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FINDING THE FORMULA FOR SUCCESS

NEW HANDS-ON LAB BRINGS CHEMISTRY CONCEPT TO LIFE

by [Kelli Caplan](#) | August 9, 2024*Read time: about 3 min*

When Dr. Dmitry Liskin grades organic chemistry examinations, he often notices students struggle to understand an important chemical reaction concept.

So, he decided to create a hands-on chemistry lab dedicated solely to helping students comprehend the process - determining the correlation between yield and amount of base in chemical reactions.

"The idea for this project came to me after seeing how many students lose points for simple mistakes on the exams. When we talk about textbook chemistry and people are asked to predict a product or illustrate a particular reaction on an exam, they often forget the base, which is necessary for this type of reaction to occur," said Liskin, a senior lecturer in the [Department of Molecular Biology and Chemistry](#). "Sadly I have to take off points for those mistakes. I thought, 'well, what if we were to design a lab to actually demonstrate how important the base is?' That way, what they're learning will be illustrated in the lab."

To make the lab a reality, Liskin enlisted the help of student Rhiannon Canfield, '24 Cellular and Molecular Biology. Canfield was a [Summer Scholar](#), part of a competitive program at CNU that pays undergraduate students to do research side by side with a faculty member over the summer.

Canfield's project focused on bringing to life the lab that Liskin envisioned. The goal: develop a procedure that allows students to apply what they have learned in class and see in real time how base and yield impact the reactions.

She assembled the necessary materials, wrote the procedures, and researched and crafted the methods that will illustrate the concept as clearly as possible. Her techniques will be published in the lab manual so students can use them for years to come.

"Basically, I am trying to develop techniques to demystify this concept," said Canfield, who is hoping to do research after she graduates.

Understanding the relationship between yield and base in a chemical reaction is often an obstacle for students grappling with organic chemistry. Liskin draws a parallel between setting up a chemical reaction and following a recipe, as certain reactants or ingredients must be added in certain proportions and order.

"Deviating from the recipe will change the taste and presentation of the dish on your plate, just as yield of the final product is affected in the flask. In lecture, we learn some of the key chemical reactions (recipes) and sometimes students forget to add important ingredients. One such ingredient is base, which ensures that the reaction proceeds favorably, and it is used in a wide range of chemical reactions," Liskin said.

As Canfield worked in the lab, located on the third floor of Forbes Hall, she was quick to explain all the elements in play. She knows the lab space inside and out, as she had created it and modeled it exactly as she thought it would work best to effectively guide students.

In fact, she said, she wishes she had had this lab when she took organic chemistry.

"It would have definitely helped me," she said.

For Canfield, the research has been enlightening.

"One thing that I have definitely really gotten out of Summer Scholars is just the opportunity to kind of dive in and immerse myself in the research that I have never been able to do before," she said. "I think it's really cool that there's an opportunity for undergraduate students in particular, because that's something you think you have to wait until graduate school to experience."

Being able to work with students, such as Canfield, and help them embark on undergraduate research, Liskin said, has proved to be both rewarding and powerful. The opportunity has propelled students to flourish and find great success in their fields. Christopher Newport's focus on research, he said, has fostered an environment of collaboration and growth that benefits students and advances science.

"I am grateful to CNU, the Department of Molecular Biology and Chemistry, and the Summer Scholars program for providing me with the opportunity, the lab space, and the finances to be able to do this kind of work," Liskin said. "I really enjoy it."

Canfield's research, Liskin said, is expected to have a long-lasting effect, as it positively influences students' ability to grasp the concept, and as a result, be more successful in the classroom.

"I think hands-on learning is extremely important. We're very hopeful that it is going to have impactful and real time results," he said.

Canfield and Liskin want to share the concept with others in the field. Canfield has submitted her research to be presented at the American Chemical Society conference in Atlanta in the fall.

While developing the lab has been a rewarding project, it has not been easy. Canfield has patiently and thoughtfully worked through problems that have arisen, and in the end, accomplished exactly what she set out to do.

"It's been really great, this kind of independent learning," she said. "There definitely have been some setbacks. But, it kind of pushed me to be like, 'OK, well, this didn't work, so let me go and try this other thing.' I have been able to explore those things for myself instead of just sitting back and waiting for a professor to tell me what to do. It's on me. Obviously, I have my mentor, who I can go to for guidance, of course. But it's very, very empowering for me knowing I can do this."

