TGA Input into BN10000326 - Ministerial Brief on the use and topical issues concerning nanomaterials

Date: 26 February 2010

Background: Nanosilver

Silver is known to be effective in killing a wide range of bacteria. This behaviour is attributed to the silver ions (positively charged silver atoms).

Nanosilver is used in a range of products such as coatings on medical devices to reduce infection rates, coatings on artificial joints and pacemakers to prevent deadly microbial growths, and coating of ceramic filters for water purification. However, most products that use nanosilver are household items where the nanosilver provides an antibacterial function to keep surfaces clean or to reduce odours.

Silver nanoparticles are one of the fastest growing product categories using nanotechnology. The greatest growth is in consumer products, some of which are available in Australia.

Nanotechnology allows silver to be incorporated into fabrics, plastics and onto surfaces for self-cleaning applications.

Following exposure to relatively high oral or dermal doses of silver colloids, humans can develop skin discoloration. However, the main concern with nanosilver is the environmental risk, particularly if significant amounts are dispersed into the environment.

The Australian Government is aware of, and in some cases are supporting, further research and analysis to provide a robust evidence base from which to make further decisions on the use and management of nanomaterials, such as nanosilver.

The Australian Government's activities include a program of work to examine the potential environmental, health and safety impacts of nanotechnology. This work includes:

- Commissioning a review of the literature on the environmental fate of nanoparticles including nanosilver. (*Dept of the Environment, Water, Heritage and the Arts, see p2 Background*)
- Commissioning research to determine the partitioning of both metallic and carbon-based nanoparticulates, including nanosilver in a representative number of Australian soils and in soils exposed to urban waste streams. (*Dept of the Environment, Water, Heritage and the Arts*)
- Participating in the OECD program at the level of Co-sponsor to test the human health and environmental safety effects of a number of nanomaterials. Australia has a particular interest in nanosilver. (*NICNAS & CSIRO*)
- Colloidal silver was apparently sprayed on surfaces of the Hong Kong underground transport system as a public health measure. A colloid may or may not be a nanoparticle with its size ranging from 1nm to 1,000nm.

- Government officials are unaware of any nanosilver in use on any public transport systems in Australia at this time.
- Questions about whitegoods (and other consumer products not regulated by APVMA, FSANZ, and TGA) should be directed to the ACCC, which is responsible for product safety, and NICNAS, which assists with technical advice on specific industrial chemicals.

Topical issues relating to nanosilver

1. Issue
Will the silver ions released from nanosilver cause human health or environmental health impacts?

If enough silver is consumed, the silver can be deposited under the skin and turn it to a blue-gray colour (called 'argyria'), and this is considered the main human toxicity associated with silver.

On the other hand, nanosilver is being engineered to release silver ions, which are toxic to bacteria. Some products, such as washing machines that feature silver as a cleaning agent, are designed to release silver into the wash and hence the environment; other products, such as self-deodorising socks, contain nanosilver impregnated into the fabric. In this case, the nanosilver is not designed to leach out, but some studies have shown that nanosilver can indeed be washed out of these articles.

There is an increased risk of environmental impacts from nanosilver if substantial releases of the nanomaterial occur as the use of products containing nanosilver becomes more widespread. Internationally, levels of conventional silver emissions have peaked in the past, and the characteristic was for a halo of silver contamination to surround domestic waste treatment plants. This is not a current problem, but total silver emissions will need to be monitored as the nanosilver applications grow.

********CONFIDENTIAL*******

The Department of the Environment, Heritage and the Arts indicated their plan to publish in 2009 a report on the fate of nanomaterials in the environment with a focus on interactions with water and soil (the report is currently awaiting clearance). It notes that although laboratory results show toxicity to algae and fish species from metal oxide nanoparticles, there is limited data on the impact of nanoparticles in the natural environment. The interaction with the soil and water will greatly influence the threat to the environment of metal oxides and this will have to be established on a case-by-case basis.

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2. Issue

Can we identify and manage any new risks from nanosilver?

Nanosilver poses questions common across nanomaterials. How does size, shape, charge state, etc alter its toxicity. Combined with unknown levels of exposure, this equates to an uncertain risk. The Australian Government is working closely with national and international partners to ensure that the regulatory requirements are sufficiently robust to manage any risks posed by nanomaterials.

Response

The Government is assessing and addressing risks from nanosilver as follows:

1. Australia is participating in the OECD program plans to test nanomaterials for their physical-chemical properties; environmental degradation and accumulation; environmental toxicology; and mammalian toxicology. Australia has agreed to participate in testing nanosilver as part of this program.

2. Following up from the report on environmental fate of nanoparticles, the Department of the Environment, Heritage and the Arts has now commissioned a research study to determine the partitioning of both metallic and carbon-based nanoparticulates, namely nanosilver, cerium oxide, fullerene and carbon nanotubes in a representative number of Australian soils and in soils exposed to urban waste streams.

3. Safe Work Australia, within the Department of Education, Employment, and Workplace Relations, conducted a review of organisations using nanomaterials from data available in the public domain. They identified eight universities working with nanosilver and five companies.

4. The National Industrial Chemical Assessment and Notification Scheme (NICNAS) located within the Department of Health and Ageing, conducted a voluntary call for information on the use of nanoparticles in the commercial sector during 2005-06. No usage of nanosilver was recorded.

5. Agencies are conducting further workplace and company surveys currently to update data in this area.