



# Green Chemistry Program Fact Sheet

## WHAT IS GREEN CHEMISTRY?

Green Chemistry is the use of chemistry for pollution prevention. More specifically, green chemistry is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances.

By offering environmentally benign alternatives to the more hazardous chemicals and processes that are often used in both consumer and industrial applications, green chemistry is promoting pollution prevention at the molecular level.

## GREEN CHEMISTRY FOCUS AREAS

Green chemistry technologies can be categorized into one or more of the following three focus areas:

- # The use of alternative synthetic pathways for green chemistry
- # The use of alternative reaction conditions for green chemistry
- # The design of safer chemicals that are, for example, less toxic than current alternatives or inherently safer with regard to accident potential.



## Chemistry Designed for the Environment

### THE GREEN CHEMISTRY PROGRAM

The Pollution Prevention Act established a national policy to prevent or reduce pollution at its source whenever feasible. The Pollution Prevention Act also provided an opportunity to expand beyond traditional EPA programs and

devise creative strategies to protect human health and the environment. A highly effective approach to pollution prevention, green chemistry applies innovative scientific solutions to real-world environmental situations, all through voluntary partnership programs. This innovative approach to pollution prevention through the environmentally conscious design of chemical products and processes is the central focus of EPA's Green Chemistry Program, an initiative under EPA's Design for the Environment Program.

### HOW WAS THE GREEN CHEMISTRY PROGRAM STARTED?

Shortly after the passage of the Pollution Prevention Act of 1990, EPA's Office of Pollution Prevention and Toxics (OPPT) began to explore the idea of developing new or improving existing chemical products and processes to make them less hazardous to

human health and the environment. In 1991, OPPT launched the model research grants program "Alternative Synthetic Pathways for Pollution Prevention". This program provided, for the first time, grants for research projects that included pollution prevention in the synthesis of chemicals. Since that time the Green Chemistry Program has built collaborations with many partners to promote pollution prevention through green chemistry. Partnering organizations represent academia, industry, other government agencies, and non-governmental organizations.

### WHAT IS EPA DOING TO PROMOTE GREEN CHEMISTRY?

The goal of EPA's Green Chemistry Program is to promote the research, development, and implementation of innovative chemical technologies that accomplish pollution prevention in both a scientifically sound and cost-effective manner. To accomplish its

goals, the Green Chemistry Program recognizes and supports chemical technologies that reduce or eliminate the use or generation of hazardous substances during the design, manufacture, and use of chemical products and processes. More specifically, the Green Chemistry Program supports fundamental research in the area of environmentally benign chemistry as well as a variety of educational activities, international initiatives, conferences and meetings, and green chemistry tools. The program is composed of four major program areas including green chemistry research, the Presidential Green Chemistry Challenge, green chemistry education, and scientific outreach.

## **GREEN CHEMISTRY RESEARCH**

EPA's Green Chemistry Program supports basic research in green chemistry in order to provide the chemical tools and methods necessary to design and develop products and processes that are more environmentally benign. In 1992, EPA awarded six grants to fund basic research projects that consider impacts to human health and the environment in the design of chemical syntheses. In 1992 and 1994, EPA's Office of Pollution Prevention and Toxics and Office of Research and Development, respectively, signed Memoranda of Understanding with the National Science Foundation (NSF) to jointly fund green chemistry research. These initial activities were the beginning of the establishment of a number of research opportunities that have, to date, awarded tens of millions of dollars in the form of grants for basic research in green chemistry. These opportunities include a number of industry/university/government consortia. In addition, EPA's Small Business Innovation Research Program (SBIR) includes green chemistry in its research grants solicitation, as does the EPA/NSF "Technologies for a Sustainable Environment" solicitation offered every 1-2 years.

## **PRESIDENTIAL GREEN CHEMISTRY CHALLENGE**

The Presidential Green Chemistry Challenge promotes pollution prevention and industrial ecology through an EPA Design for the Environment partnership with the chemical industry. Through high level recognition and support, the Presidential Green Chemistry Challenge promotes innovative developments in and uses of green chemistry for pollution prevention. The Presidential Green Chemistry Challenge recognizes outstanding accomplishments in green chemistry through an annual awards program; it also supports innovative research in green chemistry through the EPA/NSF "Technologies for a Sustainable Environment" solicitation. The green chemical technologies recognized and supported by the Presidential Green Chemistry Challenge are scientifically sound, are economically viable, and directly reduce risks to human health and the environment by reducing the hazards associated with the design, manufacture, and use of chemicals.

## **GREEN CHEMISTRY EDUCATION ACTIVITIES**

In order for green chemistry to be incorporated effectively into chemical product and process design, it first must be incorporated into the education system. For green chemistry to become widely adopted and practiced, chemists must be formally educated about green chemistry during both their academic and professional training. To accomplish this, EPA's Green Chemistry Program supports a variety of educational efforts that include the development of materials and courses to assist in the training of professional chemists in industry and education of students in academia. EPA's primary partner in these efforts is the American Chemical Society (ACS).

## **SCIENTIFIC OUTREACH**

In order for green chemistry to become standard practice in industry, academia, and government, EPA's Green Chemistry Program is working to communicate both the concept and the science at all levels of chemical education, to all sectors of industry, to decision- and policy-makers, and to the scientific community in general. EPA's Green Chemistry Program supports a number of outreach projects that include organizing and participating in prominent meetings and conferences, such as the National Green Chemistry and Engineering Conference and the Gordon Research Conference on Green Chemistry; publishing in scientific journals and books; and developing and disseminating computational tools and databases.

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