News Release

New OLI Systems platform V9.6 fuels richer, more accurate insights for process design in capital-intensive industries

A combination of industry-leading data parameters, thermodynamic frameworks, and software innovations tackle complex water chemistry challenges

OLI Systems, Inc. starts with the ability to understand how combinations of chemicals react and what by-products are produced in controlled lab environments. Moving into the real world, OLI simulations empower clients to tailor the theory, for example by suppressing certain chemical speciations so models become relevant to industrial and commercial applications. Successful modeling and simulation requires a comprehensive database of material properties together with rigorous thermodynamic and kinetic models, software development skills, and most importantly, deep domain expertise in the underlying chemistry of the commercial applications. The need for this type of comprehensive approach to modeling becomes particularly important with electrolytes, whose behavior tends to be highly complex and unpredictable. And electrolyte chemistry applications are ubiquitous, since water is a key ingredient in most process industries including oil & gas, coal & nuclear power, chemicals, metals & mining, utilities, environmental, and water management.

OLI has a rich history of shedding light on the chemistry of water-based reactions through electrolyte chemistry simulation and modeling that delivers insights from comprehensive data validation and software applications built on rigorous thermodynamic models. This helps our clients to either predict highly specific phenomena (such as corrosion, scaling, pipeline fractures, rust formation), or model chemical reactions for process flowsheet design optimization and research and development. The ability to foresee these reactions has a major impact on a wide range of operations—everything from the safety and productivity of oil and gas production, to the reliability and regulatory compliance of nuclear reactors, to the digitalization of chemical research and development activities, to purifying drinking water, to treating industrial waste water from chemical processing plants, to water reclamation and reuse — anywhere water is involved.

The OLI solution is a unique and powerful combination of simulation technology and software, with applications spanning chemical processes, electrochemical corrosion modeling, oilfield scale prediction, water treatment, and environmental simulation. With an extensive chemical speciation of over 85 elements of the periodic table, OLI can deliver key data, specialized thermophysical properties models, and software to solve a broad range of water chemistry applications.

Today, we are enabling our clients to advance their modeling and simulation capabilities with **several new and unique** data properties, thermodynamic model innovations, and enhanced software capabilities in the OLI Software Platform V9.6. For **upstream oil & gas**, the new MSE-SRK thermodynamic model has an unparalleled ability to handle systems with hydrocarbons and supercritical components at high pressure. This dramatically improves phase prediction. For deep wells and extreme production environments, the new high-temperature and high-pressure chemistry parameters for PbS, ZnS and $CaSO_4$ enable accurate scaling prediction up to ultra-high temperatures and pressures with OLI ScaleChem. New corrosion-resistant alloy chemistries enable prediction of corrosion under high temperatures and pressures, while the new drilling completion fluids chemistry enables a rigorous means to select and optimize completion fluids—and this is only available from OLI. For **water treatment** (including natural and contaminated water) and **chemicals processing**, the new arsenic and struvite chemistry models help to optimize water treatment and predict scaling during water management**. The new reverse osmosis (RO) membrane simulation** in our Flowsheet: ESP process simulator allows process engineers to simulate real process waters outside of manufacturer's specifications to enable process optimization. For **lithium and potash mining**, the new lithium and potash chemistries provide a rigorous thermodynamic foundation for the optimization of lithium and potash production with OLI Flowsheet: ESP by predicting solid formation during the production process.

Upstream oil & gas

With the V9.6 update, customers will see dramatic improvements and new capabilities in OLI's databank and thermodynamic framework. The flagship feature of this release is the increased functionality of the Mixed Solvent Electrolytes + Soave-Redlich-Kwong (MSE-SRK) thermodynamic model. The MSE-SRK Framework is a model that combines MSE for electrolyte systems and SRK for the gas phase and the second liquid, or non-electrolyte phase. This model is targeted at oil and gas production and designed to uniquely address supercritical components at elevated pressures, as well as mixtures containing supercritical components at transition points between vapor-liquid and liquid-liquid equilibria. While functional models exist for hydrocarbons and supercritical components, OLI combines the best of both worlds to not only provide a more accurate and consistent model for upstream oil & gas, but it will also provide more reliable predictions for systems containing supercritical components and hydrocarbons across low-to-high pressure ranges. Organizations in the oil & gas sector (i.e. energy production companies, oil service companies, corrosion testing laboratories, etc.) can now improve the core functionality of their systems as well as drive levels of performance that are vital for upstream oil & gas operations.

High-pressure, high-temperature (HPHT) chemistry: OLI has dramatically extended simulation capabilities to predict the formation of mineral scales—PbS, ZnS, and $CaSO_4$—at extreme high-pressure and high-

temperature ranges. This technology is essential as oil & gas transitions to deep wells and extreme production environments.

Drilling completion fluids chemistry: OLI is significantly optimizing the selection and utilization of completion fluids, equipping operators to effectively complete oil and gas production wells by predicting what will happen to completion fluids in downhole environments.

New corrosion resistant alloys (CRAs): Simulation is proven to reduce expensive and time-consuming corrosion testing, and now, OLI is extending the scope of simulation power into three new CRAs—2507 super duplex alloy and the nickel-base alloys 28, 29, and 2535. These alloys are key for highly corrosive oil and gas environments in the presence of H_2S and Cl as well as various acids, bases, and salts, enabling customers to estimate the potential for general corrosion, localized corrosion, and stress corrosion cracking.

The MSE-SRK Framework is now available in OLI Studio V9.6. MSE-SRK is now a valuable choice in OLI Flowsheet: ESP V9.6 as well, enabling oilfield process modeling at high pressures. The thermodynamic framework enables better phase predictions for unit operations, while improving all upstream oil & gas applications with accurate, intelligent software. With this development, OLI is extending its market leadership with greater accuracy as well as the usability of electrolytes.

The new phase envelope generation facility in OLI Studio allows customers to anticipate where vapor and liquid will occur. By predicting the formation of a liquid phase and a vapor phase in a single calculation, customers can build an accurate and comprehensive view of their chemistry, without wasting time or resources on multiple calculations. Additionally, supercritical fluid handling in OLI Studio with MSE-SRK combines with this feature to simplify understanding complex system behavior.

Water management & treatment

OLI's arsenic and struvite chemistry is another crucial update that dramatically optimizes water treatment. This novel capability works to predict phase equilibria and speciation of arsenic in water, in the presence of Ca, Fe, and CO_2 and in acidic environments as well as predicting the formation of struvite in waste waters. With this groundbreaking development, water treatment organizations can predict what will happen to arsenic—one of the most toxic components in natural and industrial waters—and calculate the possibility of scaling in pipes due to struvite in water treatment.

A central feature for the water management industry is the RO membrane simulation. RO membrane is the first of new specialized water treatment blocks in OLI Flowsheet: ESP. This block brings rigorous electrolyte chemistry to RO calculations, using customer-defined chemistry specifications to see how a particular membrane will perform and optimize the process flow design for customers' unique environments. Disruptive OLI RO simulation technology, which brings rigorous chemistry analysis to any

membrane, is a revolutionary addition to membrane-design software. Now, customers can simulate real process waters for conditions outside of manufacturers' chemistry specifications, taking into account the number of membrane elements per vessel and the total number of vessels in an assembly, and by estimating the total membrane area (or number of vessels required) for a specific recovery. With no comparable vendor-independent process simulator on the market, OLI is empowering process engineers to simulate a designed membrane into an actual process flowsheet and use that output to feed other unit operations.

Lithium & potash mining

Advancements in potash, lithium, as well as arsenic and struvite chemistry are providing a rigorous foundation for optimizing chemical production processes and water treatment. OLI's approach to potash chemistry is a new, competitive capability that allows customers to predict the formation of solids in potash recovery and crystallization operations. Industries centered on minerals, mining, and fertilizer will have the unique ability to perform phase equilibrium predictions for mixtures that combine Na, K, Mg, Ca, SO_4, and Cl.

Similarly, OLI's lithium chemistry helps customers perform phase equilibrium predictions for core mixtures of Li, Na, K, SO_4, and Cl in order to optimize lithium production from salt brines. This process is vitally important to lithium production industries who can capitalize on insights into potash components in addition to predicting the formation of solids in lithium production.

These new chemistries will be available in OLI Flowsheet: ESP V9.6, to accurately model lithium and potash extraction processes.

Other noteworthy advancements in V9.6

Mercaptan chemistry, that provides the thermodynamic underpinning for UOP's TM Merox and similar processes, delivers a proven model to predict how mercaptans can be removed from hydrocarbon streams by utilizing caustic. This is a dramatic improvement from the alternative, experimental-based design that will transform downstream oil & gas operations.

Pump and incinerator simulation: With this new block in OLI Flowsheet: ESP, OLI is letting customers simulate processes with pumps (to raise the pressure of a liquid stream) and incinerators (to burn gaseous components). The chemical process industry—specifically organizations utilizing flue gas applications—can now calculate discharge pressure, harnessing even greater value from this software.

V9.6 also includes updates to make software simpler to use and manage in order to enhance user productivity and visualization.

News Release

Pioneer the future of water chemistry

With extensive datasets, software, and expertise, OLI Systems is positioning itself as the first choice to help customers in various process industries overcome their water chemistry challenges.

To learn more about how OLI is leveraging its expertise and capabilities to address corrosion and scaling challenges, join us at this year's CORROSION Conference & Expo on April 15-19 in Phoenix, Arizona. CORROSION 2018 welcomes over 6,000 corrosion engineers, scientists, researchers, technicians, asset owners, and other professionals from around the globe to gain access to the latest industry research and technology. Visit OLI experts at booth #1215 to explore new innovations in corrosion software, get a sneak preview of how V9.6 will enhance corrosion and scaling modeling efforts, and learn how the MSE-SRK model and new data properties can dramatically improve your corrosion prediction accuracy.

And don't miss the exciting presentation by Dr. Anderko (OLI's Chief Technology Officer) happening on Wednesday morning, April 18th. Check out the "Flow assurance in oil & gas from inland to subsea" session to learn more about modeling mineral scaling in oil and gas environments. You can also sign up for an application assessment or speak to an OLI expert by visiting us online—and follow us on Twitter at @OLISystems for up-to-the-minute news and updates.

The new platform V9.6 is expected to be available by June 15th. Please contact sales@olisystems.com for additional information.

About OLI Systems, Inc.

OLI Systems, Inc. is a global leader in the modeling and simulation of electrolyte chemistry applications. This capability accelerates process design optimization, reliability, and productivity in capital intensive industries including oil & gas, metals & mining, nuclear energy, chemicals, water management, utilities, and defense. With core competencies in electrolyte thermodynamics, process simulation and electrochemical corrosion and scaling simulation, OLI has developed both the framework and the parameters for the framework that make it possible to accurately predict the behavior of virtually any combination of chemicals in electrolyte solutions. OLI's highly unique and rigorous solutions includes a comprehensive chemistry data bank and parameters, thermodynamic frameworks, software portfolio, services capabilities, and rich applications expertise. These solutions enable over 500 commercial organizations around the world to solve their most complex water chemistry challenges. OLI's solutions are also used by students and researchers in many academic and government organizations. OLI Systems, Inc. is headquartered in Cedar Knolls, NJ USA.