h.e.l

ChemSCAN Product Range

Parallel Reactor Systems for Screening at Pressure

Stirred reactor systems ideal for:

- **Solid phase catalyst screening**
- **Catalytic process optimization**
- **Hydrogenation, carbonylation**
- **Hydroformylation**
- **Catalytic reductions and more**

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200 °C max **200 bar max**

Smarter Screening Starts Here: ChemSCAN Parallel Reactor Platform

The ChemSCAN platform delivers fast, automated catalyst and process screening in controlled reaction environments. Designed for chemists working across hydrogenation, carbonylation, syngas chemistry, and other challenging workflows, the ChemSCAN accelerates discovery while reducing hands-on time.

Why research chemists use the ChemSCAN

✓ Multi-Condition Screening, All at Once

Run up to 8 reactions in parallel under controlled pressure and temperature conditions. Compare catalysts, gases, feeds, and process variables side-by-side for rapid optimization and enhanced research insight.

✓ Independent Control for Every Reactor

Each vessel offers full control of:

- Temperature
- Pressure
- Agitation
- Gas flow / gas charging
- Liquid dosing
- Sampling

Ideal for multivariate DoE and high-throughput screening

✓ Gas & Liquid Feed Automation

Create multi-step gas and liquid addition profiles for deeper mechanistic understanding and enhanced reaction optimization.

✓ Gas Consumption Calculation

Software controlled system calculates gas consumed during key reaction stages with uptake sensitivity of ~0.04 mmol gas consumption (0.1 bar pressure change).

✓ Flexible Reactor Volumes

Choose 16 mL to 500 mL reactors in Stainless Steel or Hastelloy, giving you the scope to explore both early-stage screening and larger-scale evaluations.

✓ Engineered for Safety and Reliability

Built-in interlocks, pressure-relief systems, and rugged construction ensure safe operation across demanding chemistries, that last the test of time.

✓ Robust Platform for Demanding Conditions

Operate reactions up to 200 °C and 200 bar with confidence. The system's durability makes it a strong long-term investment for any R&D environment.

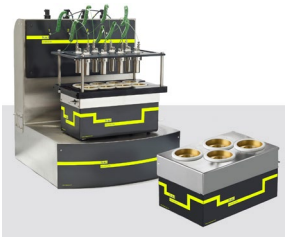
Contact our specialist

The ChemSCAN Family: Tailored Automation for High-Throughput Screening:

The ChemSCAN family represents a scalable suite of parallel reactor platforms designed to match the automation needs of modern catalytic development. From semi-automated control to fully automated multivariate experimentation, the range allows researchers to select the precise level of control needed for their process, and to upgrade capabilities as workflows evolve

ChemSCAN SA

Semi-automatic control of up to 8 reactor zones, enabling simultaneous operation with independent temperature and stirring, and controlled pressure profiling across reactors.



ChemSCAN+

Fully automatic control of up to 8 zones. Truly independent operations with individual temperature, stirring and variable pressure control across reactors

Part Automation → **Full Automation**

Screen > Optimize > Advanced automated independent control

ChemSCAN

Automatic control of up to 8 reactor zones, enabling simultaneous operation with true independent temperature, stirring as well as controlled pressure profiling across reactors.

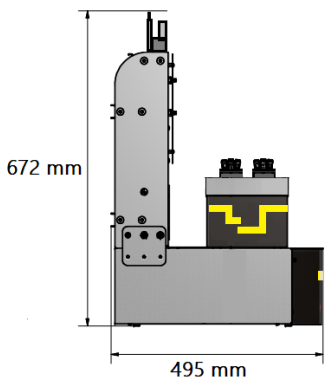
Instrument Comparison Table

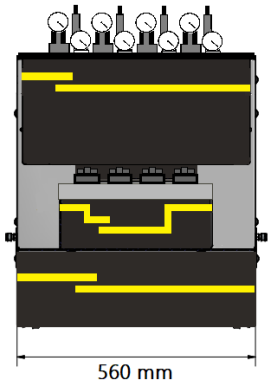
Feature	ChemSCAN SA	ChemSCAN	ChemSCAN+
Temperature control	Independent	Independent	Independent
Pressure control	Manual, independent	Independent, automated	Independent, automated
Gas feeds + strategies	2, Shared	3, Shared	3, Individual
Liquid feeds + strategies	1, variable, independent	1, variable, independent	1, Variable, independent
Best for:	Basic screens	Optimization	DoE & advanced catalysis

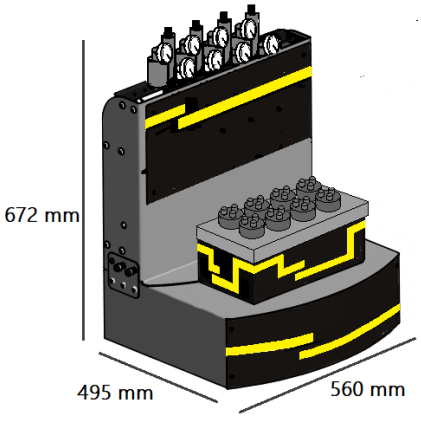
View on our website and enquire

Technical Specifications of the ChemSCAN SA Platform

	ChemSCAN 4 SA	ChemSCAN 8 SA
Platform Configuration	Compact Parallel	
Number of Zones	4	8
Reactor Vessel Volume Sizes	16, 25, 50, 75, 125, 300, 500 mL	16, 25, 50 mL
Working Volume	3 – 400 mL	3 – 40 mL
Temperature Range	25 - 200 °C (–40 °C option with circulator)	
Pressure Range	1- 100 bar (optional 200 bar)	
Stirring Speed	120-1500 rpm, (reaction media dependent)	
Stirring Option	Magnetic agitation or overhead motorized stirring	Magnetic agitation
Vessel Material Option	Stainless Steel or Hastelloy	
Liquid Feed	1	
Gas Feed	2, Shared across all zones	
Liquid Flow Rate	0.02 – 40 mL/min @100 bar and 0.01 – 20 mL/min @200 bar	





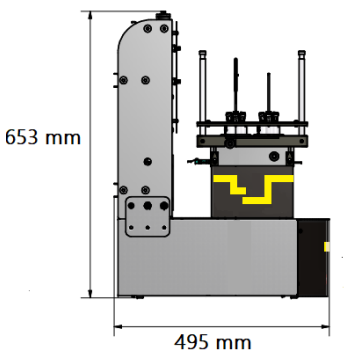


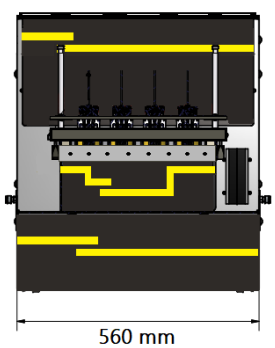
Semi-automatic multi zone control:
Semi-automatic control of up to 8 reaction zones, enabling cost effective parallel chemical screening

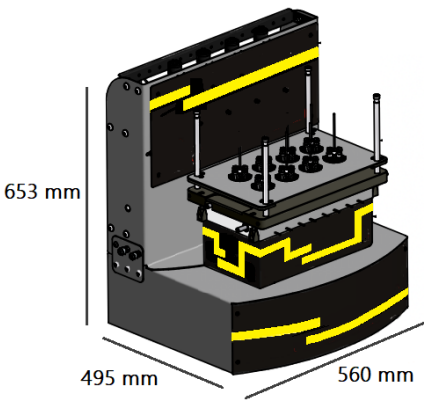
Contact specialist

Technical Specifications of the ChemSCAN Platform

	ChemSCAN 4	ChemSCAN 8
Platform Configuration	Compact Parallel	
Number of Zones	4	8
Reactor Vessel Volume Sizes	16, 25, 50, 75, 125, 300, 500 mL	16, 25, 50 mL
Working Volume	3 – 400 mL	2 – 40 mL
Temperature Range	25 - 200 °C (–40 °C option with circulator)	
Pressure Range	1- 100 bar (optional 200 bar)	
Stirring Speed	120-1500 rpm, (reaction media dependent)	
Stirring Option	Magnetic agitation or overhead motorized stirring	
Vessel Material Option	Stainless Steel or Hastelloy	
Liquid Feed	1	
Gas Feed	3, Shared across all zones	
Liquid Flow Rate	0.02 – 40 mL/min @100 bar and 0.01 – 20 mL/min @200 bar	







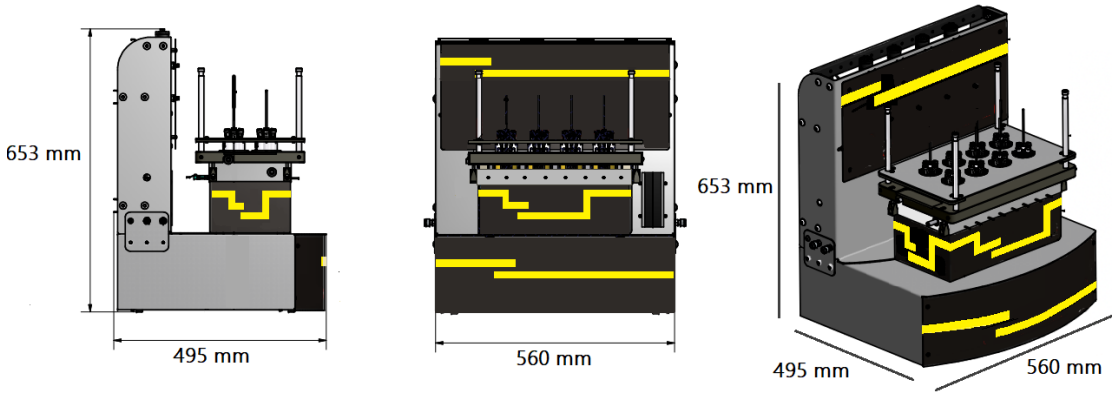
Controlled multi zone operation:

Automated control of pressure and temperature profiles in each reactor zone enables enhanced reaction insight and efficient process optimization

Contact specialist

Technical Specifications of the ChemSCAN+ Platform

	ChemSCAN 4	ChemSCAN 8
Platform Configuration	Compact Parallel	
Number of Zones	4	8
Reactor Vessel Volume Sizes	16, 25, 50, 75, 125, 300, 500 mL	16, 25, 50 mL
Working Volume	3 – 400 mL	2 – 40 mL
Temperature Range	25 - 200 °C (–40 °C option with circulator)	
Pressure Range	1- 100 bar (optional 200 bar)	
Stirring Speed	120-1500 rpm, (reaction media dependent)	
Stirring Option	Magnetic agitation or overhead motorized stirring	
Vessel Material Option	Stainless Steel or Hastelloy	
Liquid Feed	1, Independently controlled	
Gas Feed	3, Shared across all zones and independently controlled	
Liquid Flow Rate	0.02 – 40 mL/min @100 bar and 0.01 – 20 mL/min @200 bar	



Fully automated multi zone control:

Independent venting, purging, and feeding of each reaction zone, as well as temperature and pressure provides maximum flexibility for complex reaction control and deeper reaction insight

Contact specialist

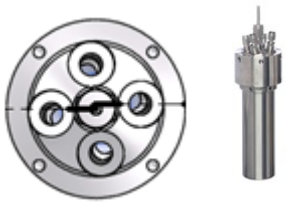
Reactor Vessel Options

ChemSCAN Reactor Vessels - Common Specifications

Material: Stainless Steel SS316 or Hastelloy HC276
Pressure Rating: 200 bar
Temperature Rating: 350 °C
Impellor: PTFE Anchor, Metal Narrow, Magnetic Anchor
Stirring option: Magnetic Agitation

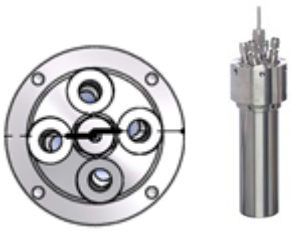
16 mL Vessel

Working Volume: 3-12 mL
Ports: Central port for impellor and 4 additional ports
Platform: ChemSCAN 4, 4+, 8, 8+, 4 SA, 8 SA



25 mL Vessel

Working Volume: 7-20 mL
Ports: Central port for impellor and 4 additional ports
Platform: ChemSCAN 4, 4+, 8, 8+, 4 SA, 8 SA



50 mL Vessel

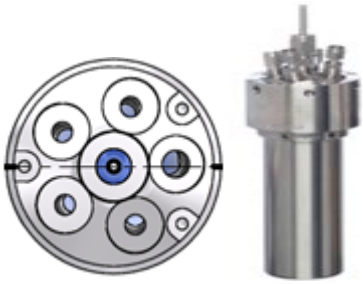
Working Volume: 9-40 mL
Ports: Central port for Impellor and 4 additional ports
Platform: ChemSCAN 4, 4+, 8, 8+, 4 SA, 8 SA

75 mL Vessel

Working Volume: 10.5-55 mL
Ports: Central port for impellor and 5 additional ports
Stirring: Overhead
Platform: ChemSCAN 4, 4+, 4 SA

125 mL Vessel

Working Volume: 10.5-100 mL
Ports: Central port for impellor and 5 additional ports
Stirring: Overhead
Platform: ChemSCAN 4, 4+, 4 SA,



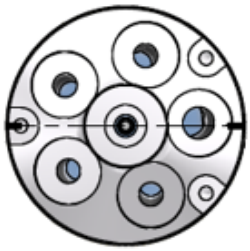
300 mL Vessel

Working Volume: 18.5-250 mL
Ports: Central port for Impellor and 5 additional ports
Stirring: Overhead
Platform: ChemSCAN 4, 4+, 4 SA

Vessel Options contd.

500 mL Vessel

Working Volume: 125-400 mL
Ports: Central port for impellor and 5 additional ports
Stirring option: Over head
Platform: ChemSCAN 4, 4+, 4 SA



CAT Systems

CAT7

Working Volume: 0.5 - 8 mL
No. of Vials: 7
Stirring option: Magnetic stirring
Platform: NA

CAT18

Working Volume: 0.2 - 1.3 mL
No. of Vials: 18
Stirring option: Magnetic stirring
Platform: ChemSCAN 4, 4+, SA

CAT 24

Working Volume: 0.2 - 1.3 mL
No. of Vials: 24
Stirring option: Magnetic stirring
Platform: ChemSCAN 4, 4+, SA

CAT 7

7 x 10 mL Vials

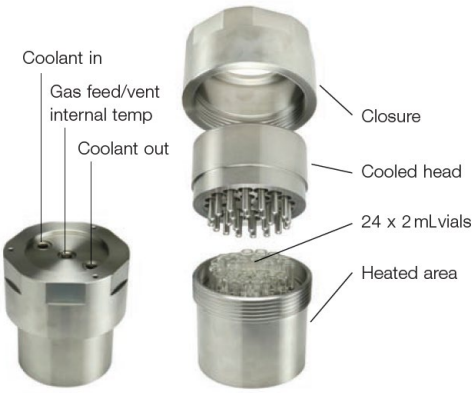
CAT 18

Uses 18 x 2mL HPLC vials (with or without Septa) but without refluxing features

CAT 24

Head fitted with coolant connection

"Cold fingers" condense vapours and minimize cross contamination



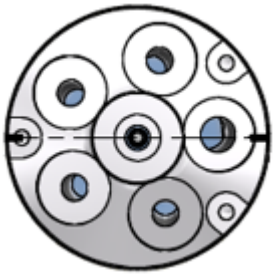
Sensors

A range of sensor types can be deployed to allow a high degree of control and monitoring of your reactions. The ChemSCAN product family has sensors for:

- Temperature
- pH
- DO
- Conductivity
- Redox

Vessel Port Options

M40 lid: 4 ports



M75 lid: 5 ports

Choose between a range sensors and lines to fit the number of ports on two lid types:

- Temperature
- pH
- DO
- Conductivity
- Redox
- Liquid dosing
- Gas feed
- Sampling

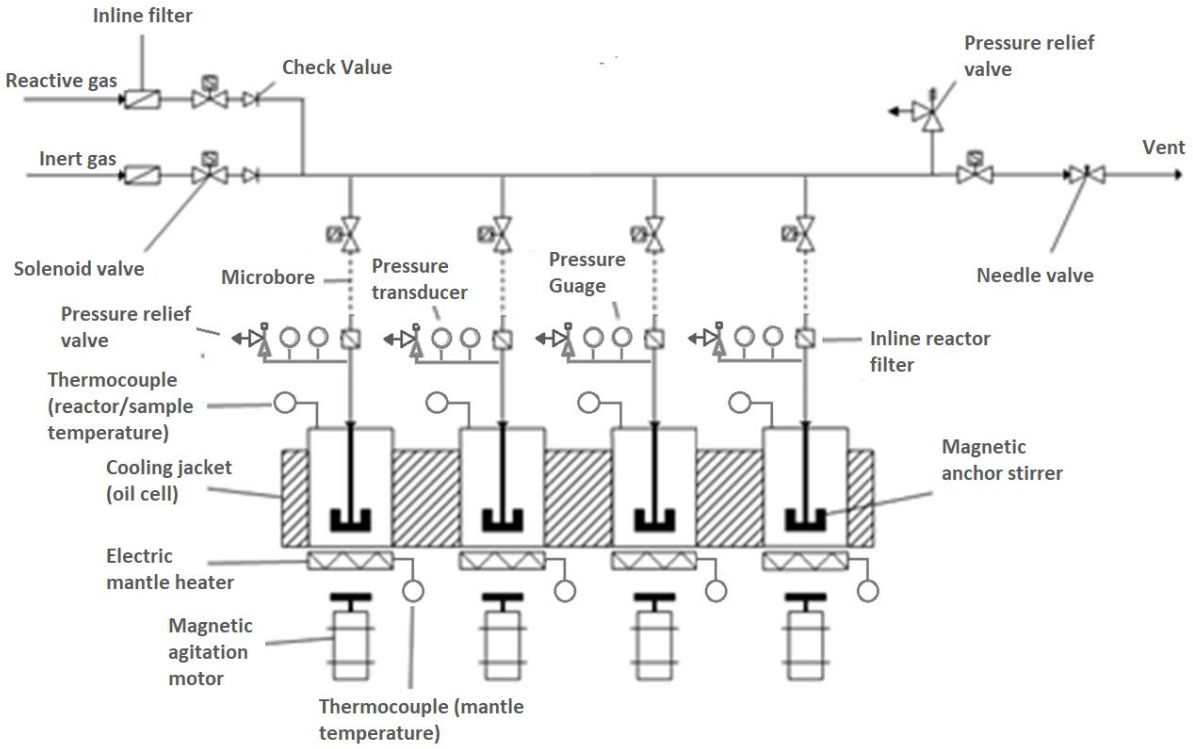
Central port is for stirring shaft

Speak to Specialist for exact combination requirements

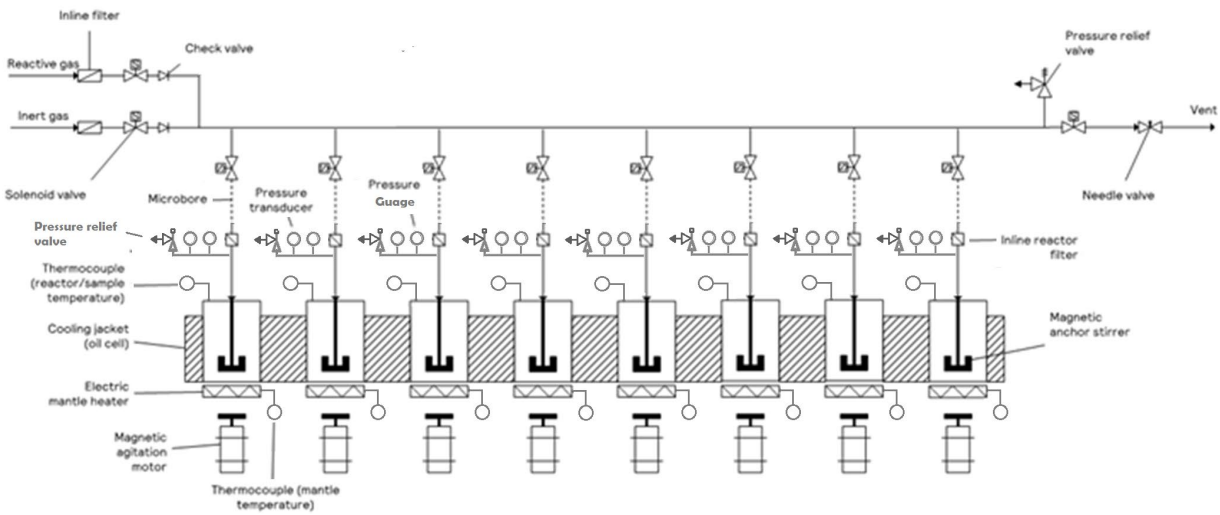
ChemSCAN Schematic

The ChemSCAN platform can have various configurations tailored to your chemical screening applications .

PID of ChemSCAN 4 with individual gas lines for each reactor



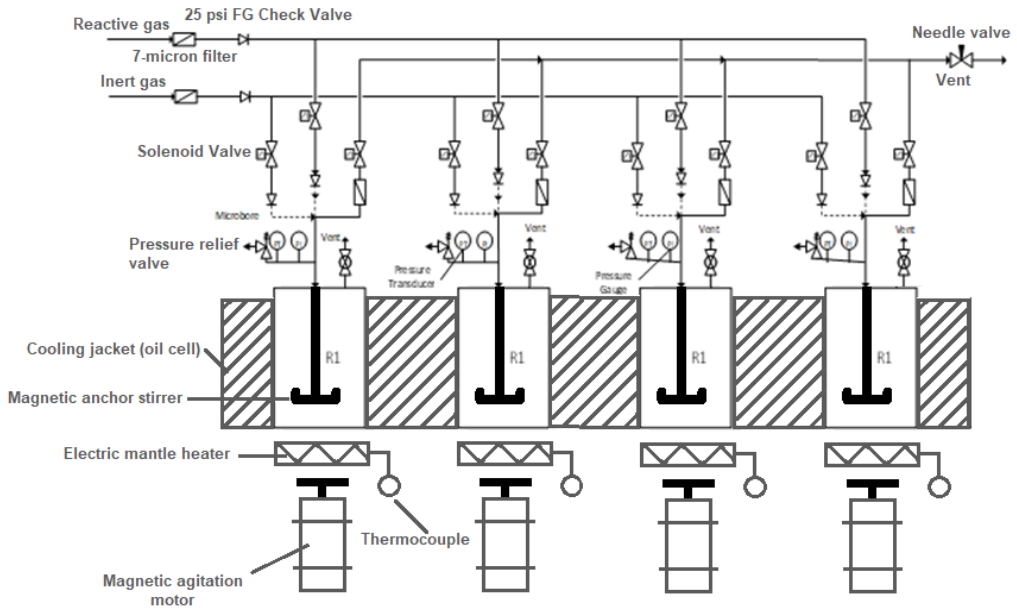
PID of ChemSCAN 8 with individual gas lines for each reactor



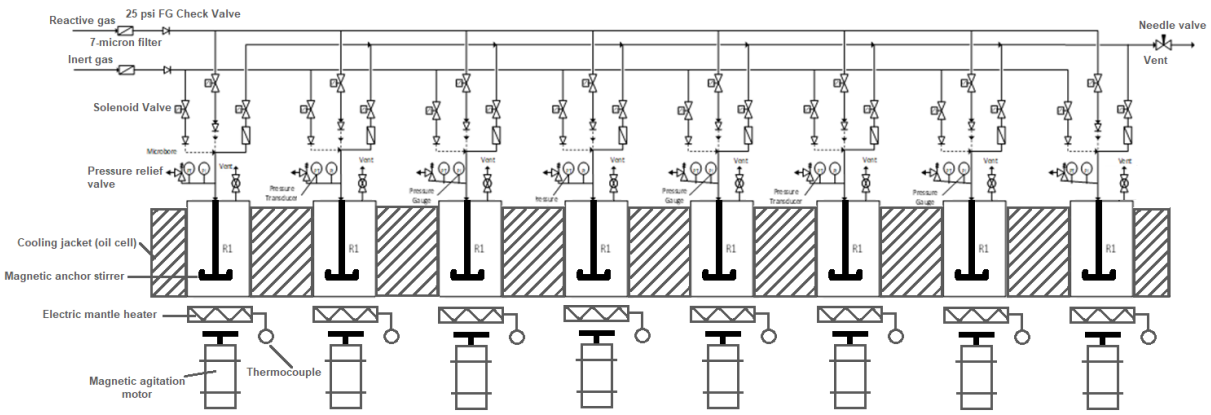
ChemSCAN+ Schematic

The ChemSCAN+ systems provide enhanced customization via a broader range of configuration options, making them well suited to complex chemical screening applications.

PID of ChemSCAN 4+ with individual gas lines for each reactor



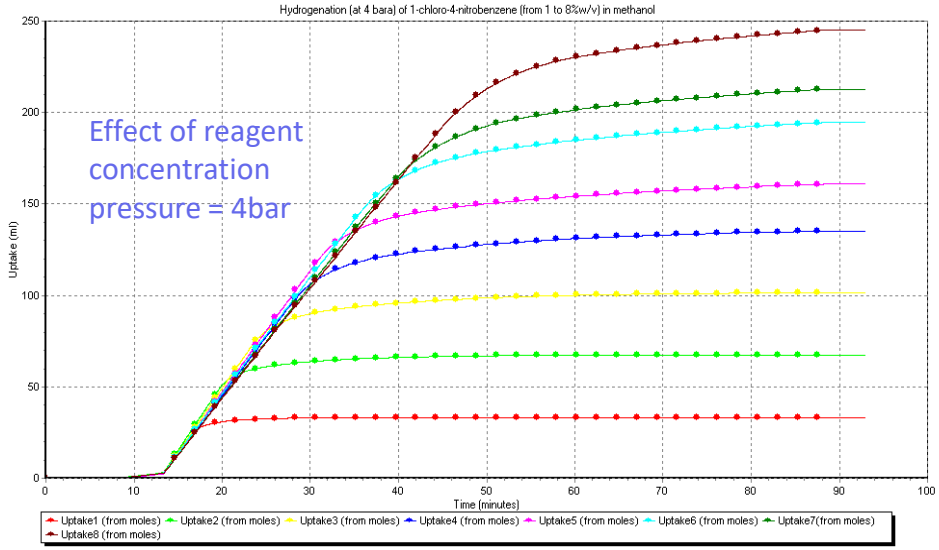
PID of ChemSCAN 8+ with individual gas lines for each reactor



Accelerate Catalyst Screening with Real-Time Hydrogen Uptake Profiling

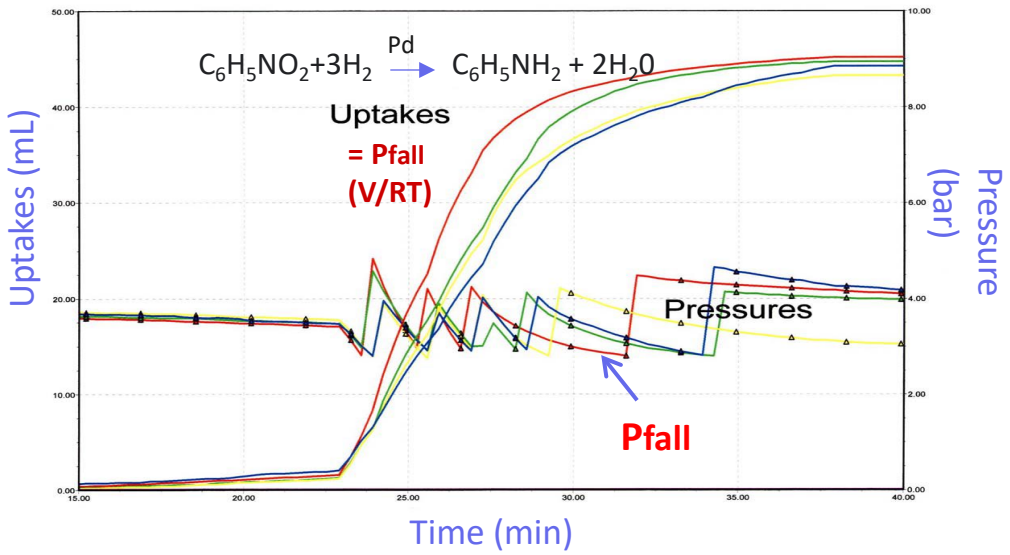
The ChemSCAN enables rapid, data-rich optimization of catalytic hydrogenation reactions. By running these experiments in parallel rather than sequentially, researchers can identify optimal concentrations, reaction rates, and performance trends in a fraction of the time traditionally required.

Hydrogenation of 1-Chloro-4-Nitrobenzene at 4 bar



Eight different reagent concentrations, in a single run can be evaluated simultaneously under identical pressure and temperature conditions. The system is able to capture real-time hydrogen uptake profiles, providing immediate visibility into reaction kinetics, catalyst behavior, and conversion efficiency.

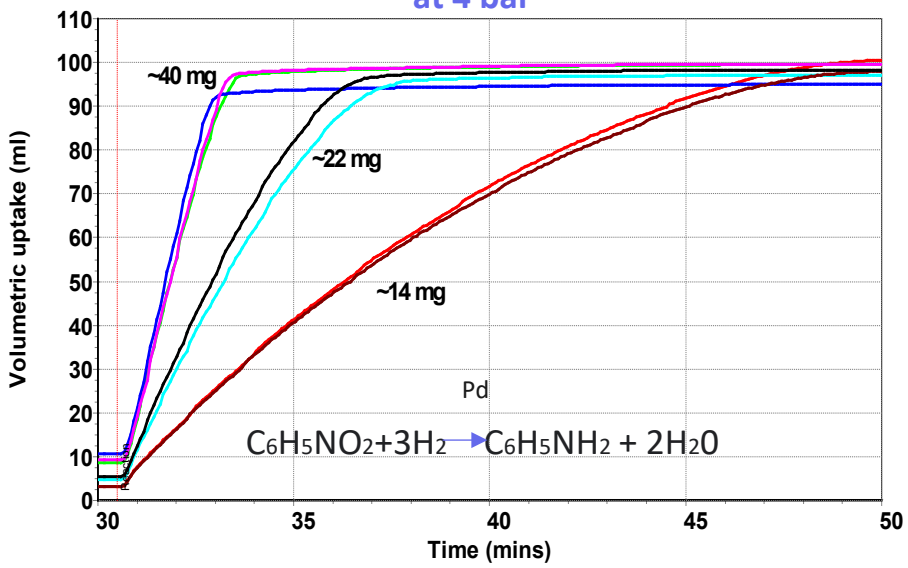
Hydrogenation 6 % w/w Nitrobenzene in Methanol controlled at 3 bar



High-Throughput Hydrogenation: Evaluate Catalyst Amounts and Temperatures in One Run

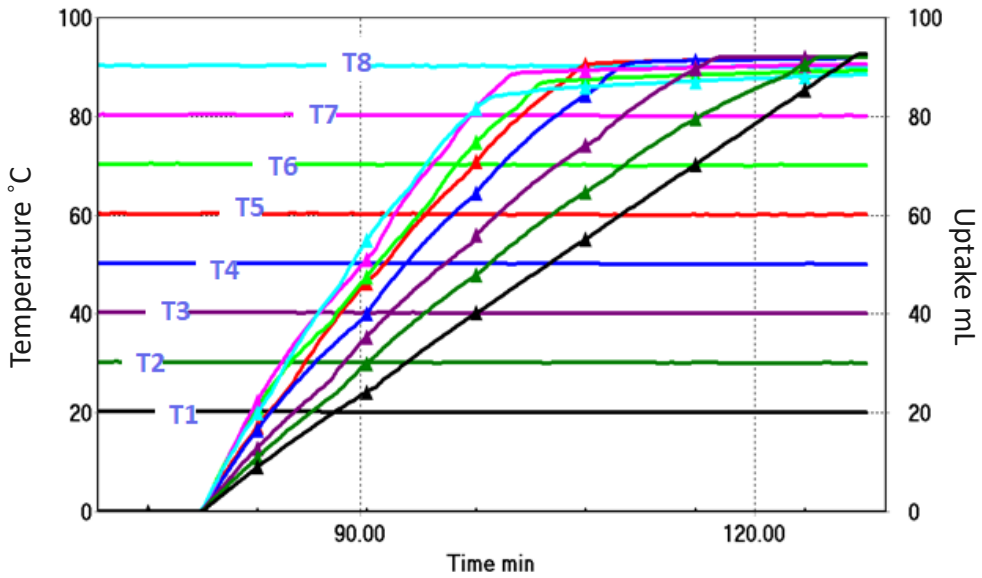
The ChemSCAN and WinISO software makes catalyst screening faster, clearer, and more data-driven. By running multiple catalyst loadings simultaneously, the system shows, in real time how increasing catalyst quantity dramatically accelerates hydrogen uptake and reaction completion.

Hydrogenation of Nitrobenzene in Decanol, with different catalyst amounts at 4 bar



For researchers, this means rapid identification of the optimal catalyst loading, reduced experiment time, and reliable kinetic data from every run, all generated automatically under controlled temperature and pressure.

Hydrogenation of Nitrobenzene at different temperatures at 5.4 bar



WinISO for Catalyst Screening

WinISO Intelligent Software Control and Analysis

- User-friendly WinISO control software enables data logging, multi-step recipes, parameter control, and feedback loops.
- The software provides real time reaction kinetics insight responsive intelligence with an intuitive interface that needs minimal training.
- Full software control of pressure, temperature, and feed rates of liquid and gas in real time.
- Edit conditions at any time without stopping, allowing for changing reaction conditions with little to no downtime.
- Integral safety features that allows the user to stop the reactions or make corrective interventions, saving time and potentially expensive starting material.

Safety Features

- User-configurable audible alarms and shutdown states to ensure user safety.
- Emergency Pressure Relief Valve (PRV).

Third-Party Analytical Instrument Integration

- The WinISO interface allows the integration of controls of analytical equipment (e.g. GC-MS, HPLC, MS) and the possibility of including feedback control based on the analytical results.

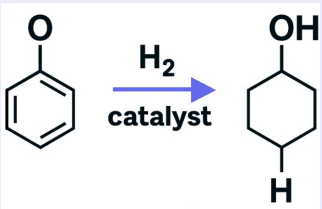
Application Categories to Accelerate Catalysis Research using the ChemSCAN Product Range

The ChemSCAN platform supports a wide spectrum of catalytic and synthetic chemistry, enabling rapid optimization, safe operation, and data-rich insight across numerous industrial and research workflows.

Hydrogenation & Reductive Chemistry

Applications:

- ✓ Catalyst screening for hydrogenations
- ✓ Optimising reductive amination conditions
- ✓ High-pressure kinetic studies
- ✓ Real-time gas uptake analysis



CO & CO_2-Based Catalysis

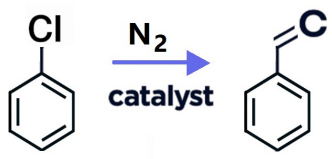
Applications:

- ✓ Carbonylation and hydroformylation
- ✓ Syngas conversion studies
- ✓ CO_2 utilization and reduction catalysis
- ✓ Comparing catalyst performance under varied gas compositions

Polymerisation & Materials Chemistry

Applications:

- ✓ Parallel optimization of polymerization conditions
- ✓ Studying catalyst lifetimes and initiation rates
- ✓ Screening solvent and monomer systems
- ✓ Evaluating temperature and pressure effects on yields



Oxidation, C–C Coupling & General Catalysis

Applications:

- ✓ Catalytic oxidation profiling
- ✓ C–C bond formation reaction optimization
- ✓ High-throughput screening of ligand/catalyst combinations
- ✓ Multivariable DOE for mechanism insight

ChemSCAN Versatility: Comprehensive Reaction Screening for Today's Chemistry Challenges

Hydrogen-based reactions
- Hydrogenation
- Hydrogenolysis
- Reductive amination
- Transfer hydrogenation
- Hydrodesulfurization
- Hydrodenitrogenation
- Hydrodeoxygenation
- Dehalogenation

Carbon monoxide / carbonylation family
- Hydroformylation
- Carbonylation
- Alkoxycarbonylation
- Reductive carbonylation
- Carbonylative coupling
- Tandem hydroformylation–hydrogenation

CO_2-based reactions
- CO_2 hydrogenation
- Carboxylation
- Urea/carbamate formation

Syngas / C1 reactions
- Fischer–Tropsch model reactions
- Methanol synthesis model
- Syngas upgrading
- Higher alcohol formation

Oxidation reactions
- Aerobic oxidation
- Oxidative dehydrogenation
- Epoxidation
- Oxidative cleavage
- Aerobic C–H activation

Ammonia / amine reactions
- Reductive amination
- Ammoximation
- Hydroaminomethylation
- Amination of alcohols
- Aminocarbonylation

Light-gas reactions
- Alkene oligomerisation
- Alkane activation
- Hydrofunctionalisation of olefins
- Dehydrogenation

Catalyst screening processes
- Parallel heterogeneous catalyst screening
- Reaction-order and kinetics profiling
- Catalyst deactivation studies
- Mixed-gas testing

Polymerisation & oligomerisation
- Pressure-enabled polymerisation
- Coordination polymerisation screens
- Solution/step-growth polymerisations

High-temperature / pressure-enabled chemistry
- Superheated-solvent reactions
- Pressure-driven equilibrium shifts
- Esterification/amidation
- Condensation reactions
- Cyclizations / ring openings
- Solvolysis

Gas–liquid–solid multiphase
- Slurry catalysis
- Crystallisation under pressure
- Gas solubility studies
- Gas absorption kinetics

Specialised / mechanistic
- Gas uptake kinetic studies
- Catalyst selectivity mapping

The reactions listed are representative examples based on the general high-pressure, high-temperature, and gas and liquid handling capabilities of the ChemSCAN platform. Actual applicability depends on the specific system configuration, materials compatibility, and operating conditions

Upgrades, Support, and Training

We understand that your needs can change over time and you may require:

- A system upgrade
- Training for new team members
- Support on your processes
- To book some time with our service team

Our dedicated service team and highly knowledgeable technical staff will work with you to find the right solution.

Customer Service Enquiries

service@helgroup.com

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Technical Support Requests

contact@helgroup.com

About H.E.L Group

H.E.L Group partners with scientists, engineers, and biotechnology professionals to accelerate innovation and unlock the full potential of modern research and manufacturing. We design and build advanced scientific instruments and intelligent software that enhance the efficiency, accuracy, and safety of chemistry and bioprocess workflows.

With a portfolio spanning automated reactor systems, parallel screening platforms, bioreactors, and safety testing technologies, H.E.L solutions support high-value applications across chemistry, catalysis, flow chemistry, materials development, fermentation, and scale-up.
Our team combines deep technical expertise with decades of engineering experience. All products are developed and manufactured in the UK, supported by global sales and applications teams who work closely with customers to implement the right tools for their scientific and production challenges.

For more than 37 years, H.E.L has helped organizations—from leading pharma and biotech companies to chemical, energy, and academic research centers—solve complex process problems and achieve safer, more productive R&D.

Why customers choose H.E.L

- **Customer-centric engineering:** Our systems are designed for real scientific needs, with modularity and scalability to fit diverse workflows.
- **Application-driven support:** Dedicated technical and service teams ensure fast implementation, tailored training, and long-term reliability.
- **Configurable solutions:** A wide range of custom options allows each platform to be optimized for specific chemistry, bioprocess, or scale-up requirements.

H.E.L Group is committed to enabling the next generation of scientific breakthroughs by empowering researchers with tools that deliver reproducibility, safety, and deeper insight every day, in every experiment.

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