

Continuous and Green (Solvent-free) Process for the Manufacturing of Metformin Hydrochloride

- CSIR-NCL has developed a continuous & green (solvent-free) process for preparing Metformin (N, N-dimethyl biguanide), a standard first line treatment for Type-II Diabetes.
- The developed technology offers a shorter reaction time (5-10 minutes) without any product purification step.
- This technology is demonstrated & validated at a lab scale and technology is now available for licensing/co-development.



Technology Available For Licensing/ Co-development

BACKGROUND

Conventional batch processes suffer with disadvantages such as:

- Longer reaction time
- Use of organic solvents: xylene/ toluene
- Organic solvents are flammable & hazardous
- Additional steps requires product purification & solvent recovery steps

CSIR-NCL's innovative solution:

- A simple, single step process
- Green, safe and economically viable technology
- Delivers high purity product
- Minimizes downstreaming process requirements.

TECHNOLOGY OFFERING

- Continuous and a green (solvent-free), additive-free process.
- Temp range: 145-155°C
- Purity: >95%.
- Substrate conversion: >90%
- Reaction time: 5-10 minutes
- Nature of Product: White crystalline powder
- Single-step process with Continuous mode by use of a screw reactor.
- Easier scale-up process to industrial production.

CURRENT STATUS

- Demonstrated at lab scale.
- TRL-5
- Already licensed awaiting commercialization
- Looking for co-development.

MARKET SIZE

- The global metformin market size is calculated at USD 4.50 billion in 2025 and is predicted to increase from USD 4.79 billion in 2026 to approximately USD 8.46 billion by 2035, expanding at a CAGR of 6.52% from 2026 to 2035. For Asia-Pacific region is expected to expand 7.6% CAGR between 2026 to 2035. ([Source](#))

VALUE PROPOSITION

- Continuous process
- Shorter reaction time
- Single step process
- Colorless product
- Green process: No use of organic solvent
- Cost-effective process: reduced upto 30%
- No product purifications steps
- Smaller footprint
- Complete conversion of reactants
- Product quality meets the FDA criteria's

Applications:

- Anti-Diabetic drug
- Drug for women with PCOS (polycystic ovary syndrome)

IP:

Granted: IN462869, EP4025560

Patent Applications: US20220274917, WO2021044445