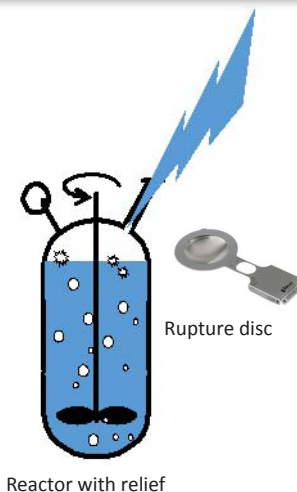


IN THIS ISSUE - TECHNOLOGY FOCUS ON: [Vent Sizing // Crystallization // Biotechnology // HEL Events]

## Vent Sizing For Runaway Chemical Reactions

Pressure relief of chemical reactors is the accepted way to prevent explosive vessel rupture in the event of a control problem such as loss of cooling supply or agitation failure. When the problem leads to a runaway reaction, potentially leading to rapid rises in temperature and pressure, correct sizing of the pressure relief device becomes much more critical due to the potential severity of the incident but also more difficult as it requires an accurate description of the runaway event.

The underlying technology for this was established ~ 1985 through a multi-company initiative (called DIERS). In addition, the need for small scale simulation of the runaway reaction was established and the characteristics of the instrument to do this were specified. HEL's Phi-TEC II adiabatic calorimeter follows directly from the findings of DIERS and provides data that can be used for sizing.



Test cells used in Phi-TEC II for thermal runaway studies



## Solubility (and MSZW) Determination

A successful industrial crystallisation requires the development of a robust process in the laboratory. Knowledge of the solubility curve and the stability of the solution in the vicinity of the equilibrium point, as indicated by the metastable zone width (MSZW), are essential to the successful development, optimisation and scale up of a crystallization process.

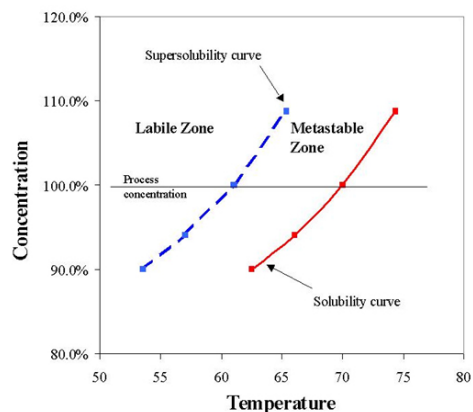
HEL has developed a highly sensitive turbidity-based probe to determine both the solubility and recrystallization temperatures automatically. This technology can be supplied either as a stand-alone probe (CrystalEYES) to be used with samples and vessels supplied by the user or else integrated into a multi-sample parallel tool (CrystalSCAN).



CrystalEYES Solubility Probes

The CrystalSCAN can automatically conduct 8 different experiments simultaneously. Specific cooling and heating regimes and automated dilution, to allow different concentrations, can be performed simultaneously and in a fully automated manner reducing weeks of development work to hours.

To generate this plot, for each sample, the CrystalSCAN provides solubility & super solubility (or MSZW) in 4 to 8 stirred samples, over a range of concentrations



Automatically generate MSZW and solubility curve in multiple reactors

The CrystalScan

## Gas Fermentation: Innovations In Miniature Bioreactors (See Our Recorded Webinar)

Gas fermentation is a growing technology for which HEL's miniature bioreactors, operating under pressure, have found widespread acceptance. Based on wide experience involving hydrogen and hydrocarbons in the chemical industry, HEL has produced a range of single and parallel reactor designs for fermentations at up to 10 bar while measuring and controlling all the key variables.

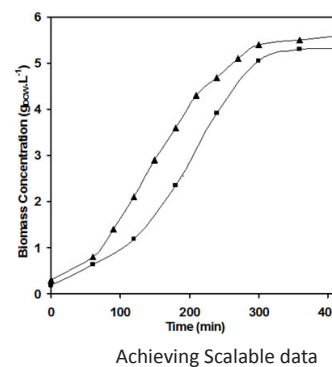
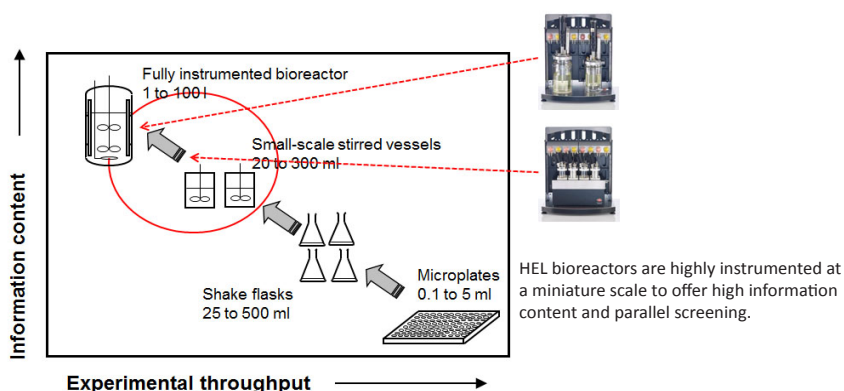
Safe handling of flammable gases is an important part of HEL's design including advice on infrastructure beyond the reactors. Some important design features include:

- Full automation from inoculation to sampling and downstream processing
- Miniature bioreactors from 20 ml to 500 ml that can be operated in parallel and at pressures to 10 bar
- Advanced gas management methods including flammable sensors



HEL Miniature Bioreactors

Scalability of data is hugely important and this has been demonstrated by independent users of HEL reactors. HEL bioreactors have redefined the widely cited plot of experimental throughput against information content where traditionally, it was necessary to operate at ~500 ml or larger in order to get the full range of data. HEL has reduced this to under 50 ml, even for fermentations (under pressure) as well as mammalian applications.



Webinar Link: <http://bit.ly/webin1>

**HEL EVENTS IN 2016. For More Events - <http://www.helgroup.com/events/>**

4th - 6th April 2016

Design of Experiments for Chemists and Engineers (DoE)

[Further Details](#)

Location: Hyderabad, India

11th - 13th April 2016

Cell Line Development & Engineering

[Further details](#)

Location: Vienna, Austria