

“Green” Chemistry – the Building Blocks of Sustainable Development



John Warner — President, Chief Technology Officer of the Warner Babcock Institute for Green Chemistry. Dr. Warner has published nearly 200 patents papers and books and is considered one of the founders of the field of Green Chemistry

Why do we need “green” chemistry?

One of the most startling realizations is that there are many professions—doctors, lawyers, nurses, teachers, architects, engineers – that at least in the U.S. and in most parts of the world require some kind of licensing, require some kind of certificate from the government that says that you know how to do something safely. For example, an electrician: he could not enter your house and change a light ball unless he had a document from the government saying that he has been appropriately trained and he knows how to do it safely. For some strange reason chemistry has evolved that the only people in the world who are capable of making a new molecule that has never existed ever before never had any trainings or any requirements of training of toxins’ environmental impact.

Every chemist on the planet when he goes to the lab can potentially make a neurotoxin, carcinogen or some other kind of highly toxic material, and yet no education on how to identify and avoid making hazardous materials was ever required in his education or training. I found that shocking as I developed as a chemist. “Green” chemistry is the correction of that education failure. We need to make sure we’ve covered the issues related to toxins and their environmental impact. It should shock you that chemists are not taught even the most basic information about what makes a molecule toxic and how to avoid it.

How government supports “green” chemistry?

The thing is that the industry itself is promoting “green” chemistry. The world has changed in the last decade in that consumers are demanding sustainability, whatever form they consider it to be. Companies are demanding to make sustainable products. Yet, the scientists that are working for these companies have no training. So, any organizations that can learn the principles of “green” chemistry not only do an ethical and moral component of taking care of the environment but also have an incredible competitive advantage. Because if nobody else is going to school to learn this and all the companies are struggling; anyone who does learn these skills and incorporates them in their products will have a massive competitive advantage.

Are there any governmental programs in the U.S. purported to stimulate the development of “green” chemistry?

There are two ways of looking at governmental impact. Remember, “green” chemistry is the science of the sustainable solutions. It is the science of invention; it is the science of innovation. It’s very difficult to government to tell people work smarter. However, the other side – chemical policy which is not “green” chemistry, but when the governments ban hazardous materials or impose regulations, they are indirectly promoting the development of a safer alternative. But that’s not really a “green” chemistry.

What the government isn’t doing yet is coming up with ways to stimulate education in developing “green” chemistry technologies, at least not in the United States. In India the government is in the process of mandating that all chemistry students take a one year course in “green” chemistry. And it’s been piloted in Delhi. In China they’ve opened up something like 15 national research labs just to do “green” chemistry.

It’s kind of funny; In the United States if an academic wants to get research funded he must have the word “nanotechnology” in the title of their grant. United States have overwhelming amount of money

supporting this concept called “nanotechnology”. Every college, every university has nanotechnology program not necessarily because scientists think it’s a wonderful thing but because the federal government has allocated over 10 billion dollars to do that. If the government allocated a similar amount of money into “green” chemistry you would find every university and every college now would have had a program in that.

Is this situation going to change in the future?

I’m hopeful. I believe that it’s going in the right direction. I think that for the last 30 years government policy has been focusing just on the demand side: coming up with laws and regulations of what not to do. The revolution of “green” chemistry is that instead of the government saying what not

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to do, how about scientists saying what to do? Instead of looking at the demand, how about the supply? It is my belief that a regulation cannot possibly work until an alternative has been invented. If an alternative isn't invented, then the government regulation must necessarily fail because the companies must hire lawyer to fight it. But if invention exists then the government regulations will succeed because it will just mandate the adoption of the alternative technology.

To be clear, I am not saying these regulations are bad or unnecessary, I am just saying they are not enough. Some people historically think that the regulations force companies to be innovative and to create alternative technologies when in fact it isn't true. Regulations often force the industry to

bioavailability the dosage is much smaller, you've got less getting out into the environment. That's one example. Another example is a hair coloring system. It is believed that one of the most significant causes of bladder cancer in the U.S. population and, probably, global, is hair pigment that is very toxic. We've invented a hair coloring system that is environmentally benign and non toxic. Another technology is cleaning solutions for silicon wafers. In the microelectronic industry they use some hazardous reagents to strip the photopolymers in silicon wafers. We've invented a technology that has non-toxic components to that. It just goes on and on. There is a dozen things that we working at right now.

The point of "green" chemistry is that "green" chemistry isn't an

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hire lawyers to fight the regulations. If industry already has alternative technology regulations then can help support mandating of that technology, the incorporation of it. That's where government and industry go hand in hand to support innovations that are going to supply the alternatives.

What are the latest technological trends in "green" chemistry?

In general I would say bio-based alternative is our huge trend. That's definitely a megatrend for a variety of reasons. Bio based polymers, bio based materials – that's one big trend. Another big trend is bio catalysis, new synthetic transformations based on catalysis. And I would say a third trend is continuous flow reaction chemistry to move away from batch processes. If I had to pick up three things going on in chemistry I would choose these three.

What are the most interest and promising projects your institute is involved into?

We have a number of projects going on at our institute. One of them is the increasing oral bioavailability of the Parkinson disease drug. By coming up with a technology to increase oral

application. It's the science behind the application. People consider solar energy to be a sustainable technology. But you could make a solar panel with hazardous reagents and a lot of energy. So, ironically, is the solar panel really sustainable if you are creating pollution while making it? Same thing is with water filtration. Many water filtration membranes are manufactured of hazardous materials. They create more water pollution than membrane is going to actually remove. So, "green" chemistry isn't about the application. It's about the fundamental building blocks. Whether you are making a pharmaceutical, a cosmetic or an electronic component, if the building blocks are sustainable, one can assume that the product will be sustainable.

INNONEWS

Games Innovation Conference 2010 (GIC2010), Hong Kong

Following the success of the inaugural conference in London last year, the IEEE Consumer Electronics Society announced the 2nd International IEEE Games Innovation Conference 2010 (GIC 2010).

The conference aims to be a platform for innovative research in game design and technologies and to focus on the multi-disciplinary aspects of the subject and make it more accessible to researchers and practitioners from different disciplines in academia and industry.

Special timing of our 2010 conference (21st-23rd December) is chosen to bring GIC 2010 together with the Asia Game Show 2010 held in Hong Kong between 24-27th December 2010. It is also important to note that SIGGRAPH Asia 2010 is in Seoul between 15-18th December 2010. These events provide a unique opportunity for having the biggest names and events of the year around the same time in the same area.

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RTS Stock Exchange wins FOW Awards for best innovations in Eastern Europe

The winners of the FOW Awards for Innovation 2010 were announced on December 1, 2010 at the close of FOW's Derivatives World conference in London.

RTS Stock Exchange won two FOW Awards for Innovation 2010:

Best innovation by an exchange in the field of product design – Eastern Europe

RTS Standard Index Futures

Best innovation by an exchange in the field of customer service – Eastern Europe

RTS unified settlement on FORTS and RTS Standard

A futures contract on the RTS Standard Index started trading on FORTS, the derivatives market of RTS, on February 15, 2010. The RTS Standard Index is made up from 15 blue chips of the Russian cash equity market and is used as the underlying asset for the futures contract. The contract gives the opportunity to buy a portfolio composed of the 15 most liquid instruments of the Russian cash equity market through one trade. As a result, transactions are more cost-efficient and show maximum results compared to usage of these assets separately

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