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New Rules Expected on Safety of Nanotechnology Products

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DuPont and Environmental Defense, one of the nation's largest environmental groups, plan to release jointly developed guidelines today for evaluating the safety and environmental risks of nanotechnology products.

The guidelines are the most extensive effort yet to address a vexing issue surrounding the rapidly expanding field of nanotechnology: the lack of information about whether materials in such minute sizes can pose novel or unexpected hazards.

Nanotechnology usually refers to materials with at least one dimension measured at 100 nanometers or less (a nanometer is one-billionth of a meter), a scale so small that the behavior of individual molecules begins to affect how the material performs. While particles of soot and other materials occur naturally on a nanoscale, businesses are now exploiting a recent explosion in the number of tools available to engineer nanoscale products.

In doing so, they have shown that familiar materials sometimes have astonishing strength, flexibility, reactivity or other useful characteristics when manipulated in tiny dimensions. Hundreds of products, including stain-resistant clothing and textiles, advanced microchips and clear sunscreens already incorporate such technology.

Technology skeptics have contended that some innovations are being deployed with too little attention to potential negative consequences.

Scattered laboratory research programs have suggested that nanoscale particles can lodge in the brain, lungs and other organs, although the effects of that are not known. Tests also show that some may be toxic to plants and other organisms.

Products are being invented much faster than toxicologists can fully test and describe all of their potential effects. "For example, there's virtually no information on nanocomposites in the literature," said David B. Warheit, the leader of DuPont's basic research

on nanotechnology toxicology, referring to products where nanoscale materials are embedded in plastics and other polymers to improve their performance.

Mr. Warheit said he had no reason to expect that the new polymers posed hazards because of the nanotechnology, in part because, in materials that DuPont tested, even incineration did not create nanoscale polymer particles that could be inhaled. “But that’s just a hypothesis,” he said.

DuPont and Environmental Defense, which was supported financially in part by the federal Environmental Protection Agency, began working on the guidelines in September 2005.

The 87-page document includes three examples of how DuPont applied the framework. One is a case study of titanium dioxide particles that DuPont is about to blend into plastics to protect them against ultraviolet light; another looks at how the company handles carbon nanotubes that it is researching but has not put into any products. A third is a study of nanoscale iron compounds that have been promoted as a novel way of cleaning up polluted water supplies. According to DuPont, the compounds have so many unknown risks that the company will not use them.

The framework’s creators and many other nanotechnology experts said the processes outlined might be too complicated and expensive for some small companies and start-ups. Some environmental and labor groups that turned down efforts to help develop the framework see more fundamental flaws.

“It’s voluntary and we think it will only delay what’s really needed, government regulation and a wider debate,” said Hope Shand, research director for the ETC Group, which has called for a moratorium on the commercialization of nanotechnology.