Transforming Chemistry Education through the Green Chemistry Commitment

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Executive Director
Beyond Benign
• Headquarters located in Wilmington, MA

• Co-founded by John Warner and Amy Cannon in August of 2007

• Co-located with the Warner Babcock Institute for Green Chemistry

• Created to carry on work in Green Chemistry education in the interdependent areas of K-12, Community, Academia and Industry

www.beyondbenign.org
Green Chemistry Commitment
Green Chemistry Commitment

• Goals:
  – Work with higher education institutions
  – Highlight existing work and programs
  – Unite the community around common goals & objectives
  – Systematically bring Green Chemistry into academia for lasting change
  – To transform chemistry education
Green Chemistry Commitment

• Process:
  – First draft
  – Talking to the community, gathering feedback
  – Formation of Faculty Advisory Board (summer 2011)
  – Creation of GCC Version 2.2
  – Green Chemistry Commitment Summit (January 2012)
  – Talking to the community, gathering feedback
  – Finalizing GCC (October 2012)
  – Dissemination and Roll-out (target: June 2013)
Faculty Advisory Board

**Dr. John Arnold**
Professor, Department of Chemistry, UCal, Berkeley

**Dr. Ed Brush**
Professor, Department of Chemistry
Bridgewater State University

**Dr. Rich Gurney**
Associate Professor, Chair
Department of Chemistry and Physics, Simmons College

**Dr. Jonathan E. Kenny**
Professor, Department of Chemistry, Tufts University

**Dr. Wei Zhang**
Associate Professor, Dept of Chemistry, Director, Center for Green Chemistry, UMass Boston

**Dr. Anne Marteel-Parrish**
Frank J. Creegan Chair in Green Chemistry, Associate Professor, Washington College

**Dr. Martin Mulvihill**
Executive Director, Berkeley Center for Green Chemistry, UCal, Berkeley

**Dr. William Petuskey**
Professor and Chair, Dept of Chemistry & Biochemistry, Arizona State University

**Prof. Irvin J. Levy**
Professor, Chair, Department of Chemistry, Gordon College

**Dr. Bill Tolman**
Distinguished McKnight University Professor, Chair, Dept of Chemistry, University of Minnesota

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greenchemistrycommitment.org
21st century chemistry
The Commitment Text: Understanding the Student Learning Objectives
The Commitment Text:

• Focused on Student Learning Objectives:
  – Knowledge-based
  – Skills and performance based
  – Ethical
  – Affective
The Commitment Text:

Green Chemistry Student Learning Objectives

Upon graduation, we believe all chemistry majors should have proficiency in the following essential green chemistry competencies:

• **Theory**: a working knowledge of the twelve principles of Green Chemistry

• **Toxicology**: understanding of the principles of toxicology, the molecular mechanisms of how chemicals affect human health and the environment, and the resources to identify and assess molecular hazards

• **Laboratory Skills**: the ability to recognize, assess and design greener alternative chemical products and processes

• **Application**: serve society in their professional capacity as scientists and professionals through the articulation, evaluation and employment of methods and chemicals that are benign for human health and the environment
Achieving Student Learning Objectives

The *Green Chemistry Student Learning Objectives* can be carried out through a number of different formats including, but not limited to:

- **Integration**
  - Embed green chemistry throughout chemistry courses
  - Include green chemistry exercises throughout laboratory courses
  - Incorporate green chemistry principles into research projects and programs
  - Build toxicology and environmental health science modules into existing chemistry courses

- **Creation**
  - Develop new courses dedicated to green chemistry for chemistry majors
  - Design toxicology and environmental health science courses for chemistry majors
  - Develop a seminar series on green chemistry and/or toxicology for chemistry majors

- **External**
  - Encourage students to take elective courses in toxicology and/or environmental health sciences from other departments or institutions
Awards, Recognition and Reporting
Awards

**Scope of Awards:** To celebrate individual, departmental and student accomplishments in green chemistry *education*.

**Individual accomplishments** can include the following:
- Creating and teaching a new course for chemistry majors on the subject(s) of green chemistry, toxicology, environmental health sciences, environmental science, etc.
- Developing new course materials, including lecture and/or laboratory exercises and resources
- Championing green chemistry education at the individual’s institution and/or within the chemistry field
- Advancing student engagement in green chemistry through course work, research and/or outreach activities

**Departmental accomplishments** can include the following:
- Integrating green chemistry in to chemistry courses through lecture and/or laboratory courses
- Creating new required or elective courses for chemistry majors on the subject of green chemistry
- Creating a new required or elective course or seminar series on toxicology, environmental health science, environmental science, etc.
- Advancing student engagement in green chemistry through course work, research and/or outreach activities

**Student accomplishments** can include the following:
- Advocating for and advancing green chemistry education at the student’s institution
- Creating new laboratory exercises and/or other curriculum resources in green chemistry
- Bringing green chemistry to the community or K-12 organizations through outreach and/or service learning
Assessment and Reporting

• Annual Reporting (one report at end of academic year)
  – Schools set individual goals
  – Tracking goals and accomplishments
• Assessed by an advisory board
  – Minimum of 10 faculty members representing 10 different institutions
  – Minimum of 3-4 green chemistry professionals representing stakeholder groups
  – Appointments of 3-4 years
  – Current/past members will nominate new members to the advisory board
Resources

• Curricula and course materials:
  – Model courses and curricula
  – Toxicology and environmental health sciences curricula and resources

• Resources for stakeholder groups
  – Web resources for potential signers
  – Students, faculty, administration, industry, etc.

• Future potential resources:
  – Member resources
    • Professional development opportunities
    • Mini-grants for signers (professional development, student research, or faculty staff time)
Stakeholder Engagement
Faculty
Administration
ACS
Government
Business
Students
Etc...
Next Steps

• Participate in public comment period for ACS CPT Guidelines
• Collaborate with existing sustainability initiatives on campuses
• Recruit total of 20 initial signers of the Commitment
• Invite institutions to participate in the Launch June 2013
For More Information

- Visit [www.greenchemistrycommitment.org](http://www.greenchemistrycommitment.org)
- Ask an advisory board member for more information
- Contact Beyond Benign directly:
  - Amy_Cannon@beyondbenign.org
  - Kate_Anderson@beyondbenign.org