

PharmaBlock

Innovative chemistry for a better future

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Technology Innovation

To Enable Greener and Low-carbon
Pharmaceutical Development & Manufacturing



Official Website



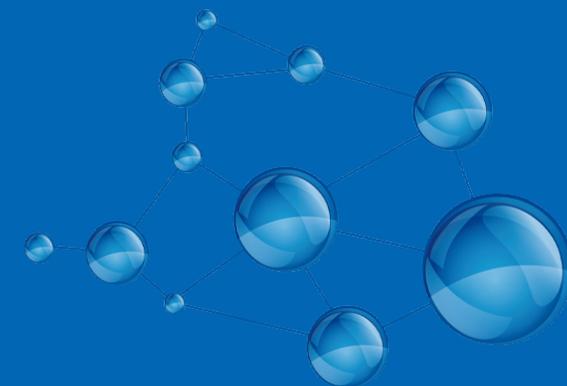
Product Search



Wechat



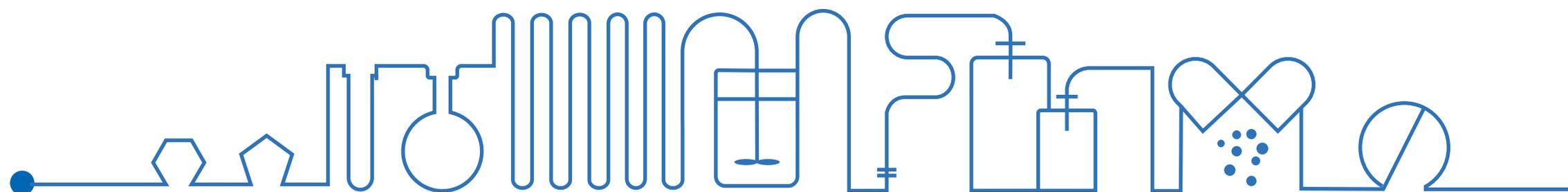
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OUR VISION

To provide better products and services through innovation of chemistry and low carbon technology in R&D and manufacturing

CONTENTS



1	Flow Chemistry P01-P04	2	Micropacked Bed Technology P05-P06	3	Catalysis P07-P08	4	Innovative Equipment P09-P10
1	Reaction Types	1	Technical Advantages	1	Heterogeneous Catalysis	1	Customized Service
2	Reactor Types	2	Reaction Types	2	Biocatalysis	2	Equipment Design
3	Cases	3	Cases	3	Cases	3	Quality Control
		4	Integrated Solutions			4	Equipment Cases

Flow Chemistry

400+
projects

40+
reaction types

kilo to metric ton scale



2023 ACS GCI CMO Excellence in Green Chemistry Award Winner

The award-winning project implemented innovative continuous flow process

Application in safer, more stable, higher-yield processes

- High temperature/pressure
- Highly energetic
- Cryogenic
- Highly reactive and air-sensitive
- Toxic and/or stinky agents
- Unstable intermediates
- Oxidation and/or ozonization
- Diazotization
- Sulfonation
- Esterification
- Halogenation
- Reduction

Reactors

- Single-tube
- Multi-tube
- Static mixer
- Fixed/micropacked bed
- Dynamic tubular reactor
- Electrochemistry reactor
- Photo-flow reactor
- CSTR

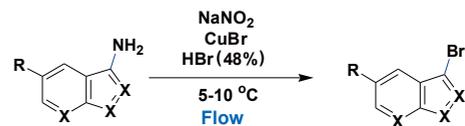
Cases

Cryogenic reaction



Comparison	Batch	Flow
Feasibility of scaling up	×	√
Temperature	-70 to -60 °C	-40 to 10 °C
Yield	N/A	84%
Scaling-up risk	High	Low
Completed 260 kg product with 240 mL continuous flow reactor in 30 hours		

Diazotization



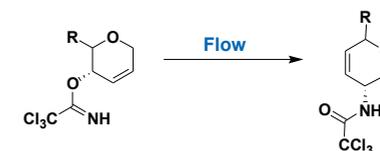
Comparison	Batch	Flow
Feasibility of scaling up	×	√
Temperature	N/A	5 to 10 °C
Yield	N/A	80 - 85%
Scaling-up risk	High	Low
Completed 200 kg product with a set of 100 mL continuous flow reactor in 2-3 days		

Nitration



Comparison	Batch	Flow
Feasibility of scaling up	×	√
Temperature	20 - 30 °C	30 - 60 °C
Yield	N/A	90 - 93%
Scaling-up risk	High	Low
Automatic leve	Low	High
Over 300 kg of product completed with an integrated continuous tubing reactor		

High temperature



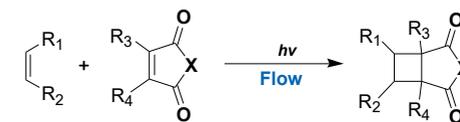
Comparison	Batch	Flow
Feasibility of scaling up	×	√
Temperature	200 °C	220 - 250 °C
Yield	N/A	>94%
Scaling-up risk	High	Low
Automatic leve	Diphenyl ether (BP: 258 °C)	Toluene (BP: 110 °C)
Over 100 kg of product completed		

Oxidation



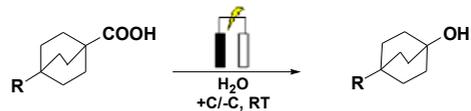
Comparison	Batch	Flow
PMI	15	7
Time	> 4 h	10 min
Yield	88 - 90%	95%
Complexity of work-up	High	Low
Over 100 kg of product completed		

Photocatalytic reaction



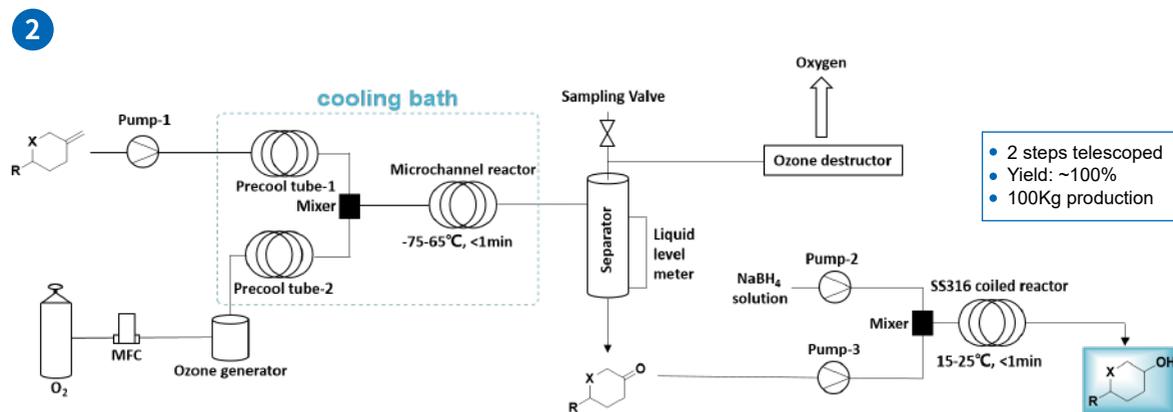
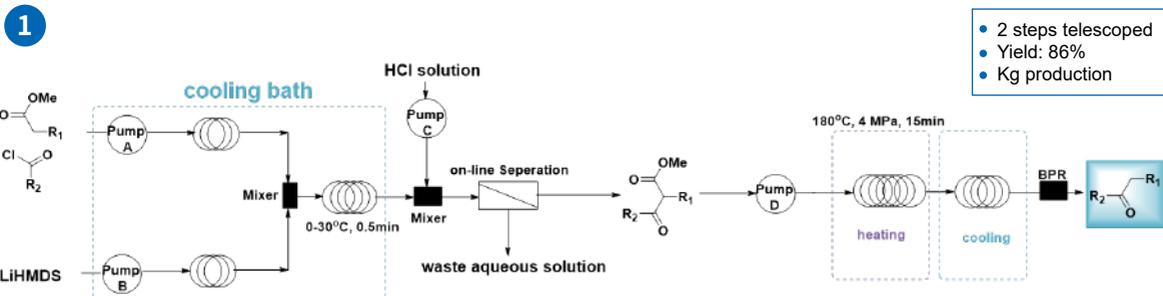
Comparison	Batch	Flow
Feasibility of scaling up	×	√
Time	30 h	40 - 50 min
Light source	Medium pressure mercury lamp	365 nm LED
Scaling-up risk	High	Low
Over 1 MT of product completed		

Electrocatalytic reaction

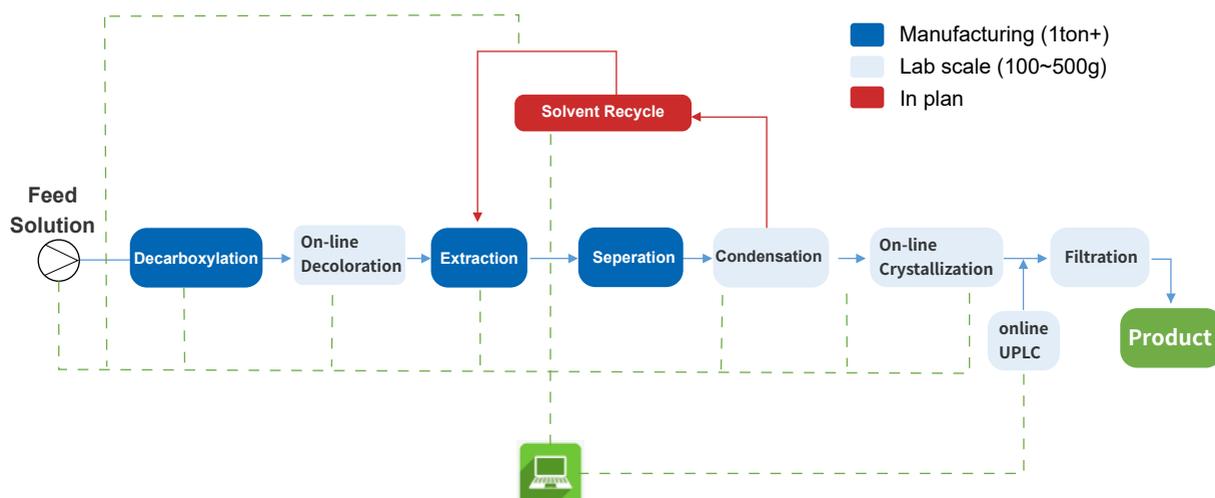


Entry	General Process	Electrochemical Process
Step	3	1
Yield	45%	67%
PMI	135	73
Cost of Material	> 30% cost reduction	
Self-made equipment, Kg scale preparation		

Telescoped flow cases



End-to-end solution



Continuous Manufacturing GMP Workshop at PharmaBlock Zhejiang

Micropacked Bed Technology

450+
projects

kilo to metric ton scale

commercial and GMP projects

■ Safety, efficiency, consistency

- Meet safety regulations
- Increased productivity
- No batch variation
- Heavy metal < 10 ppm

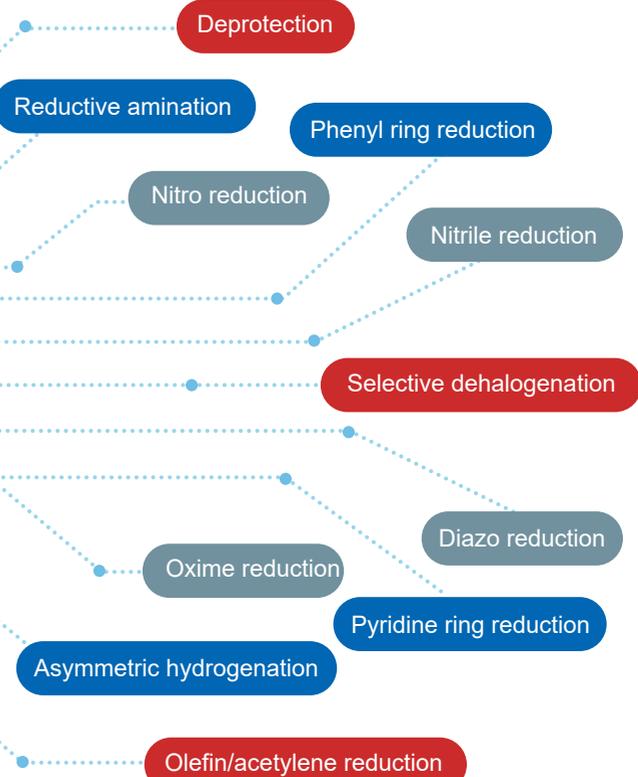
Technical advantages

■ Superior selectivity

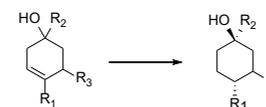
■ Significant cost savings

- Lower catalyst cost
- Lower solvent usage
- Shorter production time

Reactions applied at manufacturing scale



Cases



Comparison	Batch	Micropacked Bed
Catalyst loading	3.3%	<0.5%
Reproducibility	Poor	Good
Solvent	20V	10V
Product delivered	--	Hundred Kilo



Comparison	Batch	Micropacked Bed
Catalyst	Raney Ni	Supported Catalyst
Product	74% (HPLC)	82% (HPLC)

Integrated solutions

- Proof of concept and bench-scale R&D of flow hydrogenation process
- Pilot-scale process research, design and operation
- Turnkey solution service for industrial-scale plant operation (including hydrogenation process, equipment and catalyst)



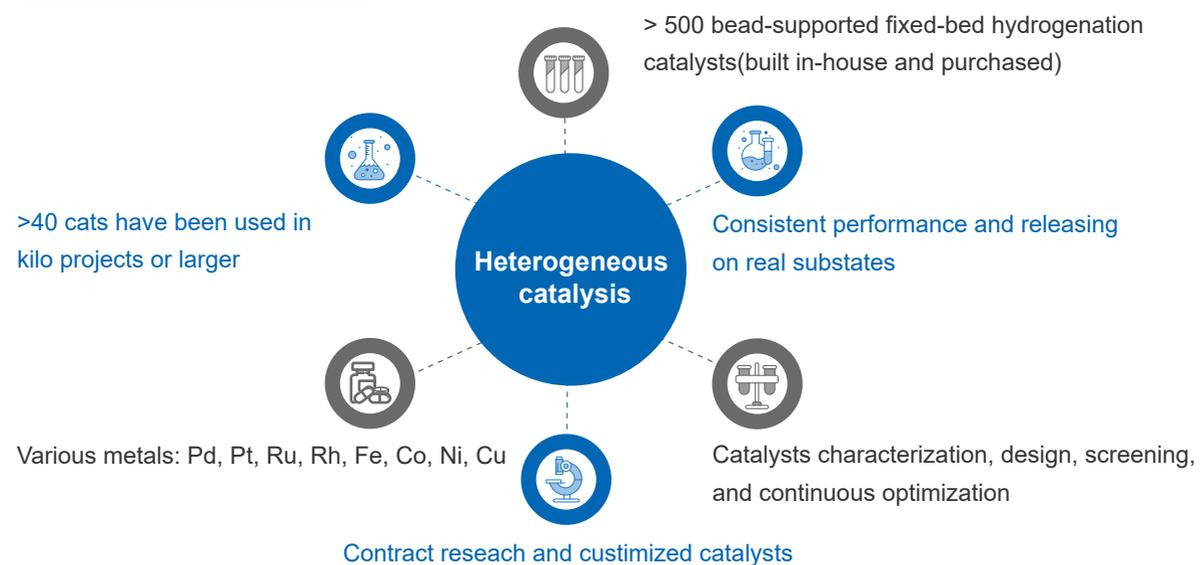
Catalysis

500+
heterogeneous catalysts

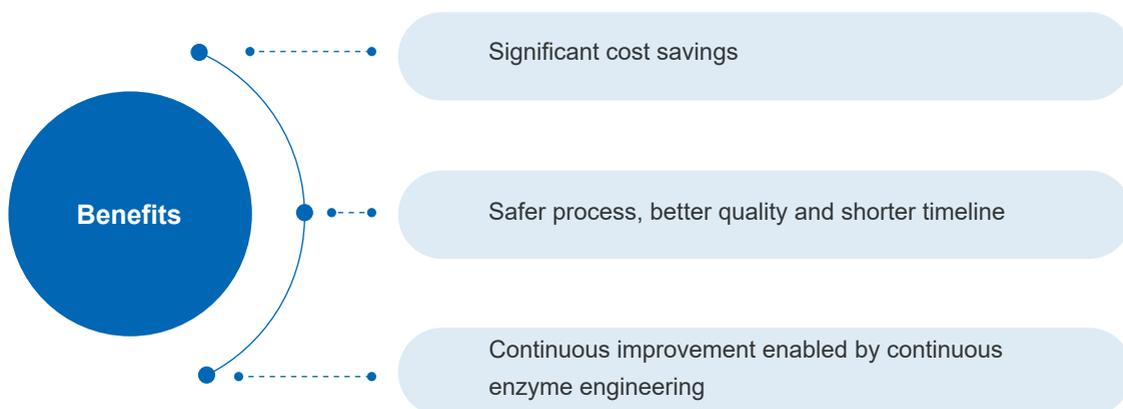
400+
biocatalysis projects

kilo to hundred-kilo scale

Heterogeneous catalysis



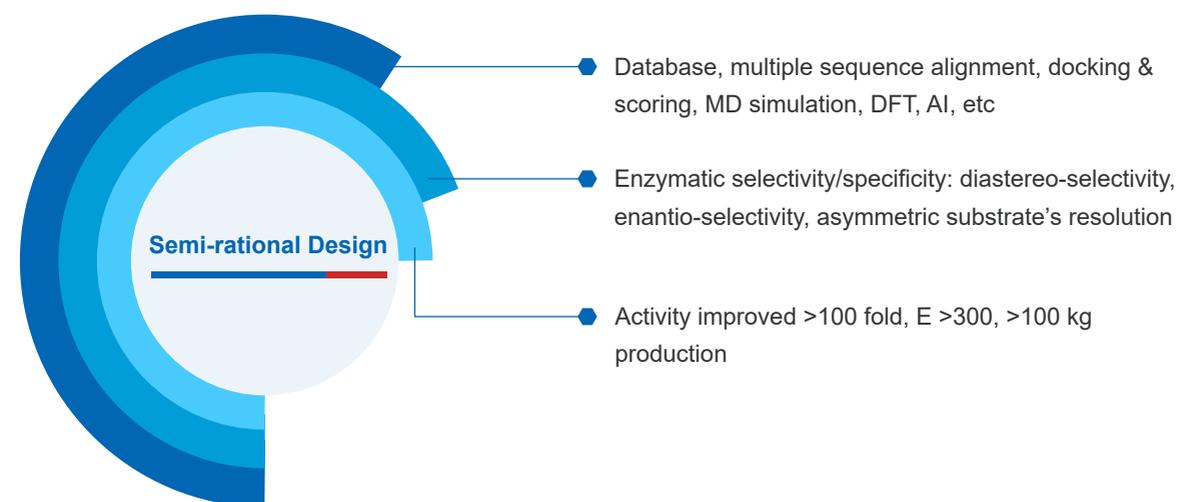
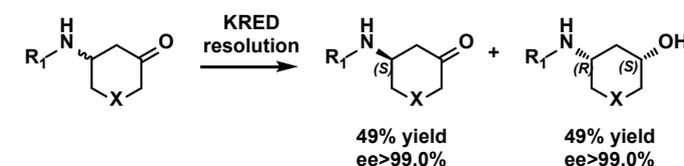
Biocatalysis



- > 500 enzymes in stock (commercial and in-house)
- Fermentation: up to 5 ton, using Various microbes
- Creening and process development
- Enzyme discovery and enzyme engineering

Cases

Semi-rational Design



Innovative Equipment

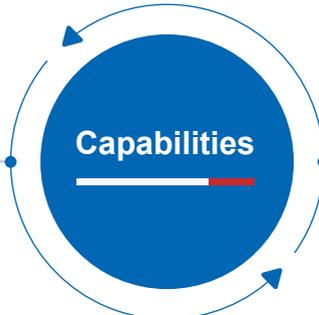
Design and develop microreactors and mixers; design and manufacture various reactors and work-up equipment.



Improve equipment design efficiency and provide guidance for equipment design through fluid simulation.



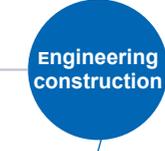
Rich experience and standardized process design.



Capabilities



Implement membrane technology to separate mixture with higher efficiency, and reduced safety risks.

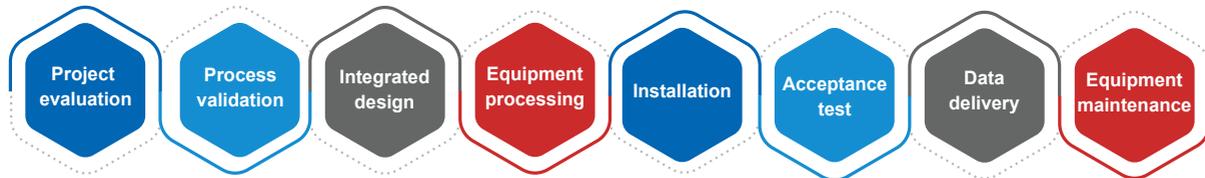


Provide equipment integration and assembly, on-site installation.

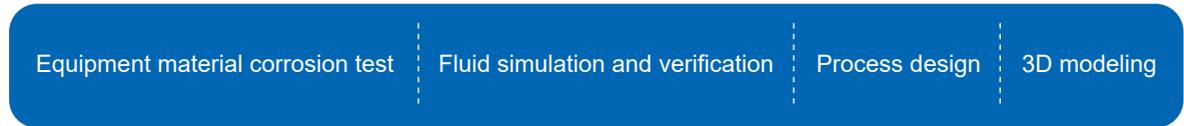


Independent programming and customized design of PLC control.

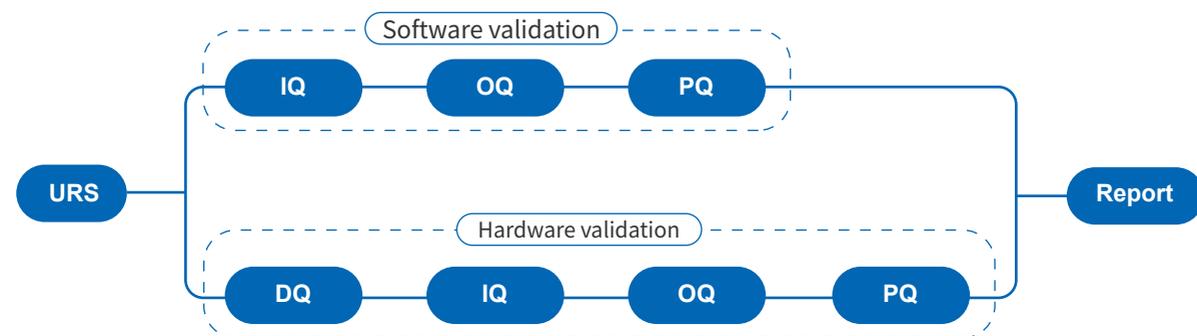
Customized service



Equipment design capacity



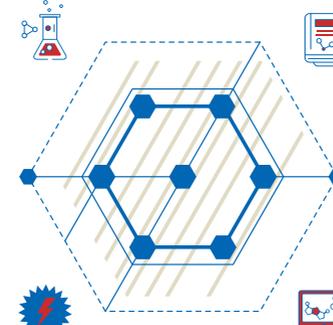
Quality control



Equipment Cases

Carry out innovation of equipment under the demand of research and production. Design various customized equipment demanding for different order of production.

Microchannel reactor/mixer



Membrane separation equipment

Electrochemical equipment



Ozone generator

Photo reaction



Volume:1-5 mL



Kilo lab scale
Volume:10-100 mL



Manufacturing scale
Volume:1-20 L
Easy to multiply capacity

Continuous hydrogenation



Lab scale



Kilo lab scale



Manufacturing scale
(100-1,000 kg /day); GMP

Continuous special material manufacturing equipment



Continuous hydrogenation reactor
(30-150 kg/day)



Continuous nitration reactor
(100-500 kg /day)



Continuous high temperature reactor
(1,000-1,500 kg/day)



About PharmaBlock

PharmaBlock (Stock Code: 300725.300725) is a global, fully integrated CRDMO in the pharmaceutical R&D and manufacturing industry. Its core businesses include a collection of rationally designed building blocks, supplying from discovery to development and commercialization; building block-enhanced hit generation and hit-to-lead optimization services and solutions; and development and manufacturing of RSMs, intermediates, APIs, and drug products for drug development and commercialization.

Throughout the product lifecycle, PharmaBlock integrates innovative and enabling technologies, such as flow chemistry, micropacked bed technology, chemo-catalysis, bio-catalysis, and equipment R&D, to proactively explore greener, safer, and more intelligent manufacturing and service models in the biopharmaceutical field, and promote the sustainable development of the industry.

Officially operated in 2008, PharmaBlock has partnered with almost all of the top 20 pharmaceutical companies, as well as hundreds of small to medium-sized biotech companies around the world. Its mission is to provide better products and services through innovation of chemistry and low-carbon technology in R&D and manufacturing, and help partners improve the efficiency of new drug discovery and development, and accelerate the project launch process at full speed.

Teams

Our core management and technical teams have in-depth industry experience in leadership and R&D, previously spearheading drug discovery and CMC campaigns at Roche, GSK, Boehringer Ingelheim, Merck, Agios and other global pharmaceutical and biotech companies.

