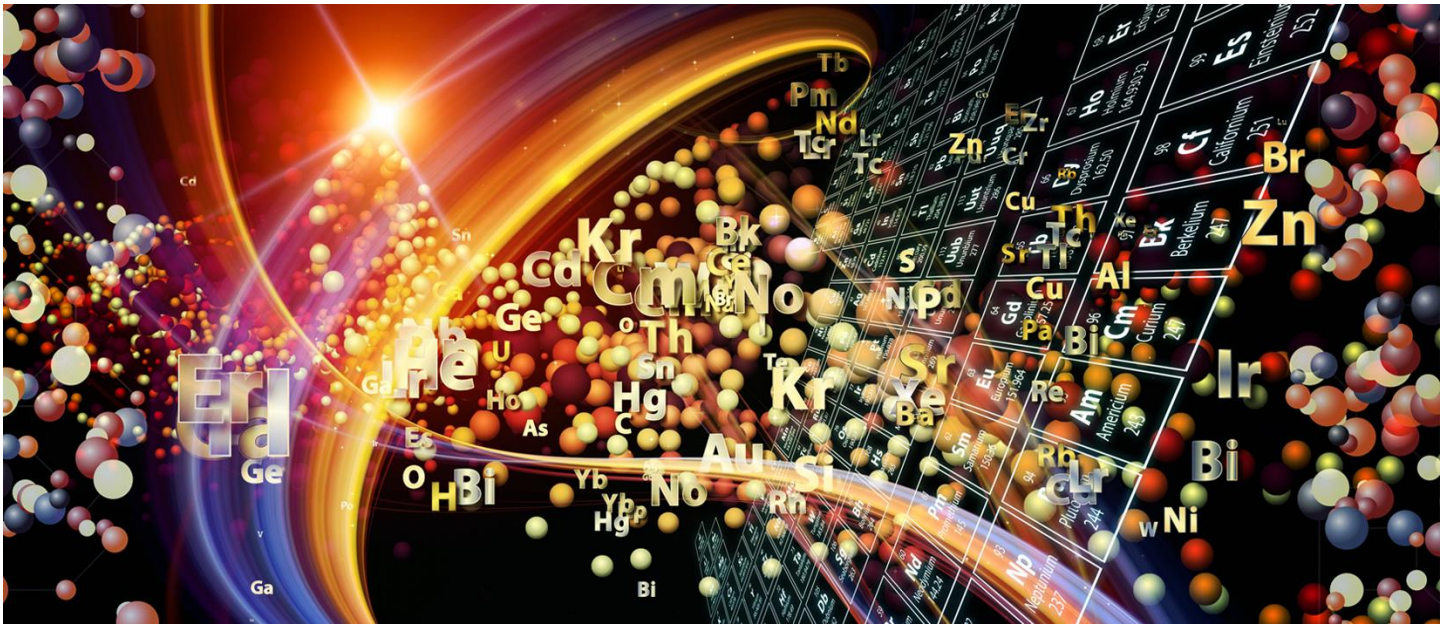

Creating Partnerships to Ensure Success in Water Chemistry

Andre Anderko, Chief Technology Officer, OLI Systems

For process industries, understanding the chemistry behind their operations is essential to running safely, productively, and cost-effectively. Sectors like Oil & Gas (O&G), Metals & Mining, Water Treatment, and Chemicals rely on chemistry insights to optimize their processes and to enable strategic growth and innovation. Yet many companies lack the technologies or chemistry expertise to achieve the best possible outcomes.

Predicting a system's properties from a multitude of components in water is a huge challenge, particularly because electrolytes are notoriously complex and counterintuitive, making their behavior extremely difficult to calculate or predict. Companies must employ the best combination of simulation tools, modeling capabilities, and mathematical algorithms to evaluate their chemistry environments. Unfortunately, limited expertise prevents companies from arriving at predictions that are representative of their process—in fact, this dearth of expertise tends to result in reliance on extensive and costly experimentation to operate more complex aqueous processes.

Partnering for success

Process industries must pursue digital transformation in order to succeed. Implementing advanced simulation software, rigorous chemistry analysis, and market-leading support is vital for companies to meet today's demands and tackle the problems of tomorrow.

Selecting an experienced partner is a critical first step to accelerate innovation and ensure success in water chemistry. Partners with lifecycle consulting expertise can offer personalized support to help companies

leverage the right simulation software and critically evaluated experimental data in order to create powerful, end-to-end solutions. Lifecycle consulting is an integral component of digital transformation, as many companies require expert guidance to harness the full power of water chemistry applications.

While OLI has already operationalized a number of pertinent chemistries, scientists are working tirelessly to define useful models for every chemistry. This massive undertaking will inspire revolutionary new technologies and comprehensive insights; however, further research is required to fully understand all chemical properties.

Successful partnerships will fuel the development of accessible and accurate models which enable companies to design, simulate, and optimize their industrial processes. Through a complete solution strategy—pinpointing unique business needs and defining applications to adopting key technologies for deep insight—companies will have the ability to solve their most demanding chemistry challenges.

Improving industrial performance

OLI Systems, Inc. is already transforming the market with cutting-edge chemical and process simulation software that provides real-world answers. OLI Systems thermodynamicists have compiled an extensive data bank of chemistry parameters for more than 80 elements on the periodic table. The database, in conjunction with a rigorous thermodynamic framework, delivers unparalleled electrolyte chemistry to enhance process performance and yields with high-level analysis. Multiple sectors are experiencing major improvements to efficiency and productivity—and this is just the beginning.

For O&G companies, OLI Systems' applications enable scaling and corrosion prediction in a variety of conditions, including high-temperature/high-pressure environments. These capabilities not only ensure reliable production, but they also offer prescriptive insights for treatment, remediation, and reducing risk of catastrophic failure. OLI software is also utilized in refinery operations to help engineers avoid catastrophic events by performing proactive maintenance and optimizing processes. Water purification is another critical O&G application, in which the removal of harmful components—such as hydrogen sulfide and mercury—is a requirement to ensure compliance with regulations like the Clean Water Act.

Metals & Mining companies utilize process simulation to enhance operations end to end. During extraction, water chemistry applications like hydrometallurgy enable companies to recover metals from ores, concentrates, and residual materials. Similar capabilities allow lithium producers to efficiently and cost-effectively extract lithium from brines and ores as well as recycle lithium and other fine metals from waste materials. OLI Systems also provides the technologies to predict and optimize the mining and recycling of rare-earth elements. This is a major area of study for national laboratories, universities, and technology developers, as these materials are essential for electronics, electric cars, power generation from renewable resources, and much more. The Critical Materials Institute (CMI) has partnered with OLI Systems to manage the supply of rare-earth elements to expand green operations and bolster economic security. The CMI is developing solutions using OLI technology to extract rare-earth elements from ore and to reprocess these elements from consumer electronic, magnet, and machine waste. Elsewhere in industrial processes, applications like flue gas desulfurization are optimized to eliminate the release of harmful chemicals into the environment. This dramatically reduces the risk of pollution, thereby enabling companies to comply with environmental regulations.

Water Treatment is another central focus for OLI Systems, delivering precision chemistry insights to purify industrial, municipal, and biological water sources. Water Treatment applications impact a variety of markets by allowing companies to safely reuse, recycle, and discharge waste water. With the development of a reverse osmosis (RO) membrane, OLI Systems' software is well-equipped to ensure the quality of water supplies. This high-fidelity technology enables companies to predict and treat for noxious components (e.g. arsenic and lead) and undesirable solids (e.g. struvite) prior to disposal.

In the Chemicals industry, water chemistry applications are driving superior levels of performance to traditional operations. For example, fertilizer companies are leveraging OLI Systems' new potash chemistry capabilities to simulate and enhance the production of agricultural chemicals. Now, producers can garner prescriptive insights to operate with greater efficiency and cost-effectiveness to increase yields.

Nuclear Energy is another rapidly evolving field that is pursuing digital transformation to improve a variety of processes. Safety is a fundamental issue for nuclear energy, and companies must adopt top-quality chemistry tools to optimize production, eliminate corrosion risks, and handle nuclear waste. Those who do will have the ability to enhance the safety of production plants and safeguard the environment.

Pursuing landmark research

OLI Systems has an unparalleled basis for water chemistry simulation. Its rigorous thermodynamic models provide a robust foundation for advancements in process design. Moving forward, OLI Systems aims to extend its physical models for all chemistries relevant to industry, compiling unique datasets and extracting key insights to enhance the OLI Databank parameters. This is a crucial step to understanding the behavior of any chemistry in water.

Operating with incomplete datasets can cause major issues for process industries. For example, if a chemical manufacturer develops a new process with an indeterminate mixture of chemical components, it will lack the insights needed to accurately model operations and achieve desired results. The consequences of this can span from decreased efficiency and lost production to catastrophic failure.

To overcome these challenges, OLI Systems is eagerly collaborating with new and existing partners in pursuit of the unknown. OLI Systems is establishing strategic collaborations to study water chemistry interactions, phase equilibrium, identify changes across all temperatures and pressures, and translate this information into a usable format in the database. The ultimate goal is to analyze all available information on different chemical behaviors to build the most comprehensive software and chemistry database in the world.

OLI Systems invites you to participate in high-level research activities as well as conducting extensive chemistry analysis. This groundbreaking effort will empower companies to not just react to chemistry insights, but instead, operate proactively to drive end-to-end optimization. As a result, companies utilizing OLI Systems' solutions will realize extraordinary competitive advantage and revolutionize their approach to industrial processes.

Driving innovation with lifecycle consulting

OLI Systems offers lifecycle consulting to help companies identify and solve the most complicated aspects of their projects from start to finish. Expert guidance enables companies to accelerate time-to-value without

hiring in-house experts. These services are changing the game for companies who require additional assistance to exploit water chemistry insights. As big data and analytics become increasingly critical to industrial processes, OLI Systems will help customers capitalize on troves of collected data, enabling companies across any vertical to operate prescriptively while focusing on running their processes.

OLI Systems is a trusted partner who brings industry-leading simulation tools and electrolyte modeling capabilities to the table. With physics-based models, the OLI thermodynamic framework offers water chemistry expertise across a broad range of environmental conditions, to deliver precise model predictions.

Our objective is to continuously develop new chemistries, expanding in-depth research and consulting solutions that allow companies to expertly design and optimize their process. OLI Systems is positioning itself to become the go-to chemistry advisor and therefore gain deeper insight into undefined parameters to drive innovation.

To learn more about this incredible opportunity for innovation with cutting-edge research and lifecycle consulting, we encourage you to contact OLI Systems. You can also follow us on Twitter at @OLISystems.