

Pharma Chemicals

Micro Reactor Technology

DSM has established a leading position in micro reactor technology as an alternative production method for pharmaceuticals. Development and production using this technology is focused at our renowned Linz facility in Austria.

Micro reactors contain thousands of continuous small-diameter tubes and have an overall volume of a few liters, compared to 10,000 liters for a traditional large vessel. The manufacturing footprint for micro reactors is therefore much smaller and more efficient, yet they can handle 1,000–2,000 kilograms of product per hour with yields up to 20% higher than traditional large vessels. Measured per cubic meter ($\text{kg}/\text{m}^3\text{h}$), productivity increases by a factor of 10^3 – 10^4 .

Due to their smaller scale, the reaction rate is quicker and easier to control, which facilitates the higher yields and lower costs. With each small tube surrounded by coolant, the reactors also use less energy and produce less CO_2 or other undesirable by-products. The process is scalable and enables process conditions that are not otherwise possible.

- :: Superior processing performance with higher yields
- :: Smaller footprint and more cost-effective
- :: Lower impact on the environment / sustainable
- :: Handle hazardous processes in a safe, controlled way

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Micro Reactors— The Future

Researchers believe that as much as 30% of fine chemicals and pharmaceuticals currently in production could be manufactured more efficiently using micro reactors. The key lies in the small tubes used in micro reactors, which have a diameter as small as 10 microns—versus up to four meters on a traditional large vessel. Reactions in these small spaces can be controlled very accurately. This makes them safer, cleaner, and more efficient.

So it's no surprise that pharma companies are increasingly looking at continuous processing using micro reactor technology as an alternative production method for active pharmaceutical ingredients—with the objective of increased cost effectiveness and reduced environmental impact. DSM is positioned to serve them as one of the frontrunners in micro reactor technology, having already produced almost a million kilograms of pharmaceutical material using this method.

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