

A Proactive Approach to Toxic Chemicals: Moving Green Chemistry Beyond Alternatives in the “Safe Chemicals Act of 2010”

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On April 15, Senator Frank Lautenberg (D-NJ) introduced the “Safe Chemicals Act of 2010” in the United States Senate. On the same day, Representatives Henry Waxman (D-CA) and Bobby Rush (D-IL) released a discussion draft of a similar bill in the House. These bills present an important and much needed modernization to the management and regulation of chemical hazards in the United States.

The Toxic Substances Control Act (TSCA), the regulation designed to protect Americans and their environment from chemical hazards, has not had its core provisions significantly amended since its enactment in 1976. However, in recent years, there has been increased pressure on lawmakers to rethink the government’s approach to the hazards that arise

during the lifecycle of chemical production and use. There are several drivers for action on chemicals management legislation including (1) recent concerns on the part of nongovernmental organizations and the public about particular chemical hazards (BPA, phthalates, etc...), (2) strict state level chemical regulations, and (3) the enactment of a comprehensive chemical regulation program by the European Community known as Registration, Evaluation, Authorisation and Restriction of Chemical substances (REACH). Further, in 2009, EPA Administrator Lisa Jackson laid out the Obama Administration’s key priorities for TSCA reform (1). This was accompanied by similar proposals from industry and the NGO communities indicating a desire to update TSCA.

Many of the provisions included in the recently proposed legislation, such as shifting the burden of data provision from the EPA to industry, are widely supported. Other elements, such as what data should be provided, how chemicals will be prioritized, the scope of EPA’s authority to take action, and whether it is feasible to “prove” the safety of a chemical have emerged as topics for vigorous debate.

Among the many elements in the current bills, there is one provision, “Green Chemistry”, that has the potential, in the long term, to drastically change the paradigm of the chemical enterprise. Green chemistry, simply defined, is “the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances” (2). Based on 12 Principles (2), Green Chemistry is a systems-based approach for reduced hazard across the entire life cycle of chemicals, from design, manufacture, and use to end of life. It integrates knowledge from across chemistry, engineering, environmental science, and toxicology to reduce, and ideally, eliminate, adverse impacts on human health and the environment.

Both versions of the bill, picking up on Administrator Jackson’s call for green chemistry to be a core element in TSCA reform, explicitly mention the need to “spur innovation in green chemistry”. They address this with a series of proposals under the title of “Safer Alternatives and Green Chemistry and Engineering”. The programs included in this section are laudable. They would provide incentives for the creation of greener, less hazardous alternatives through research funding, expedited review processes, awards, labeling programs, and the creation of four national green chemistry and engineering research centers.

While these provisions are clear signals to the chemical enterprise representing a strong beginning for enhancing green chemistry innovation, there are additional activities and strategies that can and should be advanced. Green chemistry is about more than developing safer alternatives. It is fundamentally a series of guidelines to designing chemicals to reduce, and ideally eliminate, hazard. Green chemistry is a *preventive* approach based on innovation that improves technical performance, profits, and social benefit. It takes into account long-term, life-cycle thinking.

Green chemistry is at its most powerful as a tool for the development of the next generation of chemical innovations. For new chemicals and materials, it is much more efficient

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if they are as safe as possible from the outset, eliminating the need to develop alternatives in the future. If the principles of green chemistry were broadly implemented, both in the scientific research community and in industry, they would be a powerful, market-oriented, economically favorable approach to protecting human health and the environment from any potential adverse impacts before they could be manifested.

As discussion of these bills moves forward, stakeholders involved in the process should think more creatively about how the tools of green chemistry can be incorporated throughout the reformed TSCA regulatory process. This means thinking not just about alternatives to chemicals already in commerce, but also about ways to develop and disseminate the knowledge so that new innovations are progressively safer and greener. There are a variety of approaches that should be explored including:

1. Make use of the power of public reporting, and familiarize firms with including Green Chemistry Principles and accounting in their statements:
 - a. Grant the EPA the authority to include green chemistry metrics in the data that it can require manufacturers to submit as part of their data sets. This could include information such as E-factor (a measure of the efficiency of production), use or generation of hazardous substances based on those chemicals currently listed, and use of renewable energy or material feedstocks.
 - b. Have the EPA work with NGOs, academia, and industry to create a template for a green chemistry "scorecard" for chemicals and mixtures. Provide incentives for manufacturers who voluntarily submit green chemistry "scorecards" on their products.
 - c. Make green chemistry information on chemicals publicly available, to spur public awareness and empower consumers.
2. Take advantage of the large quantity of data that will be submitted to develop new tools to make it easier for firms to incorporate green chemistry in their processes:
 - a. Environmental and toxicological data on existing chemicals could be used to help develop tools, such as molecular design guidelines, that would allow

chemical firms to more easily integrate green chemistry into their product development.

3. Support forward-looking research and innovation:
 - a. Extend research support beyond existing alternatives identification to include development of new chemical products and processes; also identify key challenges and emerging technologies as priority areas for investment in Green Chemistry and Engineering (GC&E) research
4. Foster collaborations:
 - a. Create programs that allow the government to incentivize collaboration between industry and academia to develop and implement GC&E based technologies.
 - b. Establish an interagency green chemistry forum to identify and prioritize key areas of GC&E R&D, and mechanisms for integration into various agency programs.

These are just a few of the ways green chemistry could be integrated into a reformed TSCA in a more holistic manner. Green chemistry does not need to be a separate program, but can be woven in throughout the regulation. Instead of relying on a reactive approach, a reformed TSCA presents the opportunity to simultaneously foster a proactive approach. According to both of the proposed bills, the policy of the United States will be "to protect the health of children, workers, consumers, and the public, and to protect the environment from adverse effects of exposures to chemicals" (3). If it is included more broadly throughout this regulatory framework, green chemistry can play an important role in creating a trajectory of chemical innovation that reduces hazards from the outset, which is the most effective and efficient way to protect Americans and their environment.

Literature Cited

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- (3) "Safe Chemicals Act of 2010." United States Senate, 111th Congress, S.3209, Sec. 32, 2010.

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