

Introducing SLEEK

SLEEK is a new process development software application that is specifically targeted to assist chemical engineers and chemists in understanding and effectively designing crystallization-based separation processes.

SLEEK achieves this target through a combination of the following technology features:

- Thermodynamic database access & management
- Data regression for solid-liquid equilibrium
- Ability to define polymorphs, solid-liquid phase diagrams
- Design & sensitivity analysis for continuous crystallizers
- Operating policies, design & PSD calculations for batch crystallizers
- User friendly architecture & interface

SLEEK — For Thermodynamic Analysis

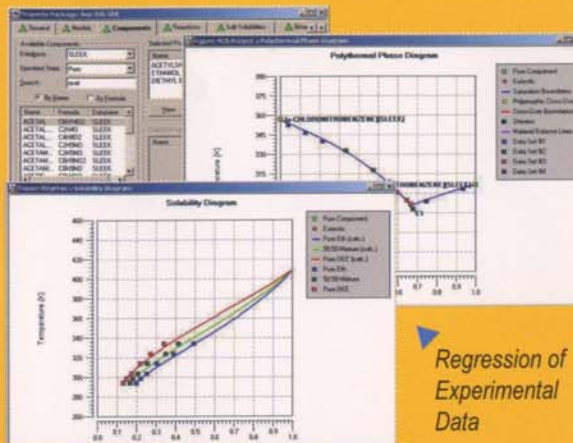
SLEEK has several features that will help you build comprehensive understanding of the solid-liquid system on hand.

These features will help you to:

- Select property methods & thermodynamic models that best describe the system
- Regress experimental data to obtain thermodynamic model parameters
- Determine the conditions for additional experiments
- Plot solubility curves & phase diagrams
- Examine the overall composition space & visualize separation barriers
- Understand how reactions & solid complexes affect solubilities & phase behavior
- Understand polymorphic crossovers (components may have any number of polymorphs in SLEEK)
- Calculate mixture properties



CLEARWATERBAY TECHNOLOGY, INC.
the Process Development Company

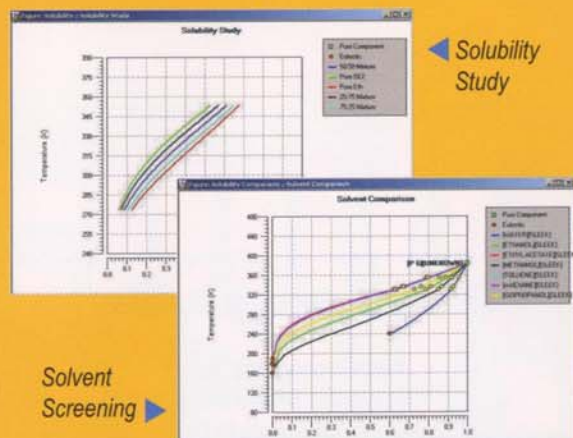


Regression of Experimental Data

SLEEK — For Solvent Selection

Solvent and/or anti-solvent selection is very crucial for solid-liquid separation. SLEEK recognizes this importance and offers you two tools to help you accomplish this task.

- The Solvent Screening tool enables you to filter & screen solvents based on a solute's solubility in a specified temperature & composition range.
- The Solubility Study tool enables you to estimate the solubility of a solute in mixtures that include cosolvents, anti-solvents, other components & impurities.



Solubility Study

Solvent Screening

SLEEK — For Continuous Crystallizer Design

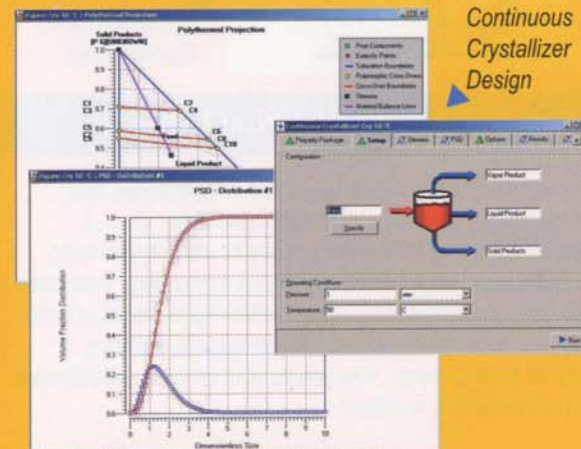
SLEEK can help you design continuous crystallizers. You can calculate the percent recoveries, total heat requirement & crystallizer performance under specified operating conditions.

SLEEK has models that allow you to calculate the particle size distributions by taking into account the effects of crystallizer size, nucleation and growth, agitator speed, fines dissolution, and product classification.

SLEEK also has a powerful capability which lets you study the effects of design variables on the performance of your crystallizer.

These features will enable you to:

- Find the right operating conditions for the recovery of your compound
- Find the operating conditions to obtain the desired polymorphic form of your compound
- Determine ways to optimize the product recovery & other performance parameters
- Study the effects of crystallizer operation on the particle size distribution



Continuous Crystallizer Design

SLEEK — For Batch Crystallizer Design

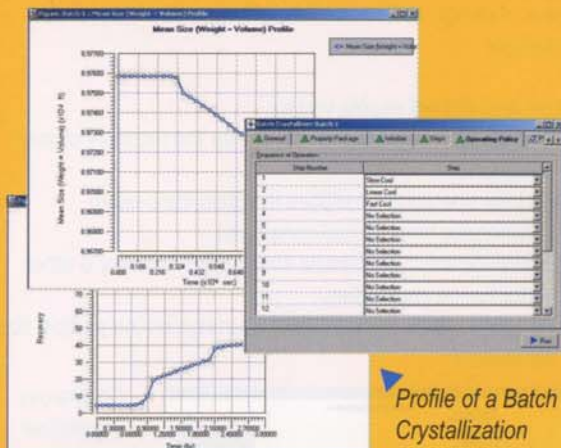
SLEEK batch crystallizer model allows you to create your own batch operating policies and then study the effect of these policies on crystallizer performance.

The batch crystallizer model also lets you calculate the particle size distribution properties dynamically.

With this model you can:

- Create operating policies by various combinations of "Cooling/Heating", "Solvent/Anti-Solvent Addition", & "Evaporation" steps

- Determine how recoveries, crystallizer variables, & component attributes change with time
- Determine how mean particle size & variance change with time
- Specify seeding
- Study the effect of seeding on mean particle size & variance



SLEEK — Any Way You Want To Use It

Process development includes experiment, analysis, and design tasks. These tasks are interdependent. Thus, a research team may iterate many times between experiment, analysis, and design before a project is completed. Each team may have a different order of accomplishing the tasks, which may also depend on the particular compound, situation, or stage of development. How you do your process development is your company's workflow.

Being a collection of tools, SLEEK is flexible enough to accommodate your needs, regardless of your workflow. Whether you want first to try a quick simulation to get an idea of what experiments to perform, or you would rather go to the lab to measure the phase diagram before doing the design calculations, SLEEK can handle the right amount of data at the right time.

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