OLI
systems, inc.

OLI's Academic Program

Options for universities and academic research organizations

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OLI's state-of-the-science electrolyte thermodynamic framework

OLI has pursued a decades-long commitment to research and development into the behavior of electrolytes. This has resulted in a state-of-the-science electrolyte thermodynamic framework, a comprehensive databank with several thousands of simulation parameter covering 80+ elements of the periodic table, and a highly tuned solver that can successfully converge the mathematically challenging behavior of electrolyte chemistry.

This simulation capability has been applied to commercial problems and processes in over 500 client companies worldwide, including among many of the top ten companies in oil and gas, chemicals, metals and mining, power generation and water treatment.

Software packages available

The main components of the OLI software include:

A virtual laboratory on your PC

OLI Studio: Stream Analyzer This component of the OLI software is useful in studying electrolyte chemistry and the behavior of electrolytes in water or another substance in depth. The basic component of this software is an equilibrium calculation, that can be specified as an isothermal calculation or as a bubble or dew point, set pH, precipitation point, composition target, or custom calculation. Calculated is the phase distribution of a solution as well as a plethora of stream properties, including pH, transport properties, densities, heat capacities as well as thermodynamic values of K-values and activities. Other calculations include a survey, where trends can be studied by varying pressure, temperature, pH and / or composition, as well as simple mixes and separate operations. This is an idea package for studying electrolyte chemistry theory for a given chemistry

Electrolyte flowsheet simulation

OLI Flowsheet: ESP This unique program is an electrolyte flowsheet simulator that can be used for electrolyte primary processes. Simple to setup, simple to tailor via callouts on the flowsheet, easy to access the stream and unit results on a speciation basis. With controllers and recycle stream capabilities, this software can and has been used in senior design classes for water-chemistry based processes.

OLI Engine in <Alliance Partner Products> OLI is proud to partner with AspenTech, AVEVA, Honeywell, KBC (coming in 2020) KWA and PSE to offer a joint alliance partner product that accesses the OLI Engine from within Aspen Plus / HYSYS, PRO/II, UniSim Design, Petrosim, SysCAD, or gPROMS. When other thermodynamic methods will also be useful, the OLI Engine partnered with your flowsheet simulator of choice is an optimal way to address the water chemistry aspect of your system.

Corrosion simulation

OLI Studio: Corrosion Analyzer This pioneering technology simulates aqueous corrosion due to chemical attack of the bulk solution in contact with a metal surface. It is sold as an add-on to the Stream Analyzer or ScaleChem software. Included are calculations for: Stability diagrams, the thermodynamics of corrosion; Kinetic rate of uniform corrosion, including computer generated polarization curves; Localized corrosion indicators; Extreme Value Statistics (EVS), a statistical model used to calculate remaining asset life

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Upstream mineral scale prediction

OLI Studio: ScaleChem This comprehensive software was specified by production chemists in Shell, ConocoPhilips and BP to build best practices into the calculation and prediction of upstream mineral scale. Features include a well scenario calculation for determining at what temperature / pressures scale is likely to from; a mixing waters calculation to find the effect of mixing two or more disparate waters together (e.g., from waterflood or for fracking) to determine "safe ratios" where no scale will form; a reservoir saturation module that can calculate a saturated water from the formation minerals at reservoir conditions; and a facilities calculation that permits simple mixes and separate functions to mimic gathering or disposal systems. Also included is a contour plot feature for visually showing safe and likely-to-scale zones within a matrix of temperature and pressure.

OLI's academic program

OLI would like to partner with you to bring the value of this technology to your academic institution. OLI offers four levels of program:

Academic Education (EDU)

This option is for individuals pursuing graduate studies, an individual copy of any one of the components listed is available.

Classroom Curriculum (EDC)

This option is for a network license at your campus that can be used by multiple students / professors within a department. This option includes the OLI Studio: Stream Analyzer and one other component from our electrolyte flowsheet, corrosion simulation, or upstream simulation software.

Academic Research (EDR)

This option is for universities and academic research institutes that have funded academic research programs. Qualifications include:

- Client organization is a research department within / or affiliated with a university
- Client results will not be used for any industry or government application
- Client work would not be competing with work normally performed by a commercial consultant
- Client cites OLI when publishing any results
- The OLI software will not be used by any client industry-partners for industrial or government applications

Commercial arrangements for industry or government consulting

OLI is an excellent choice for your research done at industry or government request. However, we do consider this work consulting, particularly when it is done by professors and / or a post-doctoral program.

OLI Services

All academic licenses come with Bronze service included in the lease fee. This is a self-service model. OLI provides installation and configuration help. Support questions may be addressed to OLI and they will be answered in the OLI Simulation Group on Linked In.

Additional resources

OLI offers additional paid services at Silver, Gold and Platinum levels. These services are bundled and discounted services that combine training, discussions of setup / results interpretations with OLI thermodynamic and / or simulation experts, some applications consulting and applications support.

OLI also periodically offers public training via web or face-to-face classes at different locations worldwide. Please ask to be put on our mailing list so that you may receive notices of upcoming events.

We are often asked by academic OLI clients whether it is possible to extend the OLI databank to either add additional species or modify current species simulation parameters. OLI does have a program for adding species to the OLI

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databank. However please note that this program is offered for commercial terms only. Please ask us for the brochure describing this OLI offering.

Finally, if you are doing your own modeling work for your graduate research in MS Excel or a program such as MATLAB, OLI has an API that we can discuss further. This is in a program called OLI Engine: Developer Edition. Please let us know what your specific application / scope is, and we can determine whether the Developer Edition would be a suitable component for your work.

For more information

If you would like to understand more about OLI's electrolyte thermodynamic framework, OLI has several peer-reviewed papers. Selected papers may be accessed at <u>OLI-Academia Introduction</u> This site also has the latest OLI product sheets, proceedings from past OLI Simulation Conferences, and other assets.

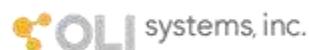If you would like to discuss your particular academic software needs, please contact us:

Dira Silvera

Academic Program and Training Lead

w 973.969.2846   **e** <u>dira.silvera@olisystems.com</u>
2 Gatehall Dr, Suite 1D
Parsippany, NJ 07054

 OLI systems, inc.

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