



Education Activities by the ACS Green Chemistry Institute®

**GC3 Education Panel Discussion
May 4, 2011
Cupertino, CA**

ACS Green Chemistry Institute®

- Mission: to enable and catalyze the implementation of green chemistry and green engineering principles into all aspects of the global chemical enterprise.
- Focus areas
 - Education & Research
 - Advocacy & Policy
 - Industry →
 - Certification/Standards (ANSI)

- Pharmaceutical Roundtable
- Formulator's Roundtable
- Chemical Manufacturer's Roundtable

www.acs.org/greenchemistry

Outline

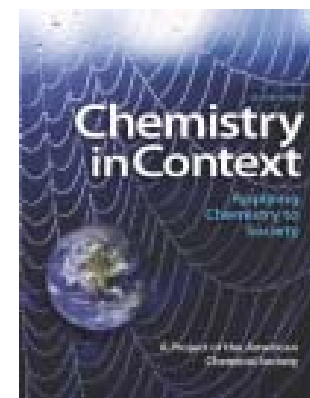
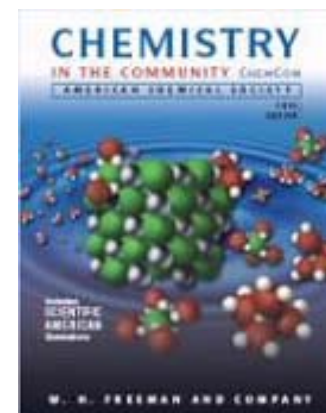
- Books
- Student Awards
- Summer School
- Workshops
- Webinars
- How can industry help with education?

ACS Green Chemistry Books



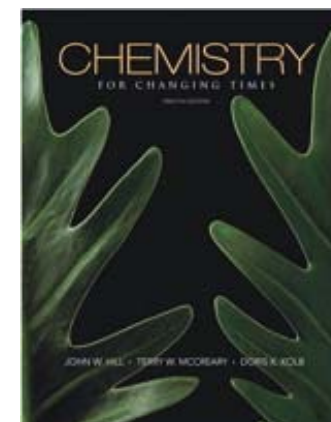
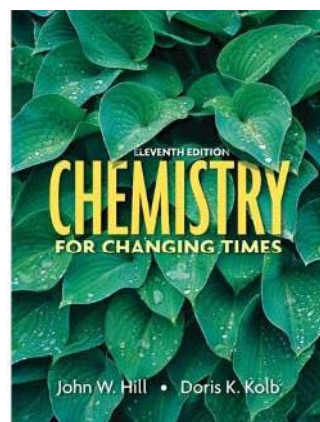
ACS Chemistry Textbooks

- *Chemistry in the Community*
 - High school textbook
 - Chemistry concepts in the context of societal issues
- *Chemistry in Context*
 - Undergraduate non-science majors
 - New 7th Edition intro chapter on green chemistry and sustainability
 - Examples of green chemistry and sustainability throughout the book



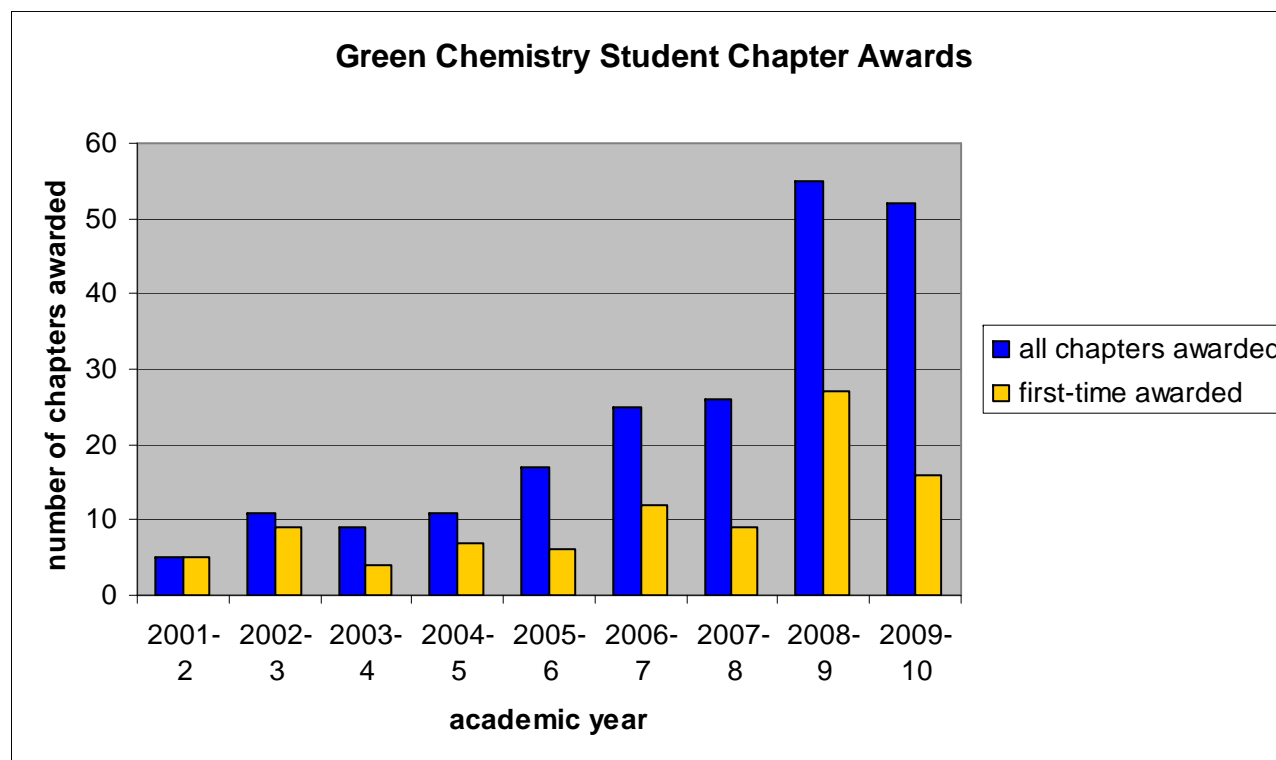
Pearson Textbook

- *Chemistry for Changing Times*, 11th & 12th Eds.
 - Non-science majors' textbook
 - ACS GCI helped incorporate Green Chemistry Essays and Instructor Resources for all 22 chapters
- Now for 13th Edition: ACS GCI working with book team and green chemistry educators to more extensively incorporate GC
 - Green chemistry essays
 - Learning objectives
 - Cross references
 - End of chapter summaries
 - End of chapter questions



Green Chemistry Student Chapter Award

- 52 chapters awarded for 2009-2010 activities
- Since 2002, 211 awards have been given to 95 chapters



Green Chemistry Student Chapter Award

(for 2009-2010 academic year; * First-time awarded)



1. Angelo State University
2. Augustana College (South Dakota)
3. Bellevue College*
4. California State University, Dominguez Hills*
5. California State University, Fresno*
6. Central Michigan University
7. Clemson University
8. Eastern Oregon University*
9. Ferris State University
10. Florida International University-Biscayne Bay Campus
11. Georgia College and State University
12. Grand Valley State University*
13. Hendrix College
14. Idaho State University
15. Illinois Wesleyan University
16. Inter American University of Puerto Rico - Metropolitan Campus
17. Millikin University
18. Pacific Lutheran University*
19. Penn State-Erie, The Behrend College*
20. Pepperdine University*
21. Saint Francis University
22. Salt Lake Community College*
23. Seton Hill University*
24. South Texas College
25. Stern College for Women - Yeshiva University
26. Suffolk University
27. Tarleton State University
28. Texarkana College
29. The University of Arizona
30. The University of Colorado Denver
31. The University of Tennessee at Martin
32. The University of Toledo
33. Truman State University
34. Union University
35. University of Houston
36. University of Kentucky*
37. University of Mary Hardin-Baylor
38. University of Pittsburgh at Titusville
39. University of Pittsburgh, Pittsburgh Campus
40. University of Puerto Rico at Aguadilla
41. University of Puerto Rico at Arecibo
42. University of Puerto Rico at Humacao
43. University of Puerto Rico, Mayagüez Campus
44. University of Puerto Rico, Río Piedras Campus
45. University of San Diego*
46. University of West Florida*
47. Utah State University
48. Valdosta State University*
49. Virginia Polytechnic Institute and State University*
50. West Virginia State University*
51. Western Kentucky University
52. Western Washington University

ACS Green Chemistry Summer Schools (2003-2010)



Summer School Survey Highlights

- Surveyed 274 summer school (2003-2007) students in late 2008; 64% response rate
- Over 90% strongly agree or agree that the summer school has a positive influence on their career path
- About 70 respondents (40%) are no longer students/post-docs
 - ~30 are teacher/faculty
 - ~30 are in industry/ business
 - ~10 are in government
- 97% currently teachers/faculty members are able to use green chemistry in their current position
- Nearly 70% in industry are able to use green chemistry in their current position
- 8% of respondents say they were hired because of their green chemistry experience
- Several commented that they couldn't find jobs in green chemistry

Workshops 2010 – 2011

- Students
 - Student Workshops annually at GC&E Conference
- Educators
 - 21st Biennial Conference on Chemical Education (BCCE): “Getting Started with Green Chemistry” workshops
 - “Teaching Green Chemistry in High School” workshop held with Eastern Analytical Symposium in New Jersey
- Professionals
 - Corporate training session at Sepracor
 - Green Chemistry 101 workshop held at ACS National Meeting in Anaheim, CA
 - Upcoming: Green Chemistry 101 and 201 at ACS National Meeting in Denver, CO



ACS Webinars – Green Chemistry and Sustainability Series (Quarterly since May 2010)

- Richard Denison (Environmental Defense Fund)
 - “How Chemical Policy Reform Can Spur Green Chemistry”
- Lynn Leger (GreenCentre Canada)
 - “Do Business and Chemistry Skills have to be like Oil & Water?”
- Upcoming: May 12 – Michael Heben (Univ. of Toledo)
 - “Green Chemistry and Renewable Energy – Two Peas in a Pod”
 - Register for free: <http://acswebinars.org/heben>
- Upcoming: September 8 – Green Chemistry Education (co-organizing with ACS Education)
- Recordings available: <http://acswebinars.org>



How can industry help with education?

- Create demand for green chemistry graduates
 - Seek green chemistry experience in job postings
- Support green chemistry training & education for:
 - Employees and professionals
 - Local universities and schools
 - Teachers and educators
- Support development of green chemistry educational materials (books, lab experiments, etc)
- Support can be by individual company or by “consortium” of companies, such as through ACS GCI Industrial Roundtables and through GC3

Questions?

Jennifer Young

email: j_young@acs.org

website: www.acs.org/greenchemistry



Green Chemistry Student Awards

- Kenneth G. Hancock Memorial Student Award
 - Rewards outstanding student research and/or education
 - Sponsored by ACS Division of Environmental Chemistry and by NIST



- Joseph Breen Memorial Fellowship
 - Sponsors travel to a conference
 - Sponsored by the ACS International Endowment Fund
- Ciba Travel Awards in Green Chemistry – NEW!
 - Sponsors travel to a conference

Where are they now? Some Current Employers (Industry, Small Business, and Government Labs)

- Akzonobel
- Albemarle Corporation
- Appleton Papers
- Argonne National Laboratory
- ChemImage Corporation
- Cirrus Pharmaceuticals
- Clariant Specialty Chemical (Zhenjiang)
- ConocoPhillips
- Corning, Inc.
- Dept of Energy Geothermal Technol.
- Dow Chemical Company
- DuPont
- Embrapa Meio Ambiente, Brazil
- Finnegan
- Ford Motor Company
- Frito-Lay
- Gilead Sciences
- Liquidia Technologies, Co-Founder
- Lubrizol Corporation
- McKinsey and Company
- Ministry of Housing Land Planning and Environment
- Ministry of Industry, Energy and Mining
- National Chemical Laboratory, Pune, India
- National Institute of Standards and Tech.
- National Water Institute (Argentina)
- Pacific Northwest National Laboratory
- PolyOne Corporation
- PowertechLabs
- PPG Industries, Inc.
- Propharma, New Zealand
- QSMSRS - Integrated Solutions
- Sandia National Labs
- The Key Publishing House Inc.
- Univ. of Alabama, Licensing Associate
- US Patent & Trademark Office
- Vertex Pharmaceuticals
- Vive Nano, CTO
- Warner-Babcock Institute for Green Chem.

Annual Green Chemistry & Engineering Conferences

- Workshop for students
- Student travel funding through National Science Foundation
- Student awards
- Strong technical sessions on Education

