

Micropacked Bed Technology

300+
projects

kilo to metric ton scale

commercial and GMP projects

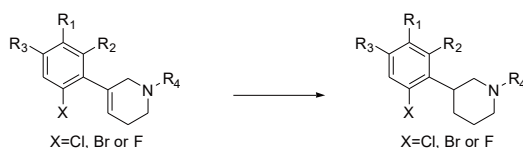
Technical advantages

- **Safety, Efficiency, Consistency**
 - Meet safety regulations
 - Increased productivity
 - No batch variation
 - Heavy metal < 10 ppm
- **Superior selectivity**
- **Significant cost savings**
 - Lower catalyst cost
 - Lower solvent usage
 - Shorter production time

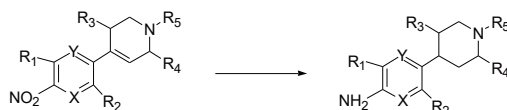
Reactions applied at manufacturing scale

- Deprotection
- Nitro reduction
- Nitrile reduction
- Diazo reduction
- Oxime reduction
- Olefin/acetylene reduction
- Reductive amination
- Phenyl ring reduction
- Selective dehalogenation
- Pyridine ring reduction
- Asymmetric hydrogenation

Cases



Comparison	Batch	Micropacked bed
Activity	Not feasible	Conversion rate \geq 90%
Impurity	Not feasible	Dehalogenation impurity < 3%



Comparison	Batch	Micropacked bed
Yield	70%	\geq 85%
Impurity	~15%	< 3%
Work up	Complex	Easy
Catalyst cost	High	Reduced 91% noble metal consumption

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)