# OLI Studio: Stream Analyzer

OLI Studio: Stream Analyzer$^{TM}$ is first-principles, thermodynamic software that calculates multiphase properties of electrolyte and non-electrolyte streams, including those derived from water analyses.  It is the main interface to the OLI Studio suite.  OLI Studio is free-form software that offers flexibility in what chemistry a user can enter or the conditions that may be tested.
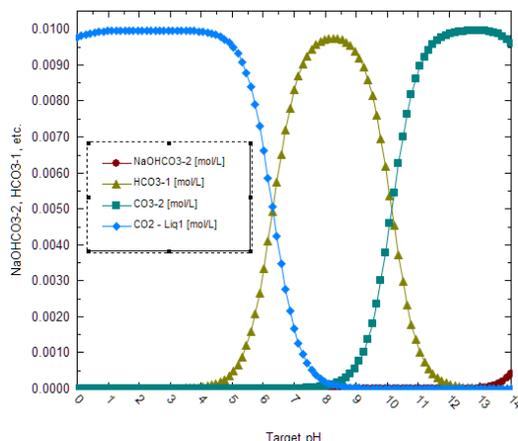


Stream Analyzer is a comprehensive thermodynamic tool that calculates speciation, phase equilibria, enthalpies, heat capacities and densities in mixed-solvent, multi-component systems.  It incorporates chemical equilibria, a kinetics module, and solid phase editing to match real environments.

Stream Analyzer is also a comprehensive applications tool, capable of performing several hundred calculation types.  The user interface, internal equation generator, and numerical solver work seamlessly to create the calculation scenario of interest.  For instance, a mixture's boiling point pressure can be computed as temperature increases, and as pH is kept constant.

## Capabilities and features

The fundamental approach to electrolyte thermodynamics enables Stream Analyzer to deliver on critical client needs.  There are no calculation short-cuts, like Henry's constants or correlation curves, because all thermodynamic properties are computed from first principles.  The following table contains a brief description of these capabilities plus other features that make the software useful for modeling electrolyte systems.

| | |
|---|---|
| ✓ Equation of state (Equilibrium constants) | OLI uses the Helgeson-Kirkham-Flowers-Tanger EOS, plus additional estimation methods. |
| ✓ Aqueous (AQ) model (activity coefficients) | A strong-electrolyte model based on combined work of Bromley, Zemaitis, Pitzer, and OLI.  Prediction range: –50 to 300° C to 1500 bar, and 0 to 30 m ionic strength. |
| ✓ Mixed solvent electrolyte (MSE) model (activity coefficients) | OLI's peer-reviewed, published model accounting for long-range, ion-ion and short-range interactions between species.  Prediction range: –80° C to 95% of the $T_C$ of the mixture, 0-4000+ bar, no concentration limits. |
| ✓ Databanks | An 80-element, several thousand species database.  Each species has activities in aqueous, vapor, oil, or solid phase where applicable. The databank also contains aqueous and non-aqueous organics. In addition, there are specialized supplements: geochemical, ceramic, ion exchange, and adsorption databases. |
| ✓ Thermophysical properties | Peer-reviewed, thermophysical models to predict surface tension, interfacial tension, viscosity, electrical conductivity, thermal conductivity, diffusivity, and osmotic pressure. |
| ✓ Molecular and ion inflows | Stream Analyzer accepts molecular inflows, typical of a formulation or a plant process stream and ion inflows, typical of a sample analysis. |
| ✓ Plotting and reporting | The software contains plotting and report features that can be formatted for trend plotting, ad-hoc analyses, and presentations. |

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## Calculation Functions

The advanced user interface and internal equation generator enable many calculation types. The list below contains these example capabilities. They can be performed alone or combined to create specialized calculations.

**Single Point**
- Isothermal flash
- Bubble/dew point
- Isochoric
- Composition point
- Precipitation point
- Custom

**Multiple Point (Survey)**
- Temperature
- Pressure
- Vapor fraction
- Composition
- pH

**Mixing**
- Single mixing flash
- Ratio mixing (1 to 100%)
- Volume or mass change
- Adiabatic and heat duty

**Other**
- Chemical phase diagram
- Kinetics
- Oxidation/reduction
- Surface complexation
- Ion exchange

## Applications

The variety of calculation types above and the ability to combine calculations enable many application types needed for broad industrial needs.

- ✓ Amine chloride sublimation
- ✓ High-pressure autoclave formulation
- ✓ Gas-phase condensation and pH prediction
- ✓ VLE and LLE partitioning of organics as temperature or pH varies
- ✓ Salt solubility vs. pH or composition
- ✓ Trace metal fixation vs pH, oxidant, and surface oxide
- ✓ Seawater evaporation from 0 to 100%
- ✓ Acid or base neutralization (titration)
- ✓ Pressure buildup in sealed mixing tank
- ✓ Solids formation vs pressure, temperature, or composition
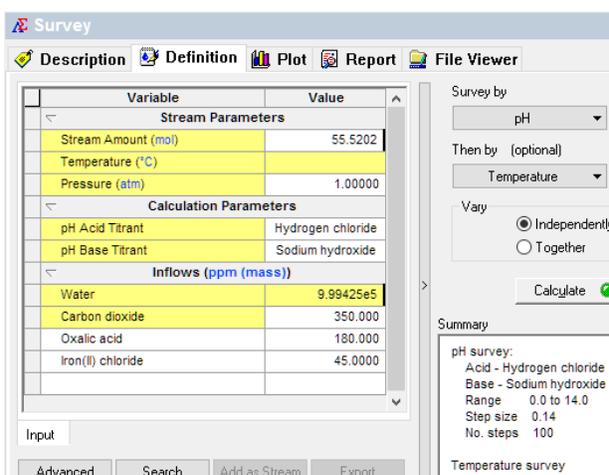


OLI Studio: Stream Analyzer, Corrosion Analyzer, and Studio ScaleChem can be used together to study or solve Process Stream and Laboratory research problems. It is professionally-maintained software, with regular releases, feature enhancements, and improved and expanded databases.

## Now shipping OLI Studio V9

Components of the OLI Studio include:

**OLI Studio: Stream Analyzer**     for in-depth chemistry studies of your electrolyte chemistry
**OLI Studio: Corrosion Analyzer**     for the electrochemistry of aqueous corrosion
**OLI Studio: ScaleChem**     in-depth chemistry studies for oilfield applications