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Flow Chemistry Highlights

A CHIMIA Column

Selected Topic: Education

Continuous-Flow Chemistry in Undergraduate Education: Sustainable Conversion of Reclaimed Vegetable Oil into Biodiesel

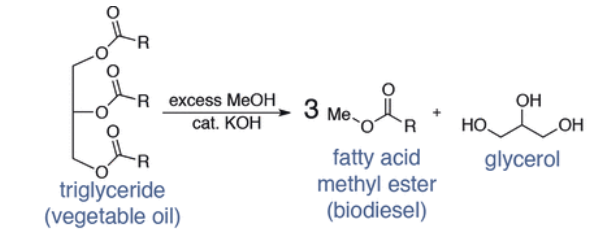
Frank A. Leibfarth, M. Grace Russell, David M. Langley, Hyowon Seo, Liam P. Kelly, Daniel W. Carney, Jason K. Sello, and Timothy F. Jamison*

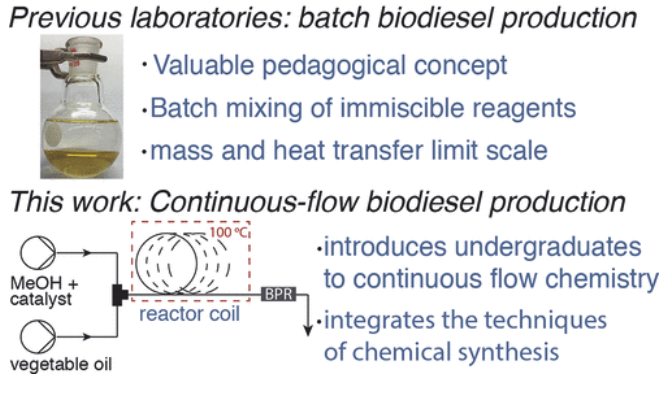
J. Chem. Educ.* 2018, *95, 1371**,**
https://doi.org/10.1021/acs.jchemed.7b00719

Integration of flow chemistry in teaching curricula and laboratory classes is an important step in raising awareness of the benefits and limitations of the technology. Implementing a process in a continuous mode requires consideration of the reactor volume and residence time, which in turn may affect the concentrations and equivalents of the reagents. To expose students to this new way of thinking about a reaction set-up, the authors devised an undergraduate laboratory module on production of biodiesel from vegetable oil in a continuous flow reactor. During several sessions, students had to build the reactor, perform the transesterification reaction, screen and optimize reaction conditions and finally convert waste cooking oil into biodiesel. Apart from achieving high yields, reactions were also optimized to be more sustainable, and students were introduced to the principles of green chemistry. The authors successfully ran the laboratory course over three years; SI of the paper includes a full manual and a guide for laboratory instructors.

Author's comments:*

"This experiment has been a component of our undergraduate chemistry major curriculum at MIT for 7 years. The student feedback that we have received suggests that it serves as a good introduction to flow chemistry and that it sparks their interest in learning more."



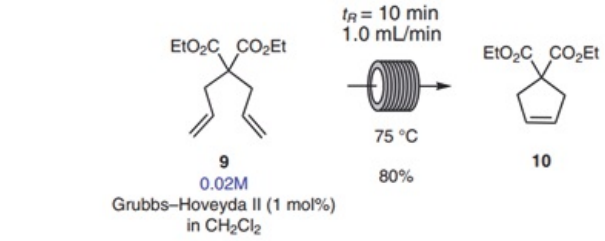


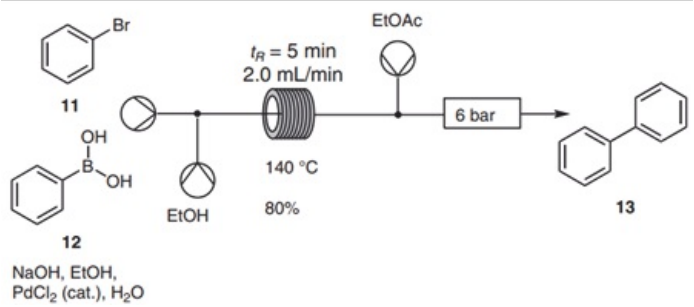
Recent Advances Towards the Inclusion of Flow Chemistry within the Undergraduate Practical Class Curriculum

Philippa B. Cranwell*

SynOpen* 2020, *4, 96, https://doi.org/10.1055/s-0040-1719539

Spurred by the more frequent use of continuous flow processes in industry, this spotlight article sets out to highlight the reactions which can be performed by undergraduate chemists during university practical sessions. Following a summary of the existing literature-known flow reaction demonstrations (including the Hofmann rearrangement; Knoevenagel condensation; Paal-Knorr pyrrole synthesis and Diels-Alder cycloaddition amongst others), the author extends this list with five more recent examples. Covered in the concise article are: photochemical reactions; green biomass upgrading reactions; liquid-phase oxidations; ring-closure metathesis and a Suzuki-Miyaura cross coupling. Often the experiment is repeated by the student both in batch and flow, thereby tangibly highlighting what factors lead to yield and conversion benefits. The work serves to stimulate those designing practical and theoretical academic courses, and the range of chemistry options is expected to grow with the coming years.





Would you like to propose a Flow Chemistry Highlight topic here?
Please contact Agnieszka Ladosz or Benjamin Martin, E-mail: agnieszka.ladosz@idorsia.com; benjamin.martin@novartis.com