



Standard & Custom Designs

Parallel Process Development



PARALLEL REACTION PLATFORMS

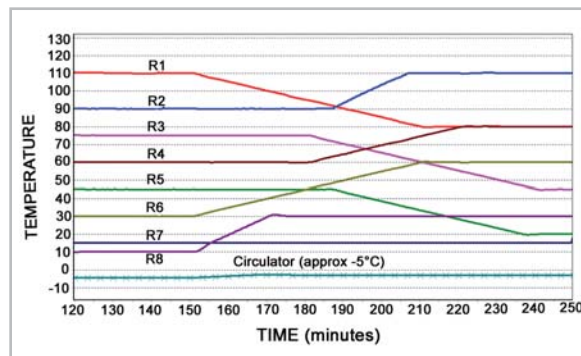
PolyBLOCK: compact, changeable, economic reaction block

INDEPENDENT TEMPERATURE MONITORING AND CONTROL

- | Temperature range of -60°C to +225°C
- | Over 100°C range between zones
- | Independent stirring, controlled & measured



Small Footprint
35cm x 20cm x 20cm



PB8 Independent temperature ramps – 30ml vessels



Use any combination of reaction vessels on one platform

Full control, real time data

Easy to use control software with choice of interfaces

- | Choice of touch screen or conventional PC interface
- | Real time editing of ramp rates, run times and set points
- | Data is easily exported to Excel or similar packages for analysis
- | Option of full recipe design with multiuser interface



Agitation

Suspended mechanical stirring for high liquid levels and suspensions (standard feature).



Overhead stirring for high viscosity liquids.



Increase the efficiency of your process screening and optimisation with HEL's multi-zone products

Reactor choices



Variety of vials and tubes, round and flat bottom flasks up to 250ml, custom reaction vessels from 75ml to 500ml

Reflux & inerting block



Water cooled **Inerting & Condensing Block**, with adapters for vials, tubes and reactors.

High pressure reactors



Wide variety of **high pressure vessels** available, with suspended or overhead stirrers.

Reflux & inerting manifold

- | Easy quick-connect solution for condensing and inerting in larger reactors
- | One connection for inert gas and water supply
- | Allows use of traditional condensers
- | Seals allow condensers to be removed without cooling liquid spillage



Quick exchange between applications...



Choose the adapter for your tubes, flasks or vessels. Custom inserts available.

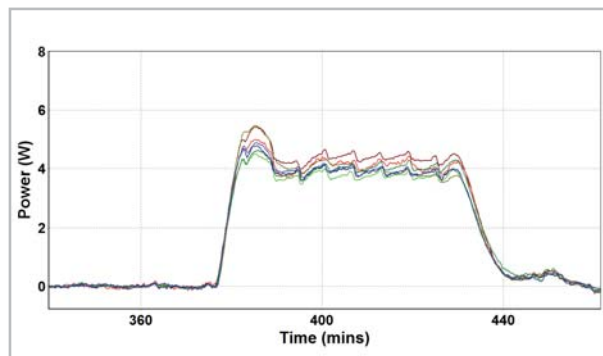


PROCESS OPTIMISATION/CALORIMETRY

Fully automated and flexible process development platform

REACTION CALORIMETRY: ON-LINE, PARALLEL

Simplified calorimetry for process development chemists, requiring no calibration and gives real-time, on-line data.



Simultaneous heat flow calorimetry on all zones of 8-pot PolyBLOCK

LIQUID DOSING

Independent dosing of one or more liquids to each reactor using precision syringe pump with multi-way valve.

PROCESS MONITORING AND CONTROL

Range of probes (pH, turbidity, temperature, pressure, etc) for monitoring multiple reactors, fully integrated into software.



HIGH PRESSURE REACTIONS

Homogenous or heterogeneous catalyst research (e.g. hydrogenation) with range of reactor types and sizes, at pressure

Process Development with Independent pressure and temperature measurement and control. Available with gas (and liquid) dosing options, using fully stirred reactor volumes from 15 to 300ml.

High pressure high throughput with CATalyst screening vials, suitable for one zone of PolyBLOCK. Available with 7, 18 or 24 vials each, for sample sizes from 1ml to 8ml in 100bar/250°C rated vessels.



4 x 300ml high pressure reactors, fully automated



CAT 18 allowing 18 x 1ml vials under pressure



8 x 75ml high pressure reactors with complete gas feed/venting manifold

PARALLEL CRYSTALLISATION

Automatically generate MSZW and Solubility curve in up to 8 reactors

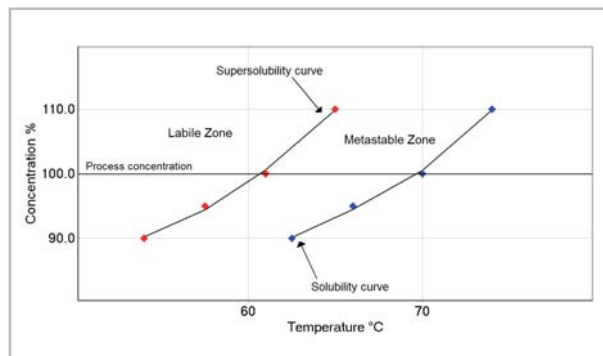
Automated determination of solubility (or MSZW) in 4 to 8 stirred samples, over a range of concentrations. Working volume 1ml to 350ml.

The system will automatically:

- Heat/cool each sample independently
- Detect dissolution/crystallisation



CrystalSCAN using PolyBLOCK PB8



Raw temperature and turbidity data is displayed graphically as the experiment proceeds. Off-line data analysis is possible using HEL's advanced software options to produce a complete MSZW plot

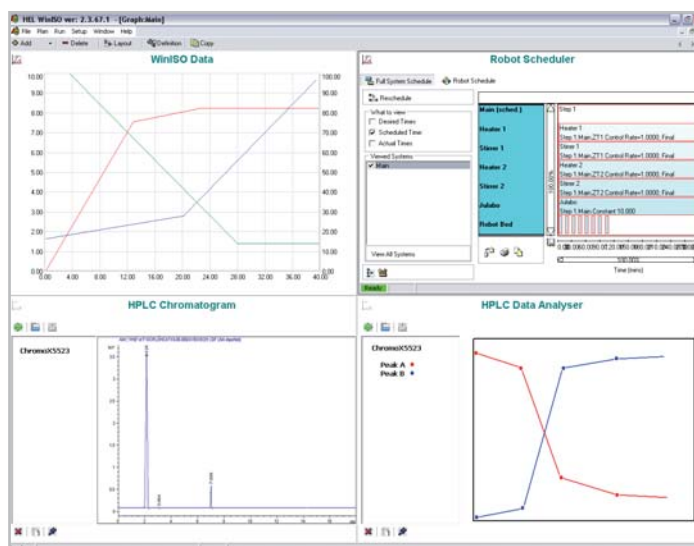
HIGH THROUGHPUT

Robotics controlled synthesis



LP ChemSCAN using PolyBLOCK PB8.
2 PolyBLOCKs can be served by one robot

- Built around the flexible PolyBLOCK reaction block, allowing a range of reactors using the same platform
- Capable of HPLC integration with live data displays
- Allows recipe changes anytime, live
- Makes possible parallel evaluations such as drug stressing, solubility studies, catalyst/route selection and other custom applications



Turn raw data into quantitative results, as experiment proceeds. Use results to make process changes

HPLC results can automatically drive recipe changes

CUSTOMISED CHEMISTRY

AutoMATE II: highly functional, versatile, customised platform

AutoMATE II is the new generation of HEL's high functionality parallel reaction platforms. It provides flexibility, efficient use of space, wide choice of features and controls and most importantly – scalable data.

- | Ideal for demanding glass and pressure applications
- | Temperature range of -80°C to +250/500°C
- | Over 100°C difference between reactors
- | Vials, flasks and custom reactors up to 500 ml, interchangeable
- | Selectable overhead and/or magnetic agitation
- | Almost limitless expansion of features: calorimetry, distillation, multiple feeds, hydrogenation and other pressure reactions, crystallisation studies
- | Designed for use in a standard fumehood



Selection of internals for different reactors in the same AutoMATE unit



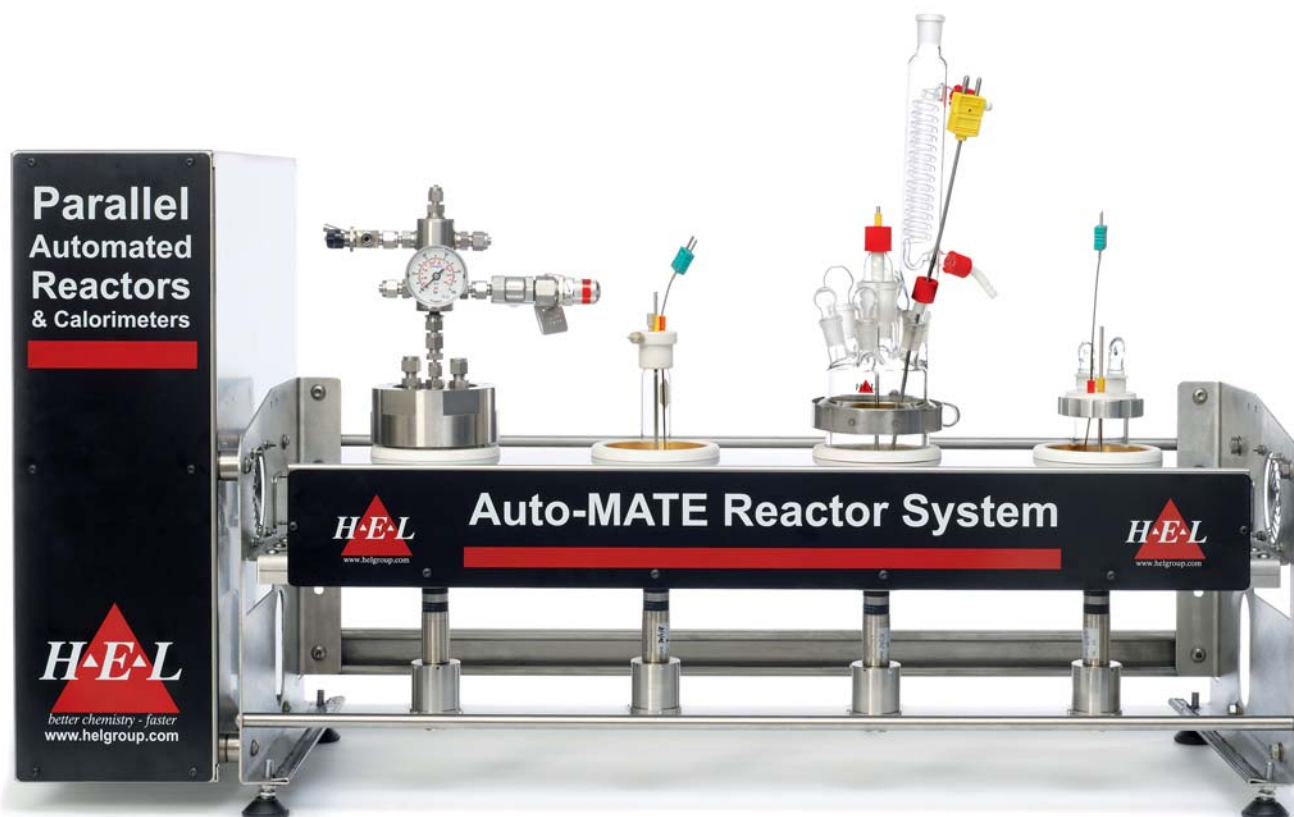
AM4 with 350ml glass vessels interchangeable with other high and low pressure reactors of different sizes. Movable jacket, independent temperature control and monitoring of each reactor



Easy switching of vessels at any time



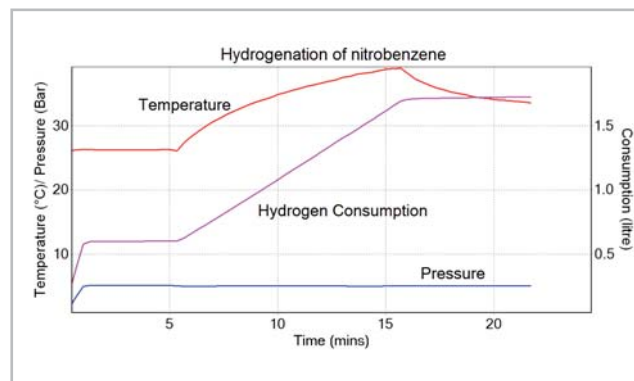
Mix & match 8 different reactors & vials, low & high pressure. AM8 with movable jacket allowing over 100°C range at any time



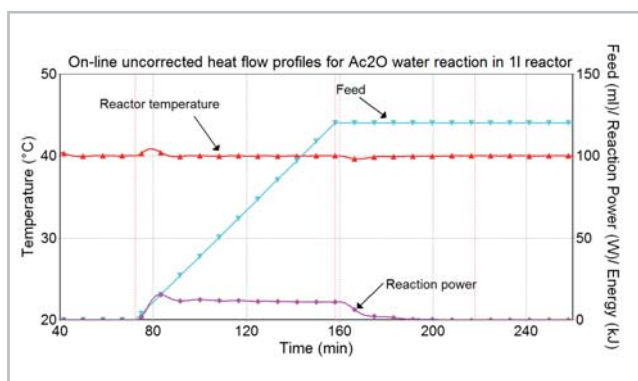
Simple system with bottom stirring, overhead stirring optional. Fixed jacket allows over 100°C temperature range between vessels, each one separately controlled



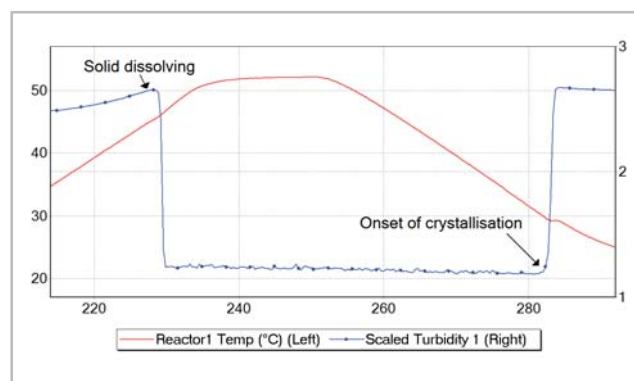
Fully automated high pressure sampling. Separate system available for low pressure applications



Typical hydrogenation data from fully automated reactor



Heat flow evaluation in parallel on multiple reactors – requires no user experience



Solubility (and MSZW) determination for one of the reactors

Bespoke systems

bigger volumes, higher pressures/temperatures, special reactors: **let us know your requirements**



ABOUT HEL

HEL is an international company that specialises in research and pre-pilot scale chemical reactors and related data logging/automation tools for process R&D in the pharmaceutical, fine chemical and petrochemical industries. Established in 1987 and with clients worldwide our key strengths are:

Knowledgeable staff - highly qualified and experienced chemical engineers and chemists

Quality - underpinned by ISO9001 certification for over 16 years

Service - choice of service contracts backed by established culture of unmatched client support

Range of products - both off-the-shelf and custom designs, manual and fully automated controls, low and high pressure/temperature applications, single and parallel/multi-vessel products

CONSULTANCY & TESTING SERVICES

Over the past 20 years we have developed expertise and become industry experts in:

- | Reaction hazards calorimetry, vent sizing
- | Process development and optimisation
- | Dust and powder flammability
- | Other hazard consultancy services, including expert opinion, HAZOPS, DIERS, incident and accident investigation and professional training



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HEL Inc // New Jersey // USA
HEL Italia // Milan // Italy
HEL AG // Germany
HEL India // New Delhi // India

e: info@hel-inc.com
e: helitalia@helgroup.com
e: helag@helgroup.com
e: info@helindia.com

HEL Ltd // UK HEADQUARTERS // 9-10 Capital Business Park //
Manor Way // Borehamwood // Hertfordshire // WD6 1GW // UK
t: +44 (0) 20 8736 0640 f: +44 (0) 20 8736 0641 e: info@helgroup.com

www.helgroup.com