ChemSCAN

Parallel Catalyst Screening & Process Optimization



ChemSCAN – 8-reactor system

4-reactor block

Compare catalysts. Measure gas uptake.
Optimize reaction conditions.

h.e.l

www.helgroup.com

The ChemSCAN Range

A bench-top platform for automated parallel screening and development of heterogeneous or homogeneous catalytic reactions, up to 200 bar and 200 °C, with an optional sub-ambient range to −40 °C.

Each reactor's pressure and temperature are controlled independently and gas consumption is measured, so the kinetics of hydrogenation, carbonylation and syngas reactions are characterized, not just run.

Choose your level of automation



ChemSCAN SA

Semi-automatic

- Pressure set manually instead of by solenoid valves
- 2 shared gas feeds
- Lower-cost entry point that can be upgraded

Best for basic screens



ChemSCAN

Automatic

- Automated, independent pressure control across all reactors
- Reactions start together and vent automatically when all are complete
- 3 shared gas feeds

Best for optimization



ChemSCAN+

Fully automatic

- Every reactor started, fed, vented and purged on its own
- 3 dedicated gas feeds per reactor

Best for DoE and advanced catalysis

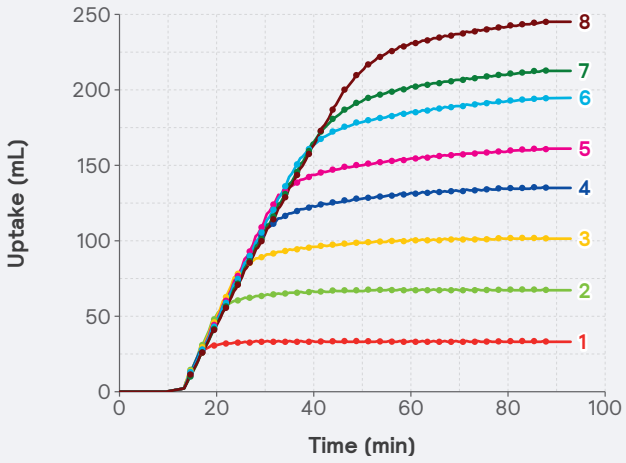
Key features

- Independent temperature control per vessel, with more than 100 °C between reactors in one run
- Independent pressure control, so reactors can start at different pressures
- Real-time, on-line gas consumption display for each reactor
- Mixing designed so gas uptake is mainly kinetically controlled, supporting scale-up
- Automated inert purge and reactive sequences, with software control and data logging
- Automated high-pressure liquid addition up to 200 bar, accurate to about 0.05 mL
- 4- and 8-reactor designs
- Predefined gas-uptake workflow, plus a protocol builder for custom workflows
- Interlocks and emergency pressure relief on every system

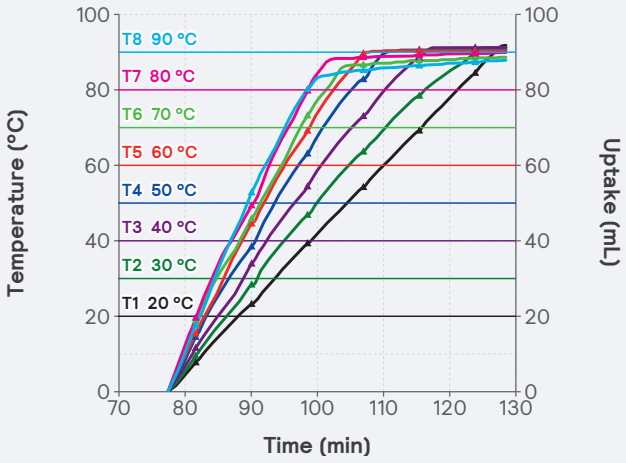
Typical ChemSCAN Data

Eight reactors run side by side and gas uptake is logged for each one in real time, so the effect of concentration, temperature or catalyst loading is clear from a single run.

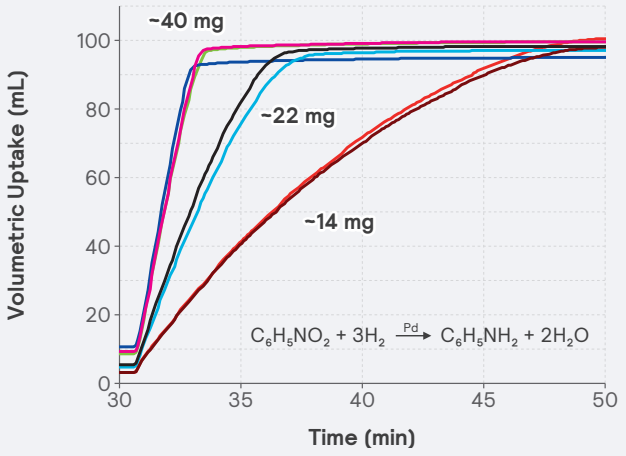
Hydrogen uptake at eight concentrations of 1-chloro-4-nitrobenzene (1–8% w/v, 4 bar).



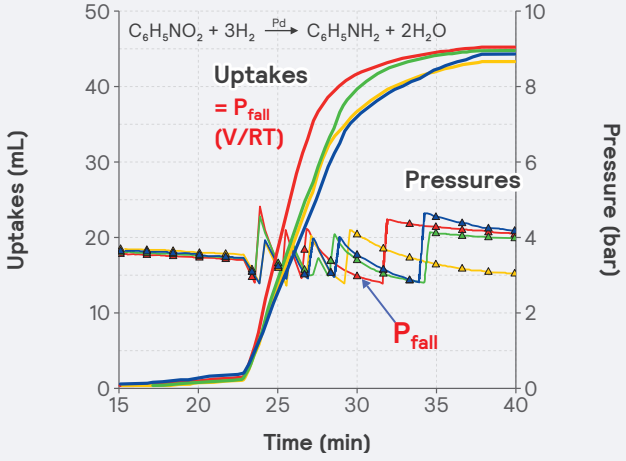
Nitrobenzene at eight temperatures in one run (5.4 bar): faster uptake, same endpoint.

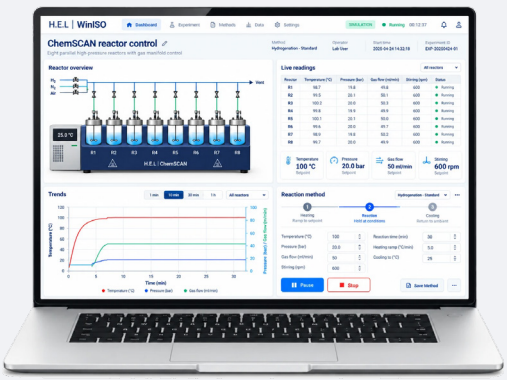


Nitrobenzene in decanol at 4 bar with ~14, ~22 and ~40 mg Pd catalyst: more catalyst, faster uptake.



6% w/w nitrobenzene in methanol at 3 bar: uptake calculated from every pressure fall in each reactor.





WinISO software

Control, data logging and recipes for every reactor. Run the predefined gas-uptake workflow, or build your own with the protocol builder.

- Real-time, on-line gas consumption display for each reactor
- Automated inert purge and reactive sequences

Specifications

Parameter	ChemSCAN SA	ChemSCAN	ChemSCAN+
Automation	Semi-automatic, manual pressure profile	Automatic, independent pressure	Fully automatic, every reactor independent
Gas feeds	2, shared	3, shared	3, individual per reactor
Reactor operation	Each reactor independent	Start together, auto-vent when complete	Start, feed, vent and purge each reactor separately
Working volume	3–400 mL (4-zone) 3–40 mL (8-zone)	3–400 mL (4-zone) 3–40 mL (8-zone)	2–400 mL (4-zone) 2–40 mL (8-zone)
Temperature	Ambient to 200+ °C	Ambient to 200+ °C	25 to 200 °C
Reactors	4 or 8, independently controlled		
Vessel volumes	4-reactor: 16, 25, 50, 75, 125, 300, 500 mL; 8-reactor: 16, 25, 50 mL		
Vessel material	316 stainless steel or Hastelloy C276		
Vessel rating	200 bar, 350 °C		
Pressure	1–100 bar, 200 bar optional		
Sub-ambient	Down to −40 °C with a circulator		
Agitation	120–1500 rpm, magnetic or overhead		
Liquid feed (optional)	0.02–40 mL/min at 100 bar; 0.01–20 mL/min at 200 bar		
Gas uptake sensitivity	0.04 mmol (equal to a 0.1 bar pressure change)		
Vial blocks	CAT 18 and CAT 24 on 4-zone platforms: 18 or 24 vials, 0.2–1.3 mL		
Sampling	Optional port on the reactor lid		
Software	WinISO: control, data logging and recipes		

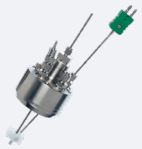
Rows spanning all three columns are common to the whole range. All three models run up to 8 zones.

Accessories and options

- Reactor vessels from 16 to 500 mL
- Sampling port on the reactor lid
- Liquid feed system
- 200 bar pressure rating
- Circulator for sub-ambient operation
- Overhead or magnetic agitation

Applications

- Parallel catalyst screening
- Hydrogenation, carbonylation and syngas chemistry
- Heterogeneous and homogeneous catalysis
- Process optimization and scale-up





Reactor vessels

16 to 500 mL in 316 stainless steel or Hastelloy C276, rated to 200 bar and 350 °C. Each reactor head carries a thermocouple and feed lines, with an optional sampling port on the lid.

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