

Precautionary Matrix for Synthetic Nanomaterials

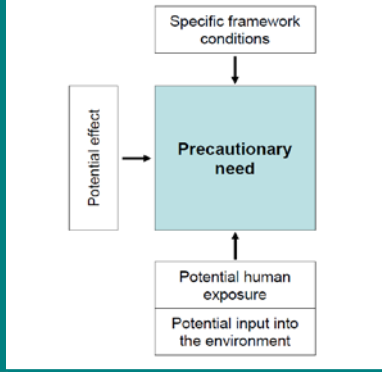


Precautionary Matrix for Synthetic Nanomaterials

Schweizerische Eidgenossenschaft
Confédération suisse
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Bundesamt für Gesundheit BAG
Bundesteam für Gesundheit BGE

$$V = N \cdot (W \cdot E + S)$$

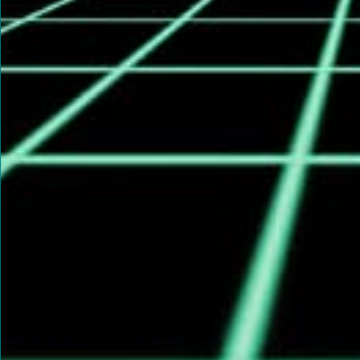


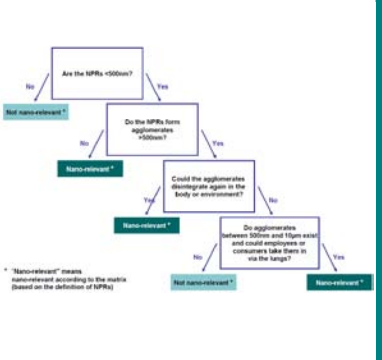
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graph TD
    A[Specific framework conditions] --> B[Precautionary need]
    C[Potential effect] --> B
    D[Potential human exposure] --> B
    E[Potential input into the environment] --> B
    
```









```

graph TD
    Q1{Are the NPBs <math>< 500\text{nm}</math>?} -- No --> A[Not nano-relevant*]
    Q1 -- Yes --> Q2{Do the NPBs form agglomerates <math>> 500\text{nm}</math>?}
    Q2 -- No --> B[Nano-relevant*]
    Q2 -- Yes --> Q3{Could the agglomerates disintegrate again in the body or environment?}
    Q3 -- Yes --> C[Nano-relevant*]
    Q3 -- No --> Q4{Do agglomerates between 500nm and 15µm exist and could employees or consumers take them in via the lungs?}
    Q4 -- No --> D[Not nano-relevant*]
    Q4 -- Yes --> E[Nano-relevant*]
    
```

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



Version 2.1
14 July 2011

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Federal Office of Public Health and Federal Office for the Environment, Berne 2011, Version 2.1

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

A computerised version of the precautionary matrix exists which includes automatic evaluation of entries (www.nanotechnologie.admin.ch)

General informations

Version 2.1, 14 July 2011

Precautionary matrix completed by / responsible contact person	
Brief description of the considered nanospecific field (type of NPR, which surrounding, in which application)	
Brief description of the considered (process) step (production, packaging, transport, further stages of processing, disposal, use...), brief description	
Calculation of the precautionary need for employees?	<input type="radio"/> yes <input type="radio"/> no
Calculation of the precautionary need for consumers?	<input type="radio"/> yes <input type="radio"/> no
Calculation of the precautionary need for a specific disposal step?	<input type="radio"/> yes <input type="radio"/> no Contact for information on disposal: see footer 28 in the guidelines
Are coated / functionalised NPRs involved?	<input type="radio"/> yes <input type="radio"/> no if yes, see statements in the guidelines, section 4.5

It is recommended that the relevant accompanying documents be studied before using the precautionary matrix
(see www.nanotechnologie.admin.ch)

A: relevant for workers
V: relevant for consumers
U: relevant for the environment
NPR: nanoparticles or nanorods

Please note:
The precautionary matrix does not produce a definitive evaluation in terms of a risk assessment!

	Parameter classes	Parameter	Identifier	A	V	U	Appraisal	Basis for appraisal, applied measurement method
Nano-relevance	Nano-relevance according to the precautionary matrix (i.e. contains NPR)		N					
		Order of size of the primary particles (NPR) in the materials (free, bound, aggregated or agglomerated)	N1				<input type="radio"/> 1nm - 100nm, or 100nm - 500nm <input type="radio"/> over 500nm	
		Do the NPRs form agglomerates >500nm	N1a	x	x	x	<input type="radio"/> yes (proceed to N2) <input type="radio"/> no (or not known) -> review of nano-relevance concluded	
		Only if N1a = yes: In the body does deagglomeration of agglomerates (or aggregates) to primary NPRs or agglomerates <500nm occur	N2 _{A,V}	x	x		<input type="radio"/> yes <input type="radio"/> no (proceed to N2a)	
		Only if N1a = yes: Under the respective environmental conditions does deagglomeration of agglomerates (or aggregates) to primary NPRs or agglomerates <500nm occur?	N2 _U			x	<input type="radio"/> yes <input type="radio"/> no	
		Only if N2A,V = no: If agglomerates between 500nm and 10µm are present, can employees or consumers take them in through their lungs?	N2a	x	x		<input type="radio"/> yes <input type="radio"/> no	

It is recommended that the relevant accompanying documents be studied before using the precautionary matrix (see www.nanotechnologie.admin.ch)

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	Parameter classes	Parameter	Identifier	A	V	U	Appraisal	Basis for appraisal, applied measurement method
Specific framework conditions	Specific framework conditions on the information status		S					
		Is the origin of the (nanoscale) starting materials known?	S1	x	x	x	<input type="radio"/> yes <input type="radio"/> partly <input type="radio"/> no	
		Is sufficient information available to complete the precautionary matrix for nanoscale starting materials?	S2	x	x	x	<input type="radio"/> yes <input type="radio"/> partly <input type="radio"/> no	
		Are the subsequent users of the considered NPRs known?	S3	x	x	x	<input type="radio"/> yes <input type="radio"/> partly <input type="radio"/> no	
		How accurately is the material system known, or can disturbing factors (e.g. impurities) be estimated?	S4	x	x	x	<input type="radio"/> accurately <input type="radio"/> not accurately <input type="radio"/> unknown	
Potential effect	Potential effect		W					
		Redox activity and/or catalytic activity of the NPRs present in the nanomaterial	W1	x	x	x	<input type="radio"/> low <input type="radio"/> medium <input type="radio"/> high	
		Stability (half-life) of the NPRs present in the nanomaterial in the body	W2 _{A,V}	x	x		<input type="radio"/> hours <input type="radio"/> days-weeks <input type="radio"/> months	
		Stability (half-life) of the NPRs present in the nanomaterial under environmental conditions	W2 _U			x	<input type="radio"/> hours <input type="radio"/> days-weeks <input type="radio"/> months	

It is recommended that the relevant accompanying documents be studied before using the precautionary matrix (see www.nanotechnologie.admin.ch)

A: relevant for workers
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Parameter classes	Parameter	Identifier	A	V	U	Appraisal	Basis for appraisal, applied measurement method
Potential exposure of humans / potential input into the environment	Physical surroundings	E1					
	Air	E1.1	x	x	x	O yes O no	
	Aerosols <10 µm	E1.2	x	x	x	O yes O no	
	Aerosols >10 µm	E1.3	x	x	x	O yes O no	
	Liquid media	E1.4	x	x	x	O yes O no	
	Solid matrix, not stable under conditions of use	E1.5	x	x	x	O yes O no	
	Solid matrix, stable under conditions of use, NPR mobile	E1.6	x	x	x	O yes O no	
	Solid matrix, stable under conditions of use, NPR not mobile	E1.7	x	x	x	O yes O no	
	Maximum possible exposure of humans	E2					
	Amount of NPR which a worker handles per day	E2.1	x			O up to 1.2mg O 1.2mg - 12mg O over 120mg	
	Amount of NPR with which a worker comes into contact in the "worst case"	E2.2	x			O up to 12mg O 12mg - 120mg O over 120mg	
	Frequency with which a worker handles the NPR(s)	E2.3	x			O monthly O weekly O daily	
	Amount of NPR which a consumer handles daily through the utility product	E2.4			x	O up to 1.2mg O 1.2mg - 12mg O over 12mg	
	Frequency with which a consumer uses the utility product	E2.5			x	O monthly O weekly O daily	
	Maximum possible input into the environment	E3					
	Amount of NPR reaching the environment from wastewater, exhaust gases, solid waste per year	E3.1			x	O up to 5kg O 5kg - 500kg O over 500kg	
	Amount of NPR in utility products per year	E3.2				O up to 5kg O 5kg - 500kg O over 500kg	
Amount of disposed NPR per year	E3.3			x	O up to 5kg O 5kg - 500kg O over 500kg		