Greenlist Bulletin

From the Toxics Use Reduction Institute at the University of Massachusetts Lowell

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DfE alternatives assessment for nonylphenol ethoxylates

Source: USEPA, May 2012

The U.S. Environmental Protection Agency has released the final report on alternatives to nonylphenol ethoxylates (NPEs) through the Design for the Environment (DfE) Alternatives Assessment Program. NPEs are widely used surfactants with a range of industrial applications and are commonly found in consumer products, such as laundry detergents. When released into the environment, they can be persistent and highly toxic to aquatic organisms. The report identifies eight safer alternatives to NPEs that meet EPA's criteria for safer surfactants.

The report provides information on the availability of safer alternatives, DfE's hazard evaluation method for surfactants, and the progress being made in adopting safer surfactants. Using rigorous hazard-based criteria, EPA evaluated hundreds of chemicals for their biodegradability and their potential effects to aquatic organisms.

DfE's Alternatives Assessment Program helps industries choose safer chemicals and offers a basis for informed decision-making by providing a detailed comparison of the potential human health and environmental effects of chemical alternatives. To date, the DfE program has labeled more than 2,700 safer products, including detergents that contain only safer surfactants and other chemicals. All companies participating in the DfE Safer Detergents Stewardship Initiative have eliminated NPEs from their product lines to meet DfE criteria.

More information on the DfE Alternatives Assessment Program and the NPEs Report:
http://www.epa.gov/dfe/pubs/projects/npe/index.htm

Download the report

Using graphene, scientists develop a less toxic way to rust-proof steel

Source: SUNY Buffalo, May 18, 2012

University at Buffalo researchers are making significant progress on rust-proofing steel using a graphene-based composite that could serve as a nontoxic alternative to coatings that contain hexavalent chromium, a probable carcinogen.

In the scientists' first experiments, pieces of steel coated with the high-tech varnish remained rust-free for only a few days when immersed continuously in saltwater, an environment that accelerates corrosion.

By adjusting the concentration and dispersion of graphene within the composite, the researchers increased to about a month the amount of time the treated steel can survive in brine. (Because brine is an extremely harsh environment, the coated steel's survival time in the real-world would be many times longer.)

The UB chemists leading the project are Sarbajit Banerjee, PhD, an assistant professor, and Robert Dennis, a PhD student. Their next step is to use a $50,000 grant from the New York State Pollution Prevention Institute to enhance the graphene composite's lasting power, as well as the quality of its finish.

Tata Steel, an international company that has provided past funding for Banerjee's projects, has been helping the scientists test larger sample sizes, Banerjee said.

Bringing the coating to the market could not only benefit public health, but also save jobs, said Dennis and Banerjee.

"Our product can be made to work with the existing hardware of many factories that specialize in chrome electroplating, including job shops in Western New York that grew around Bethlehem Steel," Banerjee said. "This could give factories a chance to reinvent themselves in a healthy way in a regulatory environment that is growing increasingly harsh when it comes to chromium pollution."

Graphene, the thinnest and strongest material known to man, consists of a single layer of carbon atoms linked in a honeycomb-like arrangement.

The material's hydrophobic and conductive properties may help prevent corrosion, repelling water and stunting electro-chemical reactions that transform iron into iron oxide, or rust, Banerjee said.

UB's Office of Science, Technology Transfer and Economic Outreach (STOR) has submitted a provisional patent application to protect the coating Banerjee and Dennis are refining. As sponsors of the research and due to inventive contribution by Tata employees, Tata Steel also has certain rights to the technology.

Read more

The impacts of endocrine disrupters on wildlife, people and their environments: the Weybridge +15 (1996-2011) report

Source: European Environment Agency, May 2012

Rates of endocrine diseases and disorders, such as some reproductive and developmental harm in human populations, have changed in line with the growth of the chemical industry, leading to concerns that these factors may be linked.

For example, the current status of semen quality in the few European countries where studies have been systematically conducted, is very poor: fertility in approximately 40 % of men is impaired. There is also evidence of reproductive and developmental harm linked to impairments in endocrine function in a number of wildlife species, particularly in environments that are contaminated by cocktails of chemicals that are in everyday use.

Based on the human and wildlife evidence, many scientists are concerned about chemical pollutants being able to interfere with the normal functioning of hormones, so-called endocrine-

disrupting chemicals (EDCs), that could play a causative role in these diseases and disorders. If this holds true, then these 'early warnings' signal a failure in environmental protection that should be addressed.

In the 1996 Weybridge meeting on EDCs ('European Workshop on the Impact of Endocrine Disrupters on Human Health and Wildlife', European Environmental Agency (EEA)/Directorate-General for Research, 1996), the problem of endocrine disrupters was first comprehensively discussed by both European and United States regulatory authorities. Since then, substantial European Union (EU) funds (i.e. over EUR 150 million spent until 2011 have been allocated to research into endocrine disrupters and their effects, and the World Health Organization (WHO) and the Organisation for Economic Co-operation and Development (OECD) have addressed the problem in many ways. At the Weybridge meeting in 1996, much focus was placed on oestrogenic compounds, and especially on receptor-mediated effects. Scientific progress over the last decade or so has expanded the scope considerably: it includes EDCs that affect other hormone systems, e.g. the thyroid; EDCs with new modes of action, e.g. inhibitors of endogenous hormone production or metabolism; and target tissues for EDCs other than those in the reproductive system, such as the brain and cardiovascular system.

The Weybridge+10 workshop (Academy of Finland, European Commission's Directorate-General for Research and EEA, 2006) aimed to evaluate the impacts of this extensive research and to determine future goals in the areas of human and wildlife health effects, mechanisms of biological actions and models, exposures, risks, and policy options. Invited participants came from 18 European countries plus Israel, Japan and the USA, with representation from 41 Europe-funded projects related to EDCs.

Download the report

Common fungicide wreaks havoc on freshwater ecosystems

Source: University of South Florida, May 16, 2012

Chlorothalonil, one of the world's most common fungicides used pervasively on food crops and golf courses, was lethal to a wide variety of freshwater organisms in a new study, University of South Florida researchers said Wednesday.

Biologists Taegan McMahon and Jason Rohr, co-authors of the study published in the journal *Ecology Letters*, report that chlorothalonil killed amphibians, snails, zooplankton, algae, and aquatic plants below estimated environmental concentrations previously deemed safe by the U.S. Environmental Protection Agency. The loss of these herbivores and plants freed the algae from predation and competition, which eventually resulted in algal blooms that were similar to the effects of eutrophication.

"Some species were able to recover from the chemical assault, but the ecosystem was fundamentally changed after its exposure to chlorothalonil," Rohr said.

The four-week study was conducted in a series of 300-gallon tanks used to mimic pond conditions. It follows a 2011 laboratory study conducted by McMahon and Rohr that found that ecologically-relevant concentrations of chlorothalonil killed four species of amphibians.

"Although our new study is the only reported community- and ecosystem-level experiment on chlorothalonil, our results are consistent with several direct toxicity studies conducted in the laboratory and with observations in the field," McMahon said.

Chlorothalonil kills molds and fungus by disrupting cellular respiration, an essential process for most multicellular organisms on the planet. Like the infamous DDT, chlorothalonil is a member of the organochlorine chemical family.

Fifty years after the book "Silent Spring" led to a ban on most forms of the pesticide DDT, chlorothalonil is one of a few organochlorine pesticides still registered for use in the U.S., Europe and Australia.

"In addition, to reducing biodiversity and altering ecosystem functions, chlorothalonil reduced the decomposition of waste, an important service that freshwater ecosystems provide to humans," McMahon added.

"Interest in the relationship between biodiversity and ecosystem functions stems at least partly from the concern that anthropogenically-driven declines in biodiversity will reduce or alter the benefits offered by ecosystems," Rohr said. "Surprisingly, however, this is one of the first studies to actually manipulate an anthropogenic factor and link it to changes in ecosystem functions mediated by declines in biodiversity."

"This is important because many species in ecosystems might contribute little to ecosystem functions or are functionally redundant with other species, and thus declines in biodiversity do not always affect the functions and services of ecosystems," Rohr said.

McMahon and Rohr encourage further research on effects of anthropogenic factors on ecosystem functions in systems with complex food webs and the re-evaluation of the safety of chlorothalonil.

Improved lubrication without oil

Source: Fraunhofer Institute, May 18, 2012

Metalworking plays a key role in industry. Drilling, milling, turning and grinding operations all use lubricants to prevent work pieces and tools from overheating and from excess wear. Standard lubricants today are based on mineral oil. This has drawbacks: fossil mineral oils come from finite resources, transport relatively little heat away from the work piece, are harmful to health and are flammable. All of this calls for extreme technical efforts, for occupational safety, fire safety and disposal, for example. So there's a need for alternative lubricants.

The idea hatched by Andreas Malberg, Dr. Peter Eisner and Dr. Michael Menner from the Fraunhofer Institute for Process Engineering and Packaging IVV in Freising sounds simple as well as surprising: lubricate with water, not oil. "At IVV here in Freising, we have been looking at the issue of cooling lubricants for some considerable time", explains Michael Menner. "In two projects supported by the Federal Ministry of Education and Research, we have successfully replaced oil with water. One surprising thing we found was that water is no worse a lubricant than oil, the key to it all being the additives." Adding natural polymers to water can dramatically improve its lubricating properties. The Freising-based researchers set about testing renewable raw materials such as celluloses, starches or bacterial polysaccharides and improving their use as lubricant additives.
Their aim: to make water more viscous by adding biopolymers, so it lubricates better.

For the idea to become a marketable product, other partners were brought on board: the Institute for Machine Tool Engineering and Production Technology at the University of Braunschweig, and Carl Bechem GmbH - a lubricant manufacturer from Hagen, Germany. The basic fluid made by the IVV, the viscous water, was improved by adding water-soluble additives so it could be used as an anti-corrosion agent, for example. That's how it meets the requirements during processing: withstanding high temperatures and shearing stresses.

In addition to the significantly lower impact on the environment and the high raw material efficiency, the new lubricant also offers technological benefits. It reduces wear and prolongs tool life, for example. The processed components are also easier to clean. This cuts costs and improves the cost-efficiency of the entire production process. Converting to the new lubricant is very easy for companies to carry out", explains Peter Eisner. "In principle, once thoroughly cleaned, the same machine tool circulation systems can be used." In addition, the use of the aqueous lubricant improves occupational health and safety and hygiene: no formation of oil mists, addition of fewer biocides, it smells better and is gentler on the skin.

For the mineral oil-free lubricant made of aqueous biopolymer solutions for use in metalworking applications, Dr. Peter Eisner, Dipl.-Ing. Andreas Malberg and Dr. Michael Menner will receive one of the 2012 Joseph-von-Fraunhofer awards. The newly developed lubricant is already being distributed by Carl Bechem GmbH under the product name of BERUFLUID and is in use in various metalworking companies in the manufacturing of tools, mechanical engineering, in the automotive and aviation industry and in medical technology.

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