

Continuous-Flow Process for the Preparation of Ketamine



KEY ACHIEVEMENTS

- Continuous-flow conditions of the whole ketamine synthesis process were optimized at microfluidic scale in lab (production yield around 20 g / day scale).
- The main steps of the process were validated on a commercially available pilot mesoscale continuous-flow reactor enabling a productivity of 4.25 kg /day.
- Preparation of various analogs of ketamine using the same flowchart.
- Easy downstream purification.
- Production of racemic ketamine, with options for the separation/recycling of enantiomers.

KEY COMPETITIVE ADVANTAGES

- Overcomes the shortcomings of the batch processes : better mixing and heat transfer, accurate control on the reaction conditions, improved yield production and obtention of a product with a constant quality and purity profile
- Safer process
- Faster process (few minutes instead of few hours)
- Cleaner process (minimal footprint)

MARKET

280 million cases of major depression all over the World. The COVID-19 pandemic has increased by 25% the prevalence of anxiety and depression worldwide.

Already used since a long time as anesthetic, ketamine is now gaining ground as a promising treatment for some cases of major depression, which is the leading cause of disability worldwide. In the US, recent estimates show 17 million adults had an episode of major depression in the course of a year. Suicide rates rose again substantially in 2021 after two years of decline with every day, approximately 132 Americans dying by suicide.

Because of its rapid action, ketamine could have a role to play in helping to prevent suicide. The methods generally used for the preparation of ketamine molecule are mainly based on stepwise macroscopic batch processes which come with various shortcomings (poor mixing...) ultimately accounting for low productivity, quality deficiency and poor flexibility.

The patented technology relates to a scalable, safe and intensified **continuous-flow process in micro/mesofluidic reactors for the production of Ketamine and analogs**. Besides, the patented invention provides various methods for synthesizing some specific pharmaceutically active species (arylcycloalkylamine derivatives), by using continuous-flow conditions with a drastically improved efficiency by comparison to the batch procedures.

PARTNERSHIP SOUGHT

Looking for a pharmaceutical partner interested in implementing the process for ketamine production.

INTELLECTUAL PROPERTY

- Patent granted in US (US11286230B2) and EP validated in BE, CH, DE, FR, GB, IE, LU (EP3700887B1).
- Patent applications pending in Canada and China.