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Will the EU’s REACH serve researchers’ needs?

A new European chemicals law will generate $13 billion worth of data, but not everyone is sure the database will be a treasure trove for researchers.

Europe’s new chemicals law, REACH (Registration, Evaluation, and Authorisation of Chemicals), will put about $13 billion worth of data on 30,000 substances onto a searchable database made available at no cost on the Internet. It sounds like a dream come true for researchers wanting to design new compounds free of the structures that cause human health hazards. But lack of funding for basic research and concerns about the competence of toxicity tests have dampened expectations among some scientists.

Due to be implemented in June, REACH puts the onus on companies to prove that their substances are safe to use. Companies must submit data to the European Chemicals Agency (ECHA) on individual chemicals manufactured or imported in quantities greater than 1 tonne per year (t/yr).

For the smallest range, 1–10 t/yr, companies need only submit limited information, such as the physical and chemical properties of the substance. For the largest range, more than 1000 t/yr, facilities will have to provide extensive tests on endpoints such as reproductive and neurological toxicity. The industry’s price tag for all of these tests will amount to about €10 billion ($13 billion), says Lothar Lissner, an industrial hygienist at the free Hanseatic city of Hamburg.

Company officials will submit the data via IUCLID5, a software program maintained by the European Chemicals Bureau. IUCLID5 creates a searchable database, says Jukka Ahtiainen, a senior researcher at the Finnish Environment Institute, and nonconfidential information, such toxicological study results, will be available on the ECHA website. However, the raw data that went into the studies will be viewed only by the agency staff, unless industry voluntarily shares them.

REACH will invigorate the growing field of in silico toxicology, the use of computer models to predict the health and environmental impacts of new chemicals, says Dave Eastmond, a toxicologist at the University of California, Riverside. The new information on thousands of chemicals will allow scientists to look for patterns that relate certain chemical structures to biological outcomes, such as cancer and skin disease, or ecological effects. “This will improve the quality of existing databases,” Eastmond says, including those with proprietary information, as well as public databases. It’ll also improve researchers’ ability to predict the behavior of new substances, he adds.

In addition to screening out bad players, the databases strengthened by REACH will be a boon to “green” chemists wanting to design new substances that work well but don’t interact with the human endocrine or neurological systems or cross the placental membrane, says Joel Tickner, an environmental health scientist at the University of California, Berkeley. The extensive testing required by REACH will spur research on new, rapid, less expensive tests for toxicity, says Joel Tickner, an environmental health scientist at the
Yet, data made available via REACH will not be perfect, other researchers point out. The databases are being designed for regulatory purposes, which may not best serve the needs of green chemists, says Paul Anastas, a synthetic organic chemist at Yale University. “For instance, the types of chemicals providing data for REACH, such as paints, plastics, and pigments, don’t necessarily represent the scope of chemical structures we need to be concerned about,” Anastas says. And the data represent a snapshot of what exists today rather than including new scientifically designed models that inform design protocols for the substances of tomorrow, he says. Research organizations like the the U.S. National Institute of Environmental Health Sciences ought to be the ones promoting basic research and creating databases to inform molecular design for safe chemicals, he says.

John Warner, a synthetic organic chemist at the University of Massachusetts, says REACH will be effective at pushing companies to select safer alternatives that are already on the market. But for the many reagents and solvents that have no safe alternatives, safe molecules must be designed, and REACH is not structured to promote the design work, Warner says.

Better testing on the impacts of substances is key to getting reliable and useful information out of REACH data, but little is being done to improve current methods, says Bernard Goldstein, a toxicologist at the University of Pittsburgh. Current tests, especially for neurological, reproductive, and developmental hazards, are not especially competent at picking up problematic chemicals. “As part of a strategic approach to chemicals, we would want to invest at least some of those funds into improving the test batteries that we have, and I don’t see that happening,” he says.

In the U.S., the government has yet to realize the benefits of green chemistry, granting only $1 million annually in research funds, Tickner says. However, a green chemistry research and development act passed in the House last year is likely to be reintroduced this year and would boost funding to $75 million per year, he says. — Janet Pelley