It's All About the Process: \(\beta\)eta Lactamase Inhibitor
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BACKGROUND

Name: Devin Marie Driscoll
Major: Biology and Mathematics Minor
Department: Process Chemistry

Why a Biology major and Mathematics minor?
I have always been a curious student, so I decided to major in Biology in the study of questioning the world around me. Majoring in Biology has given me many great learning experiences in the classroom, research lab, and clinical setting – and has helped me answer and further investigate biological questions. Additionally, I have a math minor because I am a nerd, who always needs a little math in her life.

Why Cubist?
Being from Massachusetts, I had heard of Cubist Pharmaceuticals, but my desire to work at the company came from the testimonials of past co-ops, who had nothing but wonderful things to say about the company. Now as a past Cubist co-op myself, I want to continue to spread Cubist’s good reputation to members of the Northeastern and Boston community!

Process Chemistry

What is Process Chemistry?
Process chemistry uses organic chemistry to create an efficient production process of a novel drug, and then manages and controls the transfer of that process from laboratory scale to manufacturing scale.

What do process chemists care about?
• Safety of the chemical synthesis
• Cost of the process
• Environmental impact of the process
• Reproducibility of the process
• And most importantly, process chemists care about the purity of the final compound (Just like Walter White)!

MY PROJECT

(Due to Cubist’s company confidentiality policy, I will not be able to disclose the synthetic scheme or structures of the investigative new drug, or any of its intermediates.)

Main Project
My main project for Cubist was to investigate and optimize reactions for the synthesis of the investigative, new \(\beta\)LI drug.

A \(\rightarrow\) B \(\rightarrow\) C \(\rightarrow\) D

Key Considerations
• The one crop yield of Compound C from A was only 56%.
• The yield of Compound D from C was only 79%.
• The reaction scheme contained hazardous reagents.
• The total synthesis was time-consuming, taking about two weeks.

Results
• Increased the one crop yield of Compound C to 76%, by not isolating/working up Compound B, but telescoping it to the next reaction.
• Increased the yield of Compound D to 86%, with entirely new reaction conditions and an improved work-up of the compound.
• Replaced hazardous reagents with more environmentally mild reagents.
• The time of the reaction was drastically shortened to about 2-3 days.
• The new synthesis saves Cubist about $900,000 – from a cost of reagents standpoint alone!!

CONCLUSIONS

• I had an amazing co-op experience at Cubist and encourage all undergraduates who are interested in the sciences, pharmaceutical industry, or antibiotics to apply!
• The best part of my co-op was the people I worked with in my process chemistry group. Not only were they great people and scientists, but they made an extreme effort to teach me something new everyday.
• Overall, I was given a lot of independence and responsibility at my co-op, which helped me grow as a scientist. I had a great six months! 😊

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