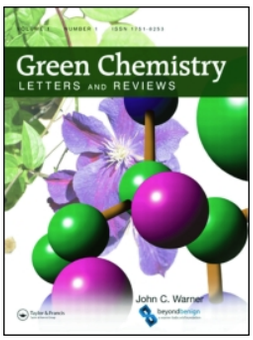

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EDITORIAL

Advances in green chemistry education

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Since the publication of the seminal book *Green Chemistry: Theory and Practice* by Paul Anastas and John Warner 21 years ago (*1*), the world has seen some remarkably innovative discoveries to improve the sustainability of industrial and manufacturing processes (*2*). Similarly, the early report of a green organic chemistry teaching experiment by Scott Reed and Jim Hutchison (*3*) in 2000 and subsequent compilation of *Green Organic Chemistry: Strategies, Tools, and Laboratory Experiments* (*4*) have inspired many educators to design new and greener pedagogical experiments. Indeed, there are currently hundreds of published green organic chemistry practicals in the teaching literature (*5*,*6*). The movement to incorporate green chemistry into other curricular areas continues to grow, and the design of novel experiments has expanded to many chemistry sub-disciplines. Green chemistry has been infused into courses at all undergraduate levels within major and non-major courses, and various models for such classes have been documented.

The articles in this *Green Chemistry Letters & Reviews* special issue on "Advances in Green Chemistry Education" were inspired by the plethora of teaching papers published every year, green chemistry and sustainability sessions at American Chemical Society national meetings, and related sessions at the Biennial Conference on Chemical Education meetings. The types of activities discussed range from new introductory courses and organic laboratory experiments to interdisciplinary courses, topics, and programs.

From a practical perspective, Baldwin et al. present a liquid carbon dioxide dye extraction that can be implemented either as an undergraduate experiment or as an outreach demonstration. The design of green guided-inquiry laboratory experiments is discussed by Bromfield Lee, and papers contributed by Palesch et al. and Bastin et al. outline the incorporation of multi-step synthesis experiments into the sophomore organic chemistry laboratory.

The interdisciplinary nature of green chemistry is explored in several articles. Kovacs and co-workers describe an introductory course as a model for introducing students to the principles of molecular toxicology. In contrast, Marteel-Parrish and Harvey share their experiences of teaching a cross-disciplinary course connecting art and green chemistry. Jarvis explores the current state and potential of green chemistry as part of science policy in the United States, and Lasker and Brush tackle the inclusion of social and environmental justice in the chemistry classroom.

Finally, there are also larger scale projects discussed in this special issue including an interdisciplinary green chemistry certificate program, and a student-led initiative that has made significant contributions to their university and the green chemistry community at large.

It is our hope that this special edition will inspire chemistry educators to create their own courses, programs, and pedagogical advancements to educate the next generation of science and non-science students.

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References

[1] Anastas, P.T.; Warner, J.C. *Green Chemistry: Theory and Practice*; Oxford University Press: New York, 1998.
[2] The United States Environmental Protection Agency Green Chemistry Challenge Winners. https://www.epa.gov/greenchemistry/green-chemistry-challenge-winners (accessed May 21, 2019).
[3] Reed, S.M.; Hutchison, J.E. Green Chemistry in the Organic Teaching Laboratory: An Environmentally Benign Synthesis of Adipic Acid. *J Chem Educ.* **2000**, *77* (12), 1627–1629.
[4] Doxsee, K. M.; Hutchison, J. E., Green Organic Chemistry: Strategies, Tools, and Laboratory Experiments. Thomson Brooks/Cole: 2004.
[5] Dicks, A.P. *Green Organic Chemistry in Lecture and Laboratory*; CRC Press: New York, 2012.
[6] Morra, B.; Dicks, A. P., Recent Progress in Green Undergraduate Organic Laboratory Design. In Green Chemistry Experiments in Undergraduate Laboratories, Fahey, J. T.; Maelia, L. E., Eds.; American Chemical Society: 2016; Vol. ACS Symposium Series 1233, pp 7–32.

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