Nano coalition unveils environmental, health and safety database

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The International Council on Nanotechnology (ICON) and Rice University's Center for Biological and Environmental Nanotechnology (CBEN) today launched the world's first online database of scientific findings related to the benefits and risks of nanotechnology. The database can be accessed at icon.rice.edu/research.cfm .

This environmental health and safety (EHS) database marks the first effort to integrate the vast and diverse scientific literature on the impacts of nanoparticles, which are tiny pieces of matter with dimensions measuring between 1 and 100 nanometers and containing between tens and thousands of atoms. (One nanometer is one-billionth of a meter or approximately 60,000 times smaller than the width of a human hair.) The database is the result of the collected efforts of Rice researchers, the chemical industry and the U.S. Department of Energy. This database will be updated and enhanced over the next year.

Many nanoparticles exhibit unique chemical, electrical, optical and physical properties by virtue of their size, shape or surface characteristics. The great diversity of nanoparticle types that have already been created has made it difficult for scientists to make general statements about the potential safety hazards that nanoparticles might pose to living organisms. This problem is exacerbated by the limited scientific data on the topic. While there is a significant body of research on the impacts of incidental nanoparticles -- a class of particles that are the unintentional byproduct of another process, such as combustion, and are often referred to as ultrafine particles -- the specific effects of only a

few engineered nanomaterials have been studied. This shortfall in scientific knowledge is beginning to be addressed through targeted research funding programs and other initiatives. However, nanotechnology's breadth poses unique challenges in this regard, and knowing which questions new research monies should be targeted toward requires an understanding of what is already known.

"An informed decision about how to ensure the safety of nanomaterials requires a comprehensive review of where we are and where we've been with prior research," said Dr. Jack Solomon, chairman of the Chemical Industry Vision2020 Technology Partnership. "By gathering findings that are scattered throughout the literatures of biomedical application developers, toxicologists, environmental engineers and nanomaterials scientists, we are helping researchers and government funding agencies to see the big picture."

This need to collect currently available knowledge on EHS issues of nanoscale materials was recognized by the Environmental Safety and Health working group of the National Nanotechnology Initiative - Chemical Industry Consultative Board for Advancing Nanotechnology (NNI-ChI CBAN). The NNI-ChI CBAN working group (which includes EHS specialists at several chemical companies, Rice faculty fellow Dr. Kristen Kulinowski and contacts from multiple government agencies) commissioned Dr. Tim Borges and Ms. LeeAnn Wilson at Oak Ridge National Laboratory to begin compiling a database through a Chemicals Plus project of the Industrial Technologies Program of the Department of Energy's Office of Energy Efficiency and Renewable Energy. Researchers at Rice helped analyze the material and make the findings Web-accessible and will maintain the database.

In addition to standard search terms such as author, year and keywords, papers in the database will be able to be sorted according to the type of particle and the type of experiment -- whether it measured a hazard or

the potential for exposure, for instance. In addition, users can find out whether the nanoparticle was intentionally engineered or is the incidental byproduct of another process, like the ultrafine particles that result from combustion of diesel fuel. These functions will be added to the database in the next few months. For now, the database archives articles that have appeared in peer-reviewed scientific journals. In the future, a separate archive of policy reports and commentaries on key papers in the field will be established.

The next phase of the project involves organizing the information within the database and providing analyses that are accessible to both nontechnical audiences and the research community.

"There is tremendous added value in structuring the database so that anyone with a Web browser, regardless of their level of scientific training, can grasp the current state of scientific understanding regarding this rapidly-evolving field," stated Kristen Kulinowski, executive director of CBEN and of ICON. "One of ICON's goals is to provide people with the best information available. Anyone wishing to investigate the current state of knowledge regarding the health and environmental implications of nanomaterials will be able to do so on this Web site."

The freely available database is maintained by ICON as a public service. ICON, a coalition of academic, industrial, governmental and civil society organizations, is administered by CBEN.