



**CASCADE**  
CHEMISTRY



## New Synthetic Route Accelerates Client into the Clinic

*Innovative Approach Saves Time and Cost*

“A complete upgrade of the route was key here, with fewer steps, proven and less expensive reagents, and the type of synthesis you really like as a chemist. Additionally, the product was now more easily purified and detected on modern HPLC equipment with the latest columns.”

JEREMIAH MARSDEN  
PRESIDENT, CASCADE CHEMISTRY

Contract research and contract manufacturing organizations (CRO/CMOs) are an asset to many smaller biotech/pharma companies that may not have the expertise and/or instrumentation in-house to fully develop and realize their products during early phase. Larger pharmaceutical companies also utilize CRO/CMOs to develop several modalities in parallel without disrupting current projects. This case study demonstrates how Cascade Chemistry, leveraging its agility and expertise, helped a new biotech company accelerate an old product into the clinic.

### A Faster, More Cost-Effective Synthetic Route

The challenge facing Cascade? Take an acquired, almost 50-year-old synthetic route whose reagents are expensive or not readily available, and innovate an effective route—utilizing less expensive starting materials, removing unneeded purification steps, and allowing the product to be purified and detected on modern HPLC columns and detectors.

Being an agile and flexible CRO/CMO, Cascade Chemistry was uniquely qualified to think outside the box and truly help this customer redefine their synthetic route, decreasing the client’s time to get into the clinic, reducing complexities, and mitigating risk.

“We were able to save our client time and money, and produce a more environmentally friendly product,” says Jeremiah Marsden, PhD, president at Cascade Chemistry. “Our approach is to bring the client to a better place than where they started. This development work was more than paid for by the savings later realized by the client.”

One of the most rewarding aspects of the project that demonstrated Cascade's impact? The client returned soon after for even more material, which was easily produced in a few short weeks. The new synthetic route was also easier to scale, and GMP-ready.

## How We Did It

Cascade delivered a completely updated synthetic route that utilized less expensive reagents and eliminated unnecessary purification steps. Reducing complexity was key, according to Dr. Marsden. "The original synthesis used several purification and ion exchange steps to remove byproducts and allow for production of the required salt form," he says. "We updated the synthesis to not only reduce the number of purification/salt-exchange steps – saving time and reducing losses – but also made it easier to purify and detect with modern HPLC techniques."

Not only did Cascade Chemistry create a faster, more effective route, they did so quickly. As they worked on the client's proposal, they were simultaneously solving the problem — enabling Cascade to include the new route in the proposal. The ability to work in parallel and quickly redesign the synthetic route theoretically, while trying some of the new, less expensive reagents, gave the Cascade team an advantage in delivering the new solution as fast as they did.

"One of things that we really liked about the new synthetic route was that there weren't any appreciable byproducts that are difficult to get rid of. Everything is either a gas or easily extractable," says Dr. Marsden. "It's the kind of synthesis you really like as a chemist. Removing the additional purification steps helped immensely in getting great quantities of high-quality product."

In the end, the proposal was accepted by the client, who liked the out-of-the-box thinking and quick turn-around that they saw. One of the most rewarding aspects for the team was when the client returned some months later to request more material. "We were able to repeat the process very easily and gave them the new batch of material in under a month," Dr. Marsden says. The new method was also easier to scale-up and produce in a GMP facility for when the biotech needed to scale-up for clinical testing, allowing the client to generate clinical data faster, potentially improving time to market.

### FOR MORE INFORMATION

For assistance solving critical synthetic and manufacturing challenges, contact Cascade Chemistry at [info@cascadechemistry.com](mailto:info@cascadechemistry.com).



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Cascade Chemistry is a Contract Research and Manufacturing Organization for the pharmaceutical/biotech, materials, and chemical industries. For nearly 40 years, the company has provided a variety of challenging synthetic and chemistry services for clients, developing a reputation as a reliable and experienced outsourcing partner. Founded as Organic Consultants, the company was purchased in 2012 by Jeremiah Marsden, a chemist at the company, who rebranded it as Cascade Chemistry to emphasize its focus on chemistry and the beauty of its location in the Cascade Mountains. Since 2012, Cascade Chemistry has enjoyed significant growth. Its increasing focus on process chemistry has helped small biopharma client companies bring their discoveries to clinical trials.