the conductivity of a mineral and thus improves its floatability. In this paper, the range of major copper sulphides is characterised by semiconductor type, and the individual flotation behaviours described.

X-ray fluorescence and sample preparation by fusion: A winning alternative to conventional wet chemistry for base metal sulfides analysis

Presenter : Marie-Ève Provencher
Co-Authors: Alexander Komelkov, Ivan Rodriguez Duran
Malvern Panalytical, QC

In an economic landscape marked by rising workforce and energy costs, the metal sulfide mining sector has been expanding to meet the growing demand for metals like copper, zinc, lead, nickel, and silver. In such a challenging environment, accurate and precise chemical analysis of sulfide ores and concentrates are here key to keeping mining and mineral processing at peak efficiency and ensuring that sulfide minerals and their products meets required standards. However, achieving these goals can be difficult, especially when on-site laboratories must conduct a high volume of analyses. While chemistry methods, such as EDTA titration, have been the norm for sulfide ore and concentrates analysis, their limitations in terms of time consumption, skilled labor, and liquid waste generation pose significant challenges when applied on a large scale. To address these issues, the application of X-ray fluorescence (XRF) combined with sample preparation by fusion has emerged as the preferred alternative, as it eliminates the need for hazardous acids for sample digestion and enables simultaneous elemental analysis by comparing samples to Certified Reference Materials (CRMs). Malvern Panalytical has developed an Expertise solution for the analysis of base metal sulfide ores and concentrates, which includes a set of CRMs covering a wide range of concentrations for sulfur, lead, zinc, copper, iron, among other elements; as well as a Fusion and XRF methodology. Metal sulfide industry can from now on expedite sample analysis without compromising accuracy and precision and meet the evolving demands of the metal sulfides market.

Advances in Nexion ICP-MS Technology for Mining Application

Presenter : Aaron Hineman
Co-Author: Sandeep Kumar, Chady Stephan
PerkinElmer Scientific Canada ULC, Woodbridge, ON

Since the introduction of PerkinElmer's Elan 250, the first commercial ICP-MS system in 1983, PerkinElmer has gone through numerous innovations such as PlasmaLok, Dynamic Reaction Cell, Axial Field Technology, Dual Detector, Lumicoil, OmniRing etc. primarily targeted towards Industrial end goal of being able to perform interference free, precise, and reproducible measurements at trace level. The challenges associated with Mining samples are mainly: low levels of some trace elements, wide concentration ranges from % level to ppt level, high total dissolved solids (TDS), non-spectral and spectral interferences, and high throughput requirements. Many of these requirements are handled efficiently using the Nexion ICP-MS system. In this presentation, we will discuss the latest advancement in Nexion ICP-MS technology elaborating the design concepts responsible for ultra – trace level detection capability and low maintenance. We will present experimental data to demonstrate Interference free and accurate elemental concentration measurements on Nexion systems up to ppt level for most of the elements.

QC Walk-Through and Case Histories with OREAS CRMs

Presenter : Brad McBain
Co-Author: Craig Hamlyn
AnalytiChem, Montreal, QC

Certified Reference Materials (CRMs) are a critical component of a laboratory's QA/QC program. They are often misunderstood in terms of their application, their interpretation and the benefits to be realized. We will present background on the CRM development process, the various applicable statistical and practical aspects to be considered, and some case studies/examples that will highlight their benefits (and a few limitations). The focus of the discussion will be on the OREAS product line in the AnalytiChem portfolio, and applications in the geochemistry/mining space.

Pre-Analytical workflow automation for raw material analysis for Batteries

Presenter : Dr. Suhas S Narkhede
Questron Technologies Corp., Mississauga, ON

Global push for emission free energy has created a demand for development of batteries. Elements like Nickle, lithium, Manganese and Cobalt have become the new precious commodities.Chase to produce electrical batteries is growing and is compelling along the need to produce quality raw materials for their construction. The raw materials for batteries are digested in acids, and a clear solution thus obtained is analyzed over ICP-OES / ICP-MS. In a typical manufacturing setup, there is a need to analyze 1,000 samples or more every day and ICP can handle these sample loads. With use of the classical approach, however, Sample Preparation is seriously short in its efficiency to catch up with the speed of ICP. One effective solution to the sample prep challenge lies in enhanced automation in sample prep. Vulcan Automated Workstation for sample prep delivers accurate quantities of reagents consistently to many samples in an HEPA filtered, contamination-free environment. In addition to the heating block digestion step, other steps of the pre-analytical workflow are discussed, along with solutions that lead to substantial improvements in laboratory operations.

Optimizing Your ICP-OES Workflow with the New Agilent Advanced Dilution System (ADS2)

Presenter: Longbo Yang
Agilent, ON

The effectiveness of an ICP-OES analytical run relies heavily on the meticulous manual tasks executed by the analyst. Among these critical tasks are the preparation of calibration standards and sample dilution prior to the run. These processes can be labor-intensive and time-consuming, and carry the risk of introducing contaminants and errors, potentially compromising the quality of the results. Additionally, samples that are identified to be overrange in concentration during the analysis would require further dilution, which can be disruptive to the analyst's daily workflow. To help labs reduce sample turnaround time and minimize cost per analysis, Agilent introduces the Advanced Dilution System (ADS 2). This is an online dilution system, purpose-built for Agilent ICP-OES (and ICP-MS) instruments. The ADS2 can automatically prepare multipoint calibration standards from a single stock standard, dilute samples before analysis by a prescribed factor, and dilute and remeasure sample immediately when sample concentration overrange is detected. Online autodilution and automatic calibration standards preparation not only reduce manual labor but also avoid the risk of introducing human error and contamination during sample preparation. The ADS2 provides valuable support for less experienced operators in conducting routine analyses, streamlines the ICP-OES workflow and ensures accurate analytical results.

A change in principle: Adopting an active washing solution to improve lab safety

Presenter : Justin Pellerin
Levitt-Safety, Edmonton, AB

Current statistics on chemical burns in laboratories highlight the significant risks these environments pose to workers. Chemical burns are a notable concern in labs, particularly in industries like healthcare, manufacturing, and scientific research. According to recent data, there have been thousands of reported incidents involving chemical burns, with laboratories accounting for a considerable percentage of these injuries. In the United States, the Occupational Safety and Health Administration (OSHA) reports numerous cases of workplace chemical burns annually, with some industries seeing higher rates due to the frequent use of hazardous substances. A report by the American Burn Association (ABA) indicated that burns from chemical exposure represent a substantial portion of the 30,000+ burn cases treated in 2022. Moreover, a study from 2021 to 2023 indicated that hundreds of accidents involving chemicals, many leading to burns, were reported in laboratories and other chemical-handling environments. These statistics underscore the importance of adopting more effective safety measures, such as active washing solutions, to mitigate the risks associated with chemical exposures in labs. Adopting an active washing solution in laboratories can significantly enhance safety by effectively decontaminating chemical splashes on human tissue. Unlike traditional water washing, an active washing solution rapidly halts the progression of chemical injuries by stopping chemical action and reversing the flow of the chemical agent out of the tissue. This approach minimizes the severity of chemical burns, reduces long-term tissue damage, and lowers the risk of complications.Incorporating an active washing solution as part of a lab's safety protocol ensures a higher level of preparedness, offering a more reliable and effective response to chemical exposure incidents.

Innovations in trace elemental analysis to support the analysis of complex matrices

Presenter : Luc Dionne
Co-Authors: Sabrina Antonio, Jeff Gross
Thermo Fisher Scientific, Mississauga, ON

Complicated sample matrices, elevated concentration range of samples, unknown sample constituents, system method optimization and system handling/stability for geochemistry and like type of samples will be discussed. The latest advances in ICP-OES and ICP-MS instrumentation that addresses these challenges will be presented including application examples.

The Separation and Signal Enhancement of Five Selected Xanthates using Capillary Electrophoresis

Presenter : Tasneem Idris
Co-Authors: Dr. Kingsley Donkor, Tharusha Jayasinghe
Thompson Rivers University, Kamloops, BC

Xanthates play a crucial role in the mining industry by facilitating froth flotation, aiding in the separation of precious metals from minerals. This family of organosulfur compounds includes potassium amyl xanthate (PAX), potassium butyl xanthate (PBX), potassium ethyl xanthate (PEX), potassium isopropyl xanthate (PIPX), and sodium ethyl xanthate (SEX). However, the compositions of commercially available xanthate samples vary, prompting the need for a method to characterize each xanthate's composition. This research successfully developed a rapid, cost-effective, and efficient approach using capillary electrophoresis (CE) for identifying and quantifying flotation agents used in mining. This method boasted short analysis times, high resolving power, and minimal sample volumes. The analysis of xanthate samples was carried out under optimized conditions, including a 60 mM borate buffer with a pH 9.1, at 25 oC, and an applied voltage of 20 kV. While the proposed method successfully quantified PAX, PBX, and PIPX samples, further optimizations are required to effectively separate PEX and SEX samples. Overall, this research lays the foundation for a valuable tool in characterizing xanthate compositions in the mining industry, contributing to the enhancement of flotation processes.

Determination of Heavy Metals in Cosmetic Foundations by ICP-MS

Presenter : Sarah Seymour
Co-Author: Dr. Kingsley Donkor
Thompson Rivers University, Kamloops, BC

The use of cosmetic products to improve skin quality or appearance is widespread globally. The growing demand for cosmetics can expose consumers to skin problems resulting from the presence of trace metals in the cosmetics. Thus, there is increasing concern about their potential long-term effects on human health. In this study, ten different cosmetic foundations were digested with nitric acid by the microwave digestion method. The heavy metals contents were determined by inductively coupled plasma-mass spectrometry (ICP-MS). The method was efficient and showed interesting data on the trace metals concentrations in the ten cosmetic foundations. Results showed that iron (Fe), aluminum (Al), and magnesium (Mg) were the most dominant metals in most of the cosmetics, however there was one cosmetic that showed zinc (Zn) as the most dominant. Manganese (Mn) and barium (Ba) were also consistently showing in the results. The analysis showed very good precision for all the trace metals determined by the ICP-MS method.

Improving Sample Digestion for Lithium and Black Mass

Presenter : Craig West
ColdBlock Technologies Inc., Niagara, ON

At last year's CMA conference in Montreal, ColdBlock presented its new Strong Acid Digestion method, a replacement for traditional 4-acid digestions (with the same accuracy/precision but in a fraction of the time with improved safety & simplicity).This Strong Acid Digestion method in now use at a wide range of laboratories including two large global commercial labs. This year we will highlight our recent work with battery metals sample types and will be presenting our lithium and black mass (recycled battery) digestion methods. Lithium, a key element in the battery sector has seen considerable commodity price pressure in recent years. A simple, efficient, inexpensive means of analysis is what is needed. We will present ColdBlock's digestion methods and share results from recent work. Black Mass, ground recycled batteries, is a relatively new hot topic an the laboratory sector. ColdBlock's methods. We will present 2 methods; one a complete digestion method, and another that can handle sample sizes up to 20g -- key for accurate results given this non-homogeneous sample type.

Rare Earth Element analysis using Nexion 5000 ICP-MS system

Presenter : Sandeep Kumar
Co-Authors: Aaron Hineman, Chady Stephan
PerkinElmer Scientific Canada ULC, Woodbridge, ON

Most rare earth elements find their uses as catalysts and magnets in traditional and low-carbon technologies. Other important uses of rare earth elements (REE) are in the production of special metal alloys, glass, and high-performance electronics. Since the prices of REEs are dependent on their purity, it is of great interest to produce rare earth metals or oxides of high purity. One of the biggest challenges in the analysis of impurities in purified REE compounds, is that the impurities are often present at extremely low concentrations. As the requirements on REE purity have increased in recent years, so have requirements for ICP-MS instrumentation to be able to measure progressively lower concentrations. For this reason, having ICP-MS instrumentation which is able to deliver exceptional background equivalent concentrations (BECs) and detection limits (DLs) to support these ultra-trace measurements is a great advantage. An important component of this is being able to separate the analyte from the matrix which is best achieved by placing an additional full-sized quadrupole before the reaction cell such that only the mass of interest is allowed to proceed to the cell and all other masses are ejected, a design unique to triple- and multi-quadrupole instruments.Another obstacle which needs to be overcome when analyzing REEs using ICP-MS with triple-quadrupole or multi-quadrupole functionality is the removal of any on-mass oxides and polyatomic ions (MO+, MOH+, MH+, MOH2+) which may have formed in the high-temperature plasma and were not removed in the first analyzer quadrupole. To address these interferences, pure reaction gases, such as NH3, can be used to react with either the interference or the analyte ions in the collision/reaction cell such that the interference is removed. Therefore, having an instrument such as Nexion 5000 which can run pure reaction gases, such as pure ammonia, for an extended period of time is highly advantageous. In this presentation, we will discuss methods using PerkinElmer's NexION® 5000 Multi- Quadrupole ICP-MS for the direct determination of trace rare earth element impurities in a high-purity rare earth oxide matrix. Fourteen rare earth element impurities were analyzed using Multi Quad mode, and pure reaction gases were used to facilitate the removal of interferences and aid the detection of ultra-trace concentrations of impurities.

Investigation of the Suitability of Dispersive Liquid-Liquid Microextraction and GC-MS to Determine Disinfection Byproducts in Real Samples

Presenter : Jessica Whitehouse
Thompson Rivers University, Kamloops, BC

Haloacetic acids (HAAs) are among the results of water disinfection, classified as disinfectant by-products, which are produced during the water treatment cycle, both in municipal water treatment and civilian water treatment. There are over thirty different forms of HAAs, many of which are labeled as suspected carcinogens, with only five being monitored annually in the Kamloops municipal treated water, these being monochloroacetic acid, monobromoacetic acid, dichloroacetic acid, trichloroacetic acid, and dibromoacetic acid. HAAs can be time-consuming and unwieldy to detect in real water samples using the standardized EPA method. This project investigated the applicability of dispersive liquid-liquid extraction combined with derivatization followed by GC-MS analysis for the determination of HAAs in water. The developed method was tested on local water samples (swimming pool, spa, and tap) and compared to guidelines and literature values.

Analysis of Edible Oils using Raman Spectroscopy and Principal Component Analysis

Presenter : Aaron Okano
Co-Author: Dr. Kingsley Donkor
T**hompson Rivers University, Kamloops, BC**

With the current economic climate putting more demand on the food industry while inflation continues to grow, many companies have moved to adulteration as a means of cutting costs while continuing to meet the demands of a growing market. One example is Extra Virgin Olive Oil (EVOO), a common edible oil that many companies are mixing with much cheaper oils while continuing to sell as a pure oil. Although this practice is considered illegal, rapid and reliable methods of detection for adulteration are uncommon making law enforcement very difficult. This study uses Raman spectroscopy along with Principal Component Analysis (PCA) as a method to discriminate among cooking oils and detect possible adulterants. In the method, various pure and hybrid cooking oils were tested using Raman spectroscopy. The results were then analyzed using PCA which was able to identify and discriminate minute differences in the oils. These distinctions made it easy to identify each oil along with any added adulterants. From this study we demonstrated that Raman spectroscopy combined with PCA is a rapid and reliable method of analysis that can help reduce fraud in the food industry and restore consumer trust in the quality and authenticity of edible oils.

Determination of Heavy Metals in Eye Drops by Inductively Coupled Plasma- Mass Spectrometry

Presenter : Oleksandra Kovalenko
Co-Author: Dr. Kingsley Donkor
Thompson Rivers University, Kamloops, BC

The objective of this research is to explore the identification of heavy metals present in eye drops using inductively coupled plasma-mass spectrometry (ICP-MS). With the increased usage of eye drops for various ophthalmic conditions, concerns have arisen regarding the potential leaching of heavy metals from the packaging materials or formulation components into the eye drop solutions. Given the limited available data on the health and environmental implications associated with heavy metals in eye drops, it is crucial to investigate whether these substances pose any risks. The study employs an analytical method involving ICP-MS to detect and quantify heavy metals in commercial eye drop samples. In the analysis, As, Cd, Co, Cr, Cu, Fe, Ni, and Pb were the primary focus as they are implicated in the development of various ophthalmological conditions such as glaucoma, cataracts, age-related macular degeneration, and dry eye disease. Additionally, the method had undergone validation to assess its precision, accuracy, and limits of detection and quantification. The findings of this investigation aim to enhance the understanding of trace metals detection in eye drops, particularly at low concentration levels. Ultimately, this research will determine the presence or absence of heavy metals and assess potential risks to human health and the environment, especially in cases of improper disposal.

Ease of Accreditation to ISO/IEC 17025

Presenter : Ema Gitej
CALA Inc., Ottawa, ON

Accreditation to ISO/IEC 17025 is essential for laboratories aiming to demonstrate their technical competence and reliability in producing accurate and consistent test results. However, the process of achieving accreditation can often seem daunting, particularly for mineral analysis laboratories facing industry-specific challenges. This presentation from CALA aims to demystify the accreditation journey, focusing on the streamlined processes and support mechanisms that make accreditation more accessible and manageable.Ðhe session will cover key aspects of the ISO/IEC 17025 standard, with an emphasis on the practical steps involved in meeting the requirements. Attendees will learn about the resources available from the accreditation body to simplify documentation and process implementation. We will also discuss common challenges faced by mineral analysts during the accreditation process. Through real-world examples, the presentation will illustrate how even small to medium-sized laboratories can successfully navigate the accreditation process without significant disruption to their operations. The goal is to empower laboratories with the knowledge and confidence needed to achieve and maintain ISO/IEC 17025 accreditation, ensuring their place in the competitive global market. This presentation is ideal for laboratory managers, quality assurance professionals, and technical staff who are considering or currently pursuing ISO/IEC 17025 accreditation, particularly within the mineral analysis sector.

Revontium: A compact XRF solution for mining and mineral industry

Presenter : Allan Ball
Co-Authors: Marie-Ève Provencher, Ivan Rodriguez Duran
Malvern Panalytical, QC

In both research and mining sectors, a comprehensive understanding of the elemental composition of materials is becoming increasingly essential. Within this framework, X-Ray Fluorescence (XRF) has amply proven to be a valuable tool in delivering precise chemical analyses, particularly in sectors of economic activity where elemental purity is critical, such as in cement production, mining, and mineral industry. Known for its reliability, this non-destructive elemental analysis technique offers several advantages over other techniques, including faster analysis times, no dissolving and digesting of solid samples, reduced ownership/operational costs, and long-term stability without the need for frequent recalibration. However, despite its strengths, XRF users often face a dilemma between the accuracy provided by large, floor-standing instruments and the efficiency and versatility of benchtop units. To address this challenge, Malvern Panalytical has developed Revontium™—the world's first compact XRF spectrometer — for those seeking superior analytical performance from a compact instrument while aiming to be more competitive by optimizing instrument and energy costs. With a mere footprint of 0.4m2, Revontium™ delivers elemental analysis accuracy that rivals that of a traditional floor-standing wavelength dispersive XRF instrument (WDXRD) while consuming significantly less power (0.2 kWh versus 2 kWh for standard WDXRF). Additionally, with reduced consumable needs and simplified maintenance, Revontium's cost of ownership can be over 25% lower than that of WDXRF, AAS, and ICP instruments. This, combined with its internal cooling system and the absence of a helium or vacuum pump for light element analysis, further position it as one of the most sustainable and efficient compact XRF solutions available for accurate elemental analysis.

Capillary electrophoretic simultaneous separation of bisphenol analogues

Presenter : Elena Kuznetsova
Co-Author: Dr. Kingsley Donkor
Thompson Rivers University, Kamloops, BC

Bisphenols, a class of chemical compounds widely employed in the production of plastics, resins, and consumer goods, have garnered significant attention due to their pervasive use and associated health concerns. Among these compounds, Bisphenol A (BPA) has been extensively studied and linked to adverse health effects, particularly its ability to disrupt endocrine systems even at low concentrations. In response to concerning scientific evidence and public reaction, manufacturers have increasingly turned to alternatives, including analogs like bisphenol S (BPS), bisphenol AF (BPAF), bisphenol F (BPF), bisphenol B (BPB) and bisphenol E (BPE). However, these substitutes, though intended to mitigate the risks posed by BPA, have raised new questions about their own potential health impacts. Research indicates that BPS and BPAF may exhibit similar endocrine-disrupting properties, prompting concerns regarding reproductive, developmental, and metabolic effects. This project aimed to improve a simultaneous separation technique for 10 bisphenol analogues (BPA, BPAF, BPBP, BPE, BPF, BPG, BPM, BPAP, BPZ, BPS) using capillary electrophoresis (CE), with a focus on optimizing parameters like pH and the inclusion of organic modifiers, such as acetonitrile (ACN). The goal was to develop a method that could be combined with extraction methods for suspected bisphenol-containing products, enabling efficient separation and identification of the analogues present.

Determination of Trace Metals in Bee Pollens by ICP-MS

Presenter : Connor Johnson
Co-Authors: Dr. Kingsley Donkor, Megan Martin
T**hompson Rivers University, Kamloops, BC**

Bee pollen is an apiculture product made from nectar, enzymes, flower pollen and bee secretion. It is used as a food supplement due to its rich micronutrients, particularly with regard to its antioxidant and antimicrobial properties. Unfortunately, bee pollen may contain toxic metals. Health Canada provides a Quality of Natural Health Products Guide that sets out the acceptable limits for elemental impurities in natural health products. However, compliance relies on the integrity of the Canadian bee product industry. Only a few countries world-wide have legislation on bee pollen, and international publications have identified toxic metals as one of the food safety risks associated with bee pollen. Thus, the purpose of this experiment was to determine the concentration of chosen trace metals in select bee pollen from different regions and compare to the Heath Canada acceptable limits. The samples used were five purchasable sealed containers of bee pollen from different regions across Canada, and a sixth bee pollen from Spain to act as a control. Samples were collected between the period of July 2023 to July 2024. Samples were prepared using microwave digestion with concentrated nitric acid. Quantitative analysis was performed using an Agilent 7900 inductively coupled plasma-mass spectrometry (ICP-MS). The resulting concentration levels of trace metals may be indications of toxicity in the environment. Exploring this connection could potentially be future work for this field.

Determination of Cannabidiol (CBD) in Cannabinoid-Based Food Products by UV-Visible Spectrophotometry

Presenter : Kayla Hermiston
Co-Author: Dr. Kingsley Donkor
Thompson Rivers University, Kamloops, BC

Due to recent growing legalization of cannabis, consumption of cannabis-based products has increased, and can be unsafe if the products are not labelled accurately. Some of these products are cannabinoid-based liquid beverages, powdered beverages, chocolate, and tea samples. One major component in these products is cannabidiol (CBD). CBD is non-psychoactive and is recently gaining a lot of attention due to its potential medicinal and pharmacological benefits including evidence as preventing seizures, lowering cravings for other drugs, reducing anxiety and pain as well as potential applications for some dermatitis and related dermal treatment. In this study, a UV-Visible spectrophotometry method is developed to determine the CBD content in selected cannabinoid-based liquid beverages and teas.

Enhancing Mining Efficiency and Sustainability with Online XRF Technology

Presenter : Kraig Kmiotek
Co-Authors: Brett Lane, Dariana Martinex
Metrohm, Canada

The mining industry faces significant challenges, from regulatory demands to ensuring sustainable operations. Accurate and reliable monitoring technologies are crucial for compliance, while sustainability pressures require effective waste reduction and tailings management. Online X-ray fluorescence (XRF) technology offers a promising solution to these challenges. This presentation will demonstrate how the 2060 XRF Process Analyzers can provide real-time, non-destructive analysis of mineral compositions around the clock. We will compare XRF analysis to traditional methods for liquid analysis and explore the potential for combining XRF with other techniques, such as titration, photometry, and ion chromatography. With online XRF, mining operations can ensure uninterrupted operations, unparalleled accuracy, and peace of mind, day or night.

Laser ablation with PerkinElmer Atomic Spectroscopy

Presenter : Sandeep Kumar
Co-Authors: Aaron Hinemann, Chady Stephan
PerkinElmer Scientific Canada ULC, Woodbridge, ON

Traditionally, inorganic analysis of geological survey samples involves acid digestion sample preparation methods. Several different approaches of acid digestion could be required, depending on rock/mineral composition, which have time and safety implications. The acid digestion procedure typically requires large volumes of acid and produce extensive chemical waste. A global push towards more sustainable operations with a smaller chemical footprint makes this approach unviable in long term. Laser ablation (LA) incorporating solid samples would bypass the need for acid digestion process in elemental analysis and reduce waste and resource consumption. LA-ICP-MS was previously a low volume, labor-intensive technique; however, the LaserTRAX laser ablation sample introduction system from Elemental Scientific Lasers (ESL) coupled with PerkinElmer's Atomic Spectroscopy instruments provide a unique combination of automated, fast sample-to-sample load times and precise analysis for both major and minor elements within fused beads. In this presentation, we will discuss the unique features of PerkinElmer's Nexion 5000 ICP-MS system and its integration with LaserTRAX system for study of Rare Earth Element (REE) ore samples. Strategies for efficient interference corrections in REE ore samples using the multi-quad capability of Nexion 5000 system will be discussed. We will further discuss application of LaserTRAX coupled Avio 550 ICP-OES system for direct analysis of cathode material LiNixMnyCo1-x-yO2 (NMC). Results will be presented for NMC samples with different metal molar ratios and Reference Standards

Detection of Cannabidiol and Cannabigerol by LC-MS for Kinetic Studies

Presenter : Gursevak Uppal
Co-Authors: Dr. Kingsley Donkor, Carla Figueroa
T**hompson Rivers University, Kamloops, BC**

Cannabidiol (CBD) and Cannabigerol (CBG) are two of the cannabinoids found in cannabis. CBD is usually sold as an oil and has certain medicinal properties and no psychoactive components. CBG is the decarboxylated form of Cannabigerol acid (CBGA). CBGA is the parent molecule from which other cannabinoids are synthesized. One such molecule that can be synthesized is Δ9-Tetrahydrocannabinol (THC), the active ingredient in cannabis. The objective of this study was to develop a method for the detection of CBD and CBG. Standards of CBD and CBG were made and determined using LC-MS. A solvent mixture of 80% A (water + formic acid) and 20% B (acetonitrile + formic acid) was found to show the best results for peak enhancement as well as separation of the two species when mixed in a sample. In the future, we plan to utilize this developed method to determine the kinetics of CBD to THC. This study will be important as CBD can be used as a medicinal ingredient. THC can be intoxicating, and it is important to ensure that CBD does not convert to THC.

Investigation of Heavy Metal Accumulation in Homegrown Cannabis Plants Using Microwave--Assisted Digestion and ICP--MS

Author: Devansh Sharma
Co-Author: Dr. Kingsley Donkor
Thompson Rivers University, Kamloops, BC

This study aimed to comprehensively assess the elemental composition of cannabis plants grown under controlled conditions and to validate the reliability of the analytical methodology employed. Through sample collection, processing, and analysis using microwave--assisted digestion and ICP-MS (Inductively Coupled Plasma Mass Spectrometry), the elemental profiles of the cannabis samples were determined. Method validation procedures, including the determination of limits of detection (LOD) and quantification (LOQ), were conducted to ensure the accuracy and precision of the analytical procedure. Regulatory compliance with daily consumption limits for elemental impurities was evaluated to ascertain the safety of the cannabis samples analyzed. Additionally, comparisons between different cannabis strains were made to elucidate potential variations in elemental accumulation. The results of this study demonstrated the robustness of the analytical method, with most data values exceeding the established LOQ thresholds, indicating reliable quantification of elemental concentrations in the cannabis samples. Compliance with regulatory limits further affirmed the safety of the cannabis products assessed, providing assurance to consumers and regulators alike. Noteworthy differences in elemental accumulation between Cannabis Sativa and Cannabis Indica strains were observed, suggesting potential implications for strain selection and product quality in cannabis cultivation practices. Overall, this study contributes valuable insights into heavy metal contamination in cannabis plants and informs best practices for growers and consumers. By enhancing our understanding of elemental composition and its variations across different cannabis strains, this study lays the groundwork for future investigations aimed at optimizing cultivation practices and ensuring the safety and quality of cannabis products in the industry.

TOURS

SEPTEMBER 12,2024

8:00 AM - 12:30 PM

TOUR 1: NEW GOLD MINE

SURFACE , MILL , AND ASSAY LAB TOUR

New Afton Mine is a block caving operation, located approximately 10 kilometres outside of Kamloops and 350 kilometres northeast of Vancouver in British Columbia.

New Gold Inc. began construction and development of the New Afton Mine in 2007 and reached commercial production in July 2012, following the first draw-bell blast in September, 2011. The operation occupies the site of the historic Afton open pit mine, which operated from 1977 until 1997. The site includes an inactive and dewatered open pit and other historic facilities. New Afton is situated on the Stk'emlupsemc te Secwépemc territory, situated within the unceded traditional lands of the Secwépemc nation

SEPTEMBER 12,2024

9:15 AM - 12:30 PM

TOUR 2: BC WILDLIFE PARK

GUIDED TOUR OF THE PARK AND BURROWING OWL ENCOUNTER

The BC Wildlife Park is a non-profit organization and registered charity located in Kamloops, British Columbia since 1965. The BC Wildlife Park is home to nearly 200 animals and 65 different species that are native to British Columbia including cougars, bears, wolves, reptiles, birds of prey, and the only Kermode bear in human care in the world.

Many of the animals at the Park have been rescued or were orphaned and are unable to survive on their own in the wild. The BC Wildlife Park is an accredited facility in Canada, by Canada's Accredited Zoos and Aquariums (CAZA).

SOCIAL EVENTS

GUIDED TOUR AND VISIT TO THE KAMLOOPS ART GALLERY

SEPTEMBER 12,2024
2:30 PM - 5:30 PM

EMBARK ON A HISTORIC STROLL THROUGH THE HEART OF KAMLOOPS DOWNTOWN

The Kamloops Museum is presenting an historic walking tour of downtown Kamloops. Learn more about crime, punishment and the history of downtown Kamloops.
The tour is approximately one hour long and starts at the Kamloops Museum and ending at the Kamloops Art Gallery, where the exhibits can be explored and refreshments will be served.

KAMLOOPS ART GALLERY

TOWN + COUNTRY: NARRATIVES OF PROPERTY AND CAPITAL

Curated by Caitlin Jones, Charo Neville, and Melanie O'Brian

Architects Against Housing Alienation
Rodney Graham
Gabrielle L'Hirondelle Hill
Karin Jones
Tiziana La Melia
Carel Moiseiwitsch
Alex Morrison
Janet Wang
Holly Ward
Tania Willard
Lawrence Paul Yuxweluptun

Town + Country: Narratives of Property and Capital troubles the enduring narrative binary of town and country. Borders between these two terrains have always morphed and slipped around each other theoretically, politically, economically, and socially, yet the narrative of the urban/rural divide persists. Indigenous land dispossession and reclamation, capital accumulation in the form of real-estate assets, labour, and technological development are all obscured by this persistent fiction. Town and country narratives similarly obscure questions of class, freedom of movement, and resource extraction.

56th CANADIAN MINERAL ANALYSTS CONFERENCE AND EXHIBITION

CONFERENCE SCHEDULE

SUNDAY, SEPTEMBER 8th			
Start	End	Function	Location
3:00 PM	5:00 PM	Registration (desk)	Main Entrance
4:00 PM	8:00 PM	Social Pub Crawl/Brewery Tour	Meet at Main Entrance
MONDAY, SEPTEMBER 9th			
Start	End	Function	Location
7:00 AM	8:00 AM	Workshop Continental Breakfast	
7:00 AM	4:00 PM	Registration Desk	Main Entrance
10:00 AM	4:00 PM	Tradeshow set-up	Ballroom
8:00 AM	12:00 PM	Short Course Workshop A	Salon A or B
12:00 PM	1:00 PM	Workshop Lunch	
1:00 PM	4:00 PM	Short Course Workshop B	Salon A or B
6:00 PM	8:00 PM	Welcome Reception (Wine & Cheese)	Ballroom
TUESDAY, SEPTEMBER 10th			
Start	End	Function	Location
7:00 AM	8:00 AM	Continental Breakfast	
7:00 AM	2:00 PM	Registration Desk	Main Entrance
8:00 AM	4:00 PM	Exhibition	Ballroom
8:00 AM	10:00 AM	Technical Sessions	Hilltop
10:00 AM	10:30 AM	Coffee Break	
10:30 AM	11:30 AM	Technical Sessions	Hilltop
12:00 PM	1:00 PM	Lunch	
1:00 PM	2:00 PM	Technical Sessions	Hilltop
2:00 PM	2:30 PM	Coffee Break	
2:30 PM	4:30 PM	Technical Sessions	Hilltop
6:00 PM		Gala Banquette Dinner	Hilltop
WEDNESDAY, SEPTEMBER 11th			
Start	End	Function	Location
7:00 AM	8:00 AM	Continental Breakfast	
8:00 AM	12:00 PM	Exhibition	Ballroom
8:00 AM	10:00 AM	Technical Sessions	Hilltop
10:00 AM	10:30 AM	Coffee Break	
10:30 AM	12:00 PM	Technical Sessions	Hilltop
12:00 PM	3:00 PM	Exhibition Teardown	Ballroom
12:00 PM	1:00 PM	CMA business lunch	Hilltop
1:00 PM	2:00 PM	CMA Business Meeting	Hilltop
2:30 PM	5:30 PM	Social - Tour and Gallery	Meet at Main Entrance
THURSDAY, SEPTEMBER 12th			
Start	End	Function	Location
8:00 AM	12:30 PM	Tours - New Gold	Meet at Main Entrance
9:15 AM	12:30 PM	Tours - Sustainability	Meet at Main Entrance

CONFERENCE OVERVIEW

** ADMITTANCE TO THESE LIMITED CAPACITY EVENTS IS BY TICKET ONLY. PLEASE ENSURE YOU HAVE YOUR TICKET ON HAND UPON ARRIVAL.

4:00 PM - 8:00 PM

KAMLOOPS CRAFT BREWERY TOUR

SUNDAY, SEPTEMBER 8, 2024**

An early bird tour with provided transportation, leaves the Conference Center main entrance at exactly **4:00 pm** on Sunday. Tour participants will visit two local breweries in Kamloops: Red Collar Brewing & Distilling Co. and Bright Eye Brewing.

6:00 PM - 8:00 PM

WELCOME RECEPTION

MONDAY, SEPTEMBER 9, 2024**

A wine and cheese reception will be available for all registered delegates and exhibitors on Monday form **6:00 pm to 8:00 pm** in the Exhibit Hall. Refreshments and hors d'oeurves will be served.

7:00 AM - 8:00 AM

CONTINENTAL BREAKFAST

TUESDAY & WEDNESDAY, SEPTEMBER 10 & 11, 2024

Registered delegates and exhibitors may enjoy a continental breakfast on Tuesday and Wednesday starting at **7:00 am**. Come fuel your brains for active listening at the technical talks. Tuesday's breakfast is sponsored by Bruker.

12:00 PM - 1:00 PM

BUFFET LUNCH

TUESDAY, SEPTEMBER 10, 2024

A buffet lunch will be served at **12:00 pm** on Tuesday.

6:00 PM

GALA BANQUET DINNER

TUESDAY, SEPTEMBER 10,2024**

An evening of food and entertainment is planned in the Hilltop room. Live music will be provided by a One-Man Band. Cocktails will be available at **6:00 pm** and dinner will be served at **7:00 pm**.

12:00 PM - 3:00 PM

CMA BUSINESS LUNCH AND BUSINESS MEETING

WEDNESDAY, SEPTEMBER 11,2024

The winners of the Best Technical Paper and Best Exhibit will be announced during lunch. The Canadian Mineral Analysts annual general meeting will be held after lunch. Lunch starts at **12:00 pm**. Thanks to Brogan Fire & Safety for sponsoring the Technical Program and STG Mining Supplies Ltd for sponsoring the Best Technical Paper.

2:30 PM - 5:30 PM

AFTERNOON SOCIAL

WEDNESDAY , SEPTEMBER 11,2024**

An hour historic walking tour of the Kamloops downtown and a visit to the Kamloops Art Gallery. Learn more about crime, punishment, and the history of downtown Kamloops. Spend an hour viewing the current exhibitions at The Kamloops Art Gallery: Town + Country: Narratives of Property and Capital, and Diasporist Anchors For Future Memory. Light refreshment will be served at the Kamloops Art Gallery. The bus leaves the Conference Center Main Entrance at **2:30 pm**.

8:00 AM - 12:30 PM

NEW GOLD MINE TOUR

THURSDAY, SEPTEMBER 12, 2024**

A surface, mill, and assay lab tour of New Gold. New Afton Mine is a block caving operation, located approximately 10 kilometres outside of Kamloops and 350 kilometres northeast of Vancouver in British Columbia. A paper bag lunch will be provided. The bus leaves the Conference Center Main Entrance at **8:00 am**.

9:15 AM - 12:30 PM

SUSTAINABILITY TOUR

THURSDAY, SEPTEMBER 12, 2024**

Conservation through education at its best! A morning tour of the Wildlife Park with a BC Wildlife Park educator to discuss how the animals came to the Park and the conservation issues connected to them. A private group encounter with a burrowing owl follows the tour. Lunch is provided while at the Park and there will be an opportunity to visit the gift shop as well. The bus leaves the Conference Center Main Entrance at **9:15 am**.

11:30 AM

BEST TECHNICAL TALK AND BEST EXHIBITION

WEDNESDAY, SEPTEMBER 11, 2024

One ballot per delegate or exhibitor for each of Best Technical Talk and Best Exhibit Booth can be found in your registration package. Please drop off your vote to the ballot boxes at the Registration Desk no later than 11:30 am on Wednesday September 11, 2024. Prizes will be awarded at the CMA Luncheon, including a trophy for Best Exhibit and $500 for Best Technical Talk. Thanks to Brogan Fire & Safety for sponsoring the Technical Program and STG Mining Supplies Ltd for sponsoring the Best Technical Paper.

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