



The significance of the Precautionary Matrix for Synthetic Nanomaterials for the environment

Precautionary Matrix for Synthetic Nanomaterials

 Schweizerische Eidgenossenschaft
Confédération suisse
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 Bundesamt für Umwelt BAFU

V = N · (W · E + S)

```

    graph TD
      A[Specific framework conditions] --> B[Precautionary need]
      C[Potential human exposure] --> B
      D[Potential input into the environment] --> B
      E[Potential effect] --> B
    
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    graph TD
      Q1{Are the NPs >100nm?} -- No --> A[Not nano-released*]
      Q1 -- Yes --> Q2{Do the NPs form aggregates >100nm?}
      Q2 -- No --> A
      Q2 -- Yes --> Q3{Could the aggregates disintegrate again in the body or environment?}
      Q3 -- Yes --> B[Nano-released]
      Q3 -- No --> Q4{Do aggregates between 100nm and 1µm exist and could employees or consumers take them in via the lungs?}
      Q4 -- No --> A
      Q4 -- Yes --> C[Nano-released*]
    
```

* "Nano-released" means nano-released according to the matrix (based on the definition of NPs)

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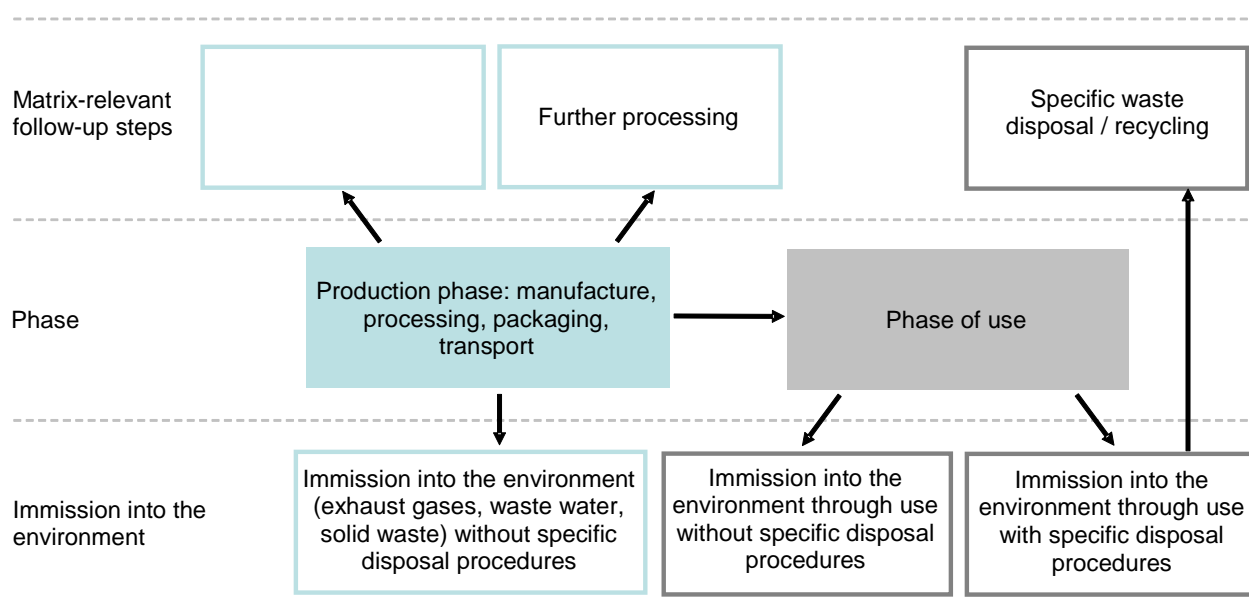
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Federal Office for Public Health FOPH
Federal Office for the Environment FOEN

Initial position

The precautionary matrix for synthetic nanomaterials

The precautionary matrix for synthetic nanomaterials¹ is a support tool for all stakeholders who are responsible for the safety of employees, consumers or the environment **in their preliminary clarification of any need for action on nanospecific topics**. The assessment of environmentally relevant issues is integrated into the concept. Two sources of imission into the environment are distinguished: imissions from production and other steps in the manufacturing process and imissions during or after the use of a product by consumers. These sources are further specified by consideration of whether the imissions happen spontaneously (exhaust gases, waste water, solid waste) or in a controlled fashion e.g. by nanospecific disposal or recycling.



When the precautionary matrix has been filled in and evaluated the **precautionary need for the environment** can be assessed for every defined step in the life cycle of a product. The division into two classes, A and B, allows for a first **preliminary decision** as to whether further steps should be introduced and if so, which. It is often considerably more difficult, however, to achieve a wide-ranging analysis of the results for the environmental domain than for the health domain because of the lack of data.

Precautionary matrix filled in, what next?

This factsheet aims to provide assistance with how to proceed after the precautionary matrix has been filled in and evaluated where there has been a **classification into Class B**. To this end the user of the precautionary matrix should be made aware of

- the **construction and interpretation of relevant scenarios**
- the **location and comprehension of material flows** (where do the NPRs go to, which concrete routes do they follow) and the application of this knowledge (deduced need for action)
- the **reduction or avoidance of an imission** into the environment

¹ For further information and definitions (e.g. NPR) regarding the precautionary matrix see link <http://www.bag.admin.ch/themen/chemikalien/00228/00510/05626/index.html?lang=de>

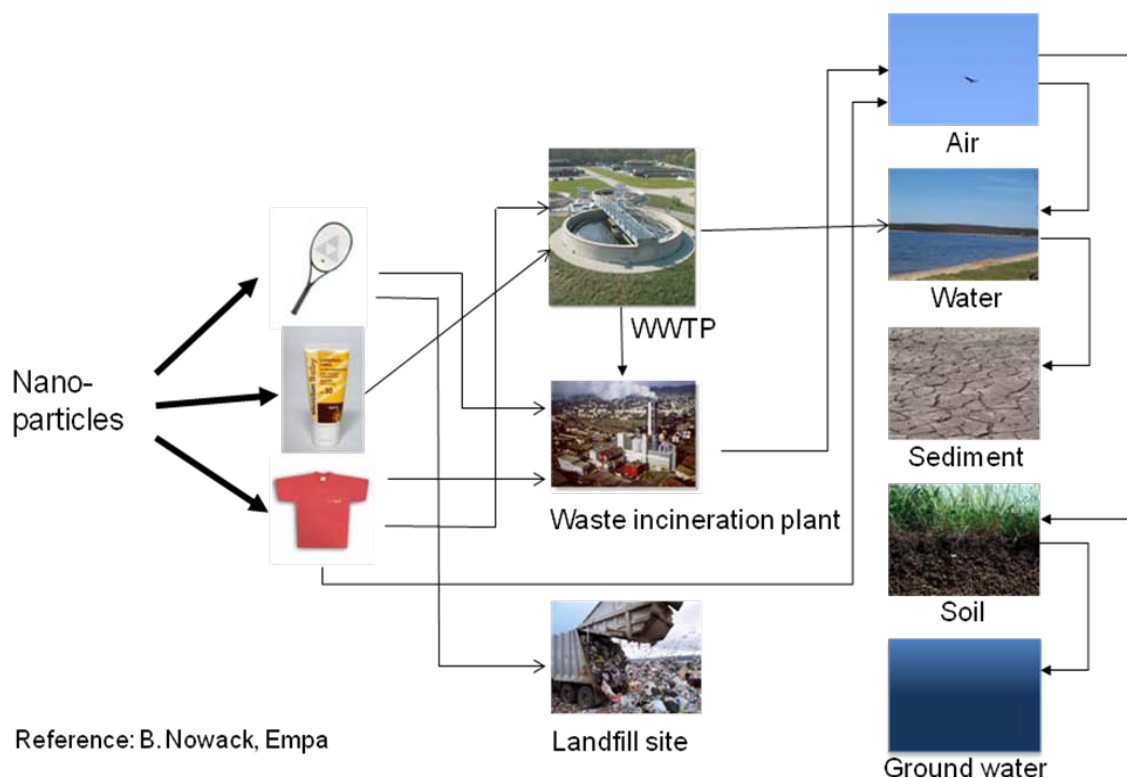
The precautionary matrix as a basis for further measures

Locating and evaluating scenarios

For a preliminary clarification of possible risks and an assessment of the need for action a **specific consideration of precisely defined framework conditions** (different compartments, different environmental conditions, different types and quantities of NPRs) of possible scenarios is essential. An **inventory of the possible scenarios** is obtained automatically after systematic application of the precautionary matrix. The specific application of the precautionary matrix to the scenarios found permits a **pre-selection and prioritisation of relevant cases**. With this as a basis it is easier to locate the material flows involved and to define the scope of the deduced need for action.

Locating material flows and deduced need for action

Building on the scenarios found, it is possible, independently of the process and product, to infer **different stages and final points in the life cycle** of the NPRs and so their **significance for further consideration**. Based on this significance and on the environment of the NPRs, measures can be defined promptly and specifically to cover the appropriate need for action. For example, if a product gets into the waste water treatment plant (WWTP), additional study will be necessary to define the actual retention rate of the NPRs in the WWTP.



Reduction or avoidance of imissions

The deduced need for action will determine whether in some circumstances a reduction or even a complete avoidance of the use of certain NPRs is advisable (a reduction of use is in principle to be recommended as this also helps to keep the waste water treatment plant clean). Possible precautionary measures include:

- Designating nanospecific **disposal as special waste**
- Binding unattached NPRs **for disposal** (e.g. in cement)
- Using suitable **filter technologies** for production exhaust gases
- Clarifying the question: **are NPRs necessary** or can they be replaced by other materials?

Contacts and information sources

Contacts

Federal Office for the Environment FOEN: Nanomaterials and Environment

- Dr. Andreas Weber (andreas.weber@bafu.admin.ch)
- Dr. Ernst Furrer (ernst.furrer@bafu.admin.ch)

Federal Office of Public Health FOPH: General Information on the Precautionary Matrix

- Dr. Christoph Studer (christoph.studer@bag.admin.ch)

Experts: Scientific issues

- Prof. Dr. Kristin Schirmer, Eawag (kristin.schirmer@eawag.ch)
- Dr. Bernd Nowack, Empa (bernd.nowack@empa.ch)

Disposal of Nanomaterials:

- Dr. Mathias Tellenbach, Terraconsult (mtellenbach@bluewin.ch)

TEMAS AG, Development Concept:

- Dr. Jürgen Höck (juergen.hoeck@temas.ch)

Industry-specific information: from the Associations

Helpful links

<http://www.bafu.admin.ch/publikationen/publikation/00574/index.html?lang=en>

<http://www.bag.admin.ch/themen/chemikalien/00228/00510/05626/index.html?lang=en>

<http://www.eawag.ch/forschung/utox/schwerpunkte/nanoecotoxicology/index>

<http://www.empa.ch/nowack>

<http://www.nanopartikel.info/cms/lang/en/page3.html>

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