Risks of nanomaterials under the microscope

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Nanotechnology is continually increasing in terms of research, economic and social significance. However, working with synthetic nanomaterials also conceals risks. Empa has produced a study for the Federal Office for the Environment (Bundesamt für Umwelt, BAFU) in order to clarify whether special regulations should be incorporated into the Federal Hazardous Incident Ordinance with regard to human and ecotoxicity. The conclusion, based on present knowledge, was this: At present, the safety measures for chemicals are also sufficient for synthetic nanomaterials.

Synthetic nanomaterials are already manufactured and processed in Switzerland in various plants. It is therefore essential that, as well as identifying opportunities, potential risks to humans and the environment are detected at an early stage and, if necessary, appropriate preventative measures are implemented. Within the scope of the federal government's action plan to establish principles for safe nano-technology, Empa evaluated whether special regulations need to be incorporated into the

Hazardous Incident Ordinance, on account of the potential danger and various hazardous incident scenarios.

The objective of the Hazardous Incident Ordinance is to protect the population and the environment from serious damage caused by extraordinary events. To this end, researchers visited the Empa "Technology and Society" and "Materials Biology Interactions" departments of several companies that process synthetic nanomaterials, analysed data from human toxicological and ecotoxicological studies and backed up their findings with their own experience and experiments in the field of nanotechnology. The report entitled, "Human and Ecotoxicity of Synthetic Nanomaterials – Initial Insights for Major Accident Prevention" has now been published by BAFU.

Tried and tested methods still sufficient

The document, approximately 40 pages in length, analyses various synthetic nanomaterials and summarises the various international guidelines and research findings. In Switzerland, according to an initial finding from the study, the manufactured and processed quantities of synthetic nanomaterials are small. The existing safety measures in place within the chemical industry are also sufficient for synthetic nanomaterials and, according to the report, additional protective measures for nanomaterials are not necessary. Risks when working with nanomaterials in powder form could, for example, be minimised through safety measures in place when working with standard dusts. However, it is essential that the manufacturers of nanomaterials fulfil their obligation to create a safety datasheet and provide the necessary information for the classification of materials.

Further research is urgently required

Finally, the Empa team analysed the (acute) risks to people, animals and the environment in the event of an accident. According to initial findings there is currently no need to incorporate specific regulations for nanomaterials in the area of human and ecotoxicity into the Hazardous Incident Ordinance. As such, the evaluations of the Empa researchers have no relevance to occupational safety. The Hazardous Incident Ordinance only considers persons outside the business premises, with one-off exposure – chronic effects, for example as can be caused by long-term exposure in the workplace, are excluded. It is therefore essential to know more, in particular when it comes to these chronic risks. Further research and, first and foremost, detailed guidelines and a definition of the topic of synthetic nanomaterials are essential according to the report.

At present there is no need for action with regard to possible "nano accidents" in Switzerland is the report's conclusion. However, it is important that we always bear current findings from research and the world of industry in mind and conduct regular checks as to whether the statements mentioned in the report are in keeping with the latest technical advances.

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