THALESNano

"Good reactions"™

H-Cube Midi™

Scale-up hydrogenation reactions

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FEATURES

The H-Cube Midi™ is designed to fulfill the need towards process scale flow hydrogenation. Utilizing current H-Cube® technology, the H-Cube Midi™ increases the capacity of the H-Cube® up to 4 mol compound per day without compromising efficiency and safety. The H-Cube Midi™ allows users of the H-Cube® to transfer protocols within a day in order to scale up reactions.

- A continuous flow of substrate is combined with hydrogen, generated in-situ from electrolysis of water
- The hydrogen/substrate mixture can be heated and pressurized up to 150°C and 100 bars (1450 psi) respectively
- The mixture is then passed through a catalyst filled cartridge, where the reaction takes place at elevated flow rate up to 25 mL/min

Within minutes, product emerges for fast reduction. Reductions varying in scale from 10 g to 500 g can be performed on the same compact reactor.

H-Cube Midi™ is capable of hydrogenating a wide range of different functional groups, for example:

- Nitro reduction
- Alkene, alkyne and ring saturation
- Nitril reduction
- Desulfuration
- Dehalogenation
- Imine reduction
- *N*- and *O*-debenzylation
- Deuteration

ADVANTAGES

Safer

- No gas cylinder or other external hydrogen source
- Can be used in standard laboratories
- No catalyst filtration or direct catalyst handling
- Easy catalyst exchange

Efficient

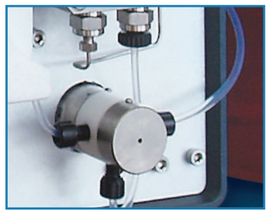
- Analyze reaction results within minutes
- Higher reaction rates with increased phase mixing
- Easy to use, touch screen controlled
- Experiments run on the standard H-Cube® can be replicated in the H-Cube Midi™ easily - about one day is needed to convert the process.

Convenient

- Compact size can be used in a standard laboratory fume hood
- No special training or skill is required to operate

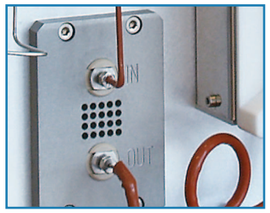
1. Touch screen

Every operational step of the H-Cube Midi™ is conveniently controlled using a touch screen panel. Parameters such as temperature, pressure, hydrogen production, and flow-rate can be adjusted through the screen, providing simple and rapid reaction set-up, system monitoring and reaction control.



2. Inlet and outlet valve Switches

Two Manual Inlet Valve Switches help chemists to easily switch between the reaction mixture and the eluent. The second switch at the end of the device directs the reaction mixture towards the product collector or waste.



3. Preheating and heating units

A two-step heating of the reagent/hydrogen mixture allows chemists to reach a precise temperature.

4. ThalesNano's MidiCart™

The MidiCarts™ are sealed cartridges containing heterogeneous or immobilized homogeneous catalysts. Exposure to the catalyst is limited since there is no need for filtration and separation. The cartridges significantly increase the ratio of the catalyst to the hydrogen and substrate, which in turn significantly increases the reaction rate.

5. Product collector

The reaction mixture or product collects in the collection vial. The short reaction time means that analytical samples can be taken to measure product conversion in minutes.

ThalesNano's MidiCarts™

ThalesNano's MidiCarts™ contain sealed heterogeneous catalysts, which can be used in scale-up hydrogenation and other heterogeneously catalyzed reactions in the H-Cube Midi™. Exposure to the catalyst is limited by removing the need for filtration, while the cartridges are easy to install and replace. In the MidiCarts™, the ratio of catalyst to hydrogen and substrate is significantly increased, which results in faster reaction rates.

The following MidiCarts™ are currently available:

- Quartz sand
- Titanium
- 10% Pd/C
- Raney Ni
- 10% Pt/C
- 5% Rh/C
- 20% $Pd(OH)_2/C$
- Raney Cobalt
- Raney Copper
- 5% Pd/Al_2O_3
- 1% Pt/SiO_2
- 1% Pt/SiO_2/Polyethyleneimine
- 5% Pt/C (doped with Bi)
- Nickel Sponge
- Au/TiO_2
- 5% Pd/C
- 5% Ru/Al_2O_3
- 5% Pt/Al_2O_3

Product Name	Product Code	Product Description
H-Cube Midi™	THS 09004	Stainless steel flow reactor with maximum parameters of 150°C and 100 bar. The reaction zone with catalyst/reagent cartridge containing heterogeneous /immobilised homogeneous catalyst for scale-up hydrogenation reaction.
General		
Pump		Start/Stop, Flow Rate – 3 to 25 mL per minute
Heater		Ambient to 150°C (ambient to 302°F)
MidiCart™		Internal measurements of 9.5 mm x 90 mm stainless steel, see MidiCart™ list
Pressure		Up to 100 bar
Maximum Hydrogenation Production		125 cm^3/min in Full Hydrogen mode
Required Water Specification		De-ionized water with recommended conductivity of 71,4 nS/cm
Water Reservoir Capacity		1 L
Controlling the amount of hydrogen		Percentage of produced hydrogen can be set
Physical Dimensions		
Height		43 cm (17 inches) (Including touch screen)
Width		36,5 cm (14.2 inches)
Length		54 cm (27,3 inches)
Weight		23 kg (50 lbs)
Operating Range		
Temperature		15°C to 30°C (60°F to 85°F)
Humidity		10-85% at 3°C (85°F) or below
Electrical		
Input Voltage		Automatic detection of nominal 110V AC / 220V AC
Input Frequency		47 to 63 Hz
Power Consumption		Max. 700 VA
Safety		
Operator safety		MidiCart™ technology - stainless steel, sealed, prepacked Back pressure regulator Bubble detectors Inlet and Outlet Valve Switches

For further information please contact us at **flowchemistry@thalesnano.com** or visit our website: **www.thalesnano.com**

ThalesNano Nanotechnology Inc.
Zahony u. 7.
H-1031 Budapest
Hungary
Tel.: +36 1 880 8500
Fax.: +36 1 880 8501
E-mail: sales@thalesnano.com

US Office
50 S. Penn St. Suite B-2
Hatboro
PA. 19040
USA
Phone: +1 732 274 3388
E-mail: USAsales@thalesnano.com

www.thalesnano.com