

Stoffenmanager og Nanosafer

Eksempler på web-værktøjer til risikovurdering af kemikalier, pulvere og nanomaterialer

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Det kemiske sikkerhedsarbejde I DK pt.

- **Der skal laves Arbejdspladsbrugsanvisninger (APB; Arbejdspladsbrugsanvisning for stoffer og materialer, At-vejledning C.0.11; november 2005.** <https://arbejdstilsynet.dk/da/regler/at-vejledninger/a/c-0-11-arbpladsbrugsanv-for-stof-og-mat>

Baseret på Teknisk Datablad + Sikkerhedsdatablad og Arbejdsforhold

APV ikke nævnt

Risikovurdering ikke nævnt)

- **Der skal laves kemisk Arbejdspladsvurdering (APV; At-vejledning D.1.1-3; Juli 2009 - Opdateret april 2016;** <https://arbejdstilsynet.dk/da/regler/at-vejledninger/a/d-1-1-arbejdspladsvurdering>)

Baseret på Teknisk Datablad + Sikkerhedsdatablad og Arbejdsforhold

Risikovurdering ikke nævnt

Risikovurdering nævnt som punkt 2 i processen hos bla. Industriens vejledning, men ingen yderligere information

Arbejde med nanomaterialer:
At-vejledning 9.3.1 - 1. november 2014

Bedre APB / Kemisk APV baseret på risikovurdering af de reelle arbejdsprocesser!

"Konventionelle"

Stoffenmanager
(Prædiktiv og
CB prioritering)



Dansk version
(2018)

Nanomaterialer

caLIBRAt
NanoSafer CB
(Prædiktiv)



AT Vejledning 9.3.1

NanoSafer CB og Stoffenmanager Nano
(valideres i EU H2020 caLIBRAt projektet i 2019)

Kvantitative
modeller
(valideres
(2019)

"Nanomaterialer"

Stoffenmanager
Nano
(Prioritering)



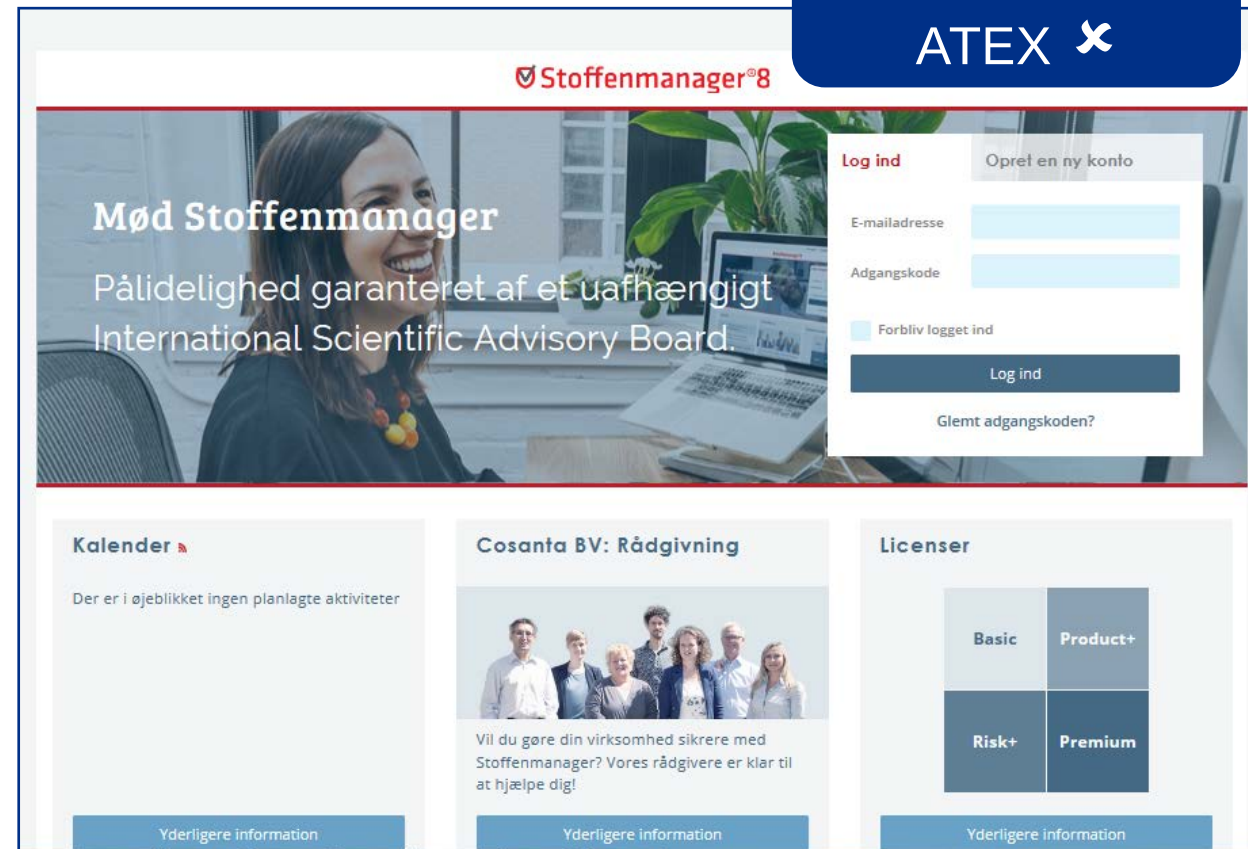
Stoffenmanager®

Nogle nøgleinformationer

- Web-baseret værktøj
- Risiko-vurdering og -håndtering af kemikalier, støv og produkter i både små og store virksomheder
- Risiko-kommunikation internt og eksternt (Instruktionskort (APV input); Sikkerhedsdatablad)
- Anbefalet i ECHA Guidance til eksponeringsvurdering
- Dokumenteret videnskabeligt til at være et beskyttende og robust værktøj. Brugert raining er dog typisk påkrævet.
- Baseret på mere end 6000 arbejdspladsmålinger, som ligger til grund for risikovurdering
- Ejer: Cosanta

REACH ✕

ATEX ✕



Kvalitativ
Luftveje & Hud

Kvantitativ
Luftveje

Rene stoffer og materialer,
blandinger og produkter

Dækker mange, men ikke alle scenarier!

Produkt Aktivitet	Gas	Flygtige væsker	Ikke- flygtige væsker	Pulvere	Fibre	Elementer
I bevægelse og under omrøring						ikke relevant
Overflytning vha. tyngdekraften						ikke relevant
Spredning og nedsænkning						ikke relevant
Luftfortyndningsteknik						ikke relevant
Varmebearbejdningsteknikker						ikke relevant
Slid og stød: Træ og sten	ikke relevant	ikke relevant	ikke relevant	ikke relevant	ikke relevant	
Slid og stød: andre aktiviteter som plastik, glas eller metal	ikke relevant	ikke relevant	ikke relevant	ikke relevant	ikke relevant	

**Mulige
Videreudviklinger!**

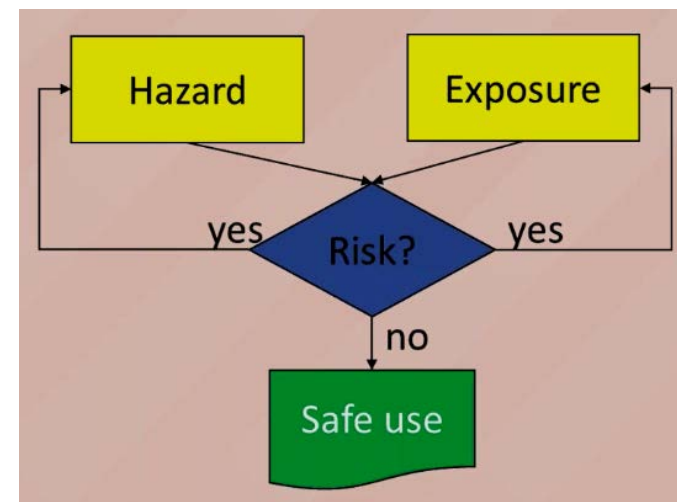
Støvning ?

Fibre?

Gasser?

Svejsning?

.....



SDS
GV
DNEL
LOAEL

Opgave
PROC
Rumstr.
Værn
Scenario

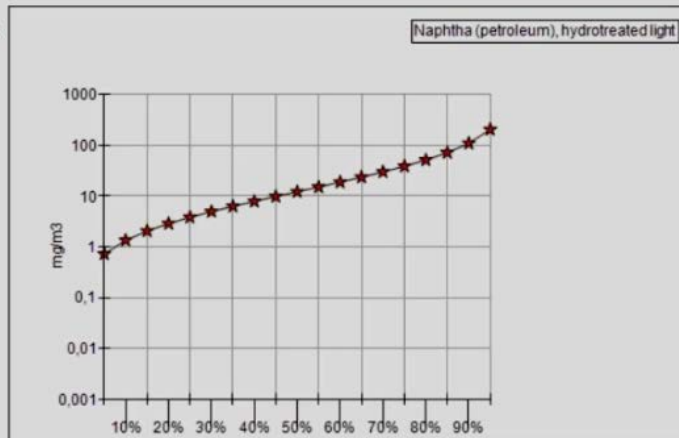
Vurdering og APB (WIC)

Hazard class	A	B	C	D	E
Exposure class					
1	III	III	III	II	I
2	III	III	II	II	I
3	III	II	II	I	I
4	II	I	I	I	I

Naphtha (petroleum),
hydrotreated light

mg/m³

50 percentile : 12,20
75 percentile : 38,93
90 percentile : 110
95 percentile : 206



Stoffenmanager

Hovedmenu Lagerbeholdning Prioritering Vurdering

Arbejdspladsbrugsanvisning

Forklaring

Gem som dokument

Arbejdspladsbrugsanvisning

Placering/afdeling i brug Lab 1

Produktnavn Poly Lak ISO

Sammensætning (komponent/koncentration/CAS-nummer) Styren

Signalord Fare

Faremærkninger

H-sætninger

P-sætninger

Ventilation

Forebyggelse

Øjen-, åndedræts- og ansigtsbeskyttelse

Beskyttelseshandsker

Beskyttelsesbeklædning

Førstehjælp

Generel information

Førstehjælp for Luftveje

Førstehjælp ved Hudkontakt

Førstehjælp for Øjne

Førstehjælp ved Oral indtagelse

Bemærkninger til lægen

Slukningsmidler, opbevaring og rengøring

Slukningsmidler

Miljøbeskyttelsesforanstaltninger

Betingelser for sikker opbevaring

Metoder og udstyr til inddæmning og oprensning

Miljøoplysninger

Tilbage til oversigten

Arbejdspladsbrugsanvisning: Poly Lak ISO

Dato: 05-12-2018

Signal term: Fare

Fareegenskaber

H226: Brandfarlig væske og damp.
H315: Forårsager hudirritation.
H319: Forårsager alvorlig øjenirritation.
H335: Kan forårsage irritation af luftvejene.
H361d: Mistænkes for at skade det ufødte barn.
H412: Skadelig for vandlevende organismer, med langvarige virkninger.

Beskyttelsesforanstaltninger

Gas-/støvfilter A (brun)-P2

kapselbriller

Butylgummi

Generel information

Luftveje

Hudkontakt

Øjenkontakt

Oral indtagelse

Slukningsmidler

Miljøbeskyttelsesforanstaltninger

ADR-klasse

UN-nummer

Pakkegruppe

Førstehjælp

Hændelser

Miljø

Transport

Oversigter over vurderinger

Risikovurdering for luftveje: oversigt

^ Forklaring

Hazard class \ Exposure class	A	B	C	D	E
1	III	III	III	II	I
2	III	III	II	II	I
3	III	II	II	I	I
4	II	I	I	I	I

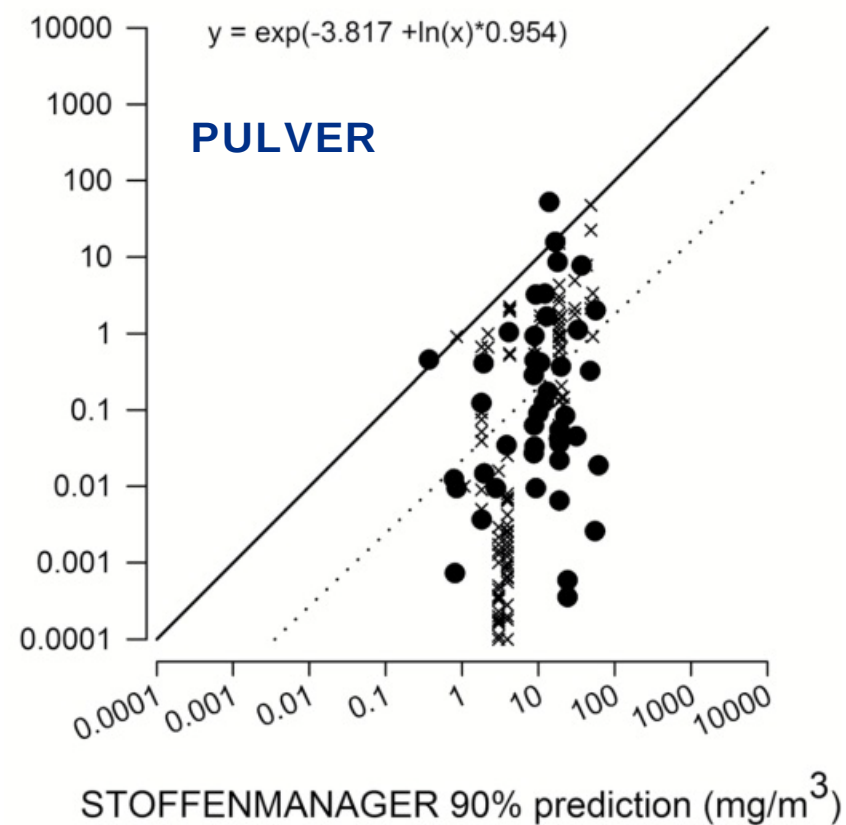
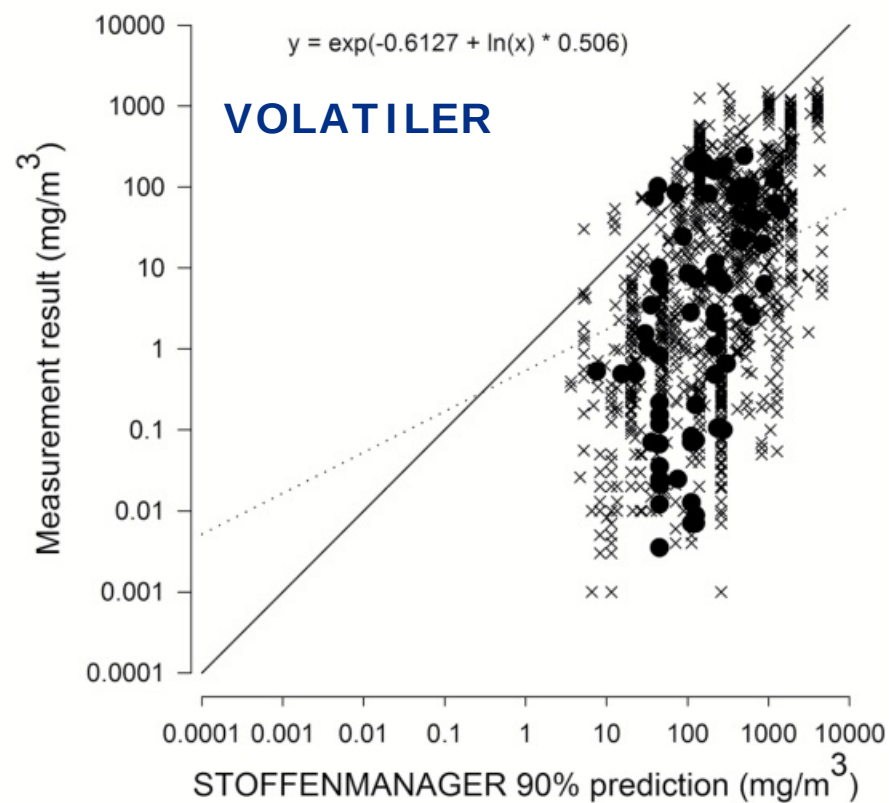
Ny risikovurdering Eksporter til Excel

	Navn	Produkt	fk ø	fk I	ek	risiko
			~	~	~	~
	Vinduespudsning	Vinduesrens	C	B	1	III
	glasrens flader	Glasrens	B	-	3	III
	Rens af tank	Poly Lak ISO	C	D	1	II
	Manuel pårulning	Poly Lak ISO	C	D	2	II

1 10 emner pr side Viser rækker 1 - 4 af 4

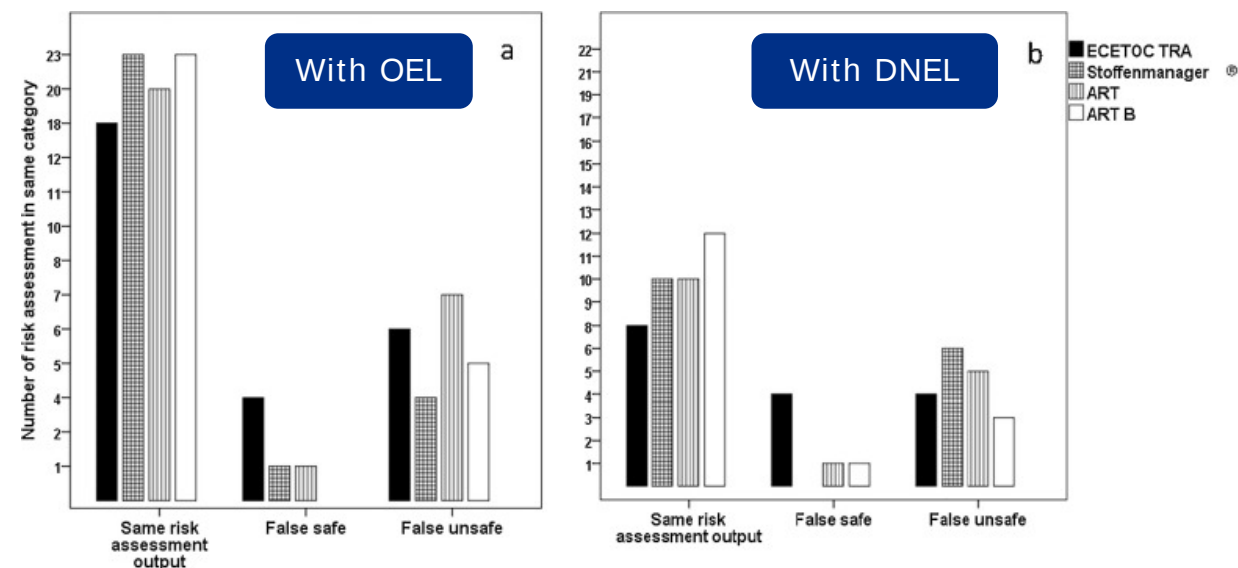
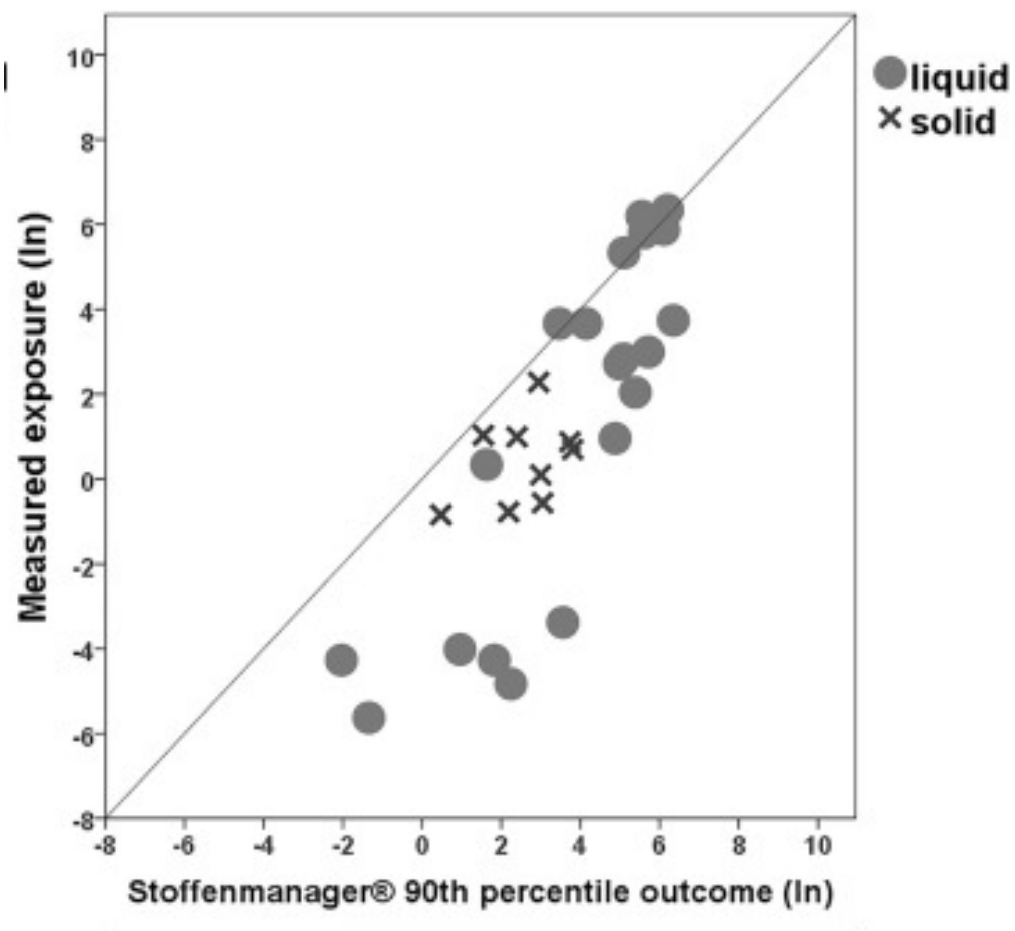
Valideringsstudier

Udviklerne: 4000 Målinger



Valideringsstudier

Ny uafhængig test – 29 Målinger



Safety Science 109 (2018) 412–420



Contents lists available at ScienceDirect

Safety Science

journal homepage: www.elsevier.com/locate/safety



Evaluation of risk assessment approaches of occupational chemical exposures based on models in comparison with measurements

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NanoSafer CB (Control Banding)

NanoSafer 1.1beta

HOME ABOUT CONTACT

Currently applicable for MNM powder handling (dustiness; mg/kg)
and processes with known or estimated emission rates (mg/min)

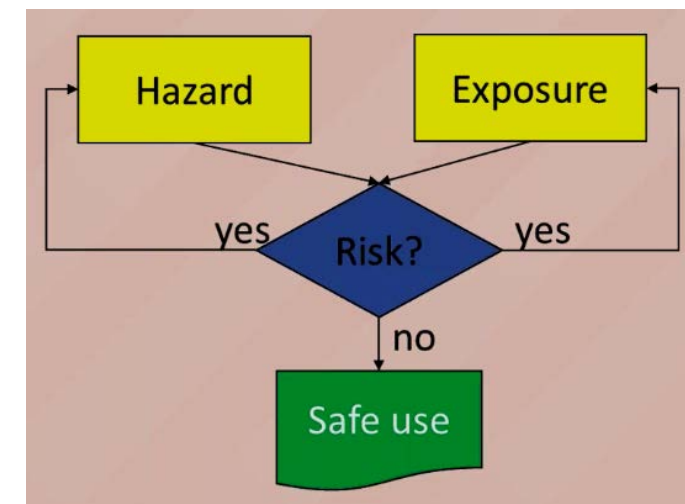
Welcome to NanoSafer

NanoSafer is a combined control-banding and risk management tool that enables assessment of the risk level and recommended exposure control associated with production and use of manufactured nanomaterials (e.g., nanoparticles, nanoflakes, nanofibers, and nanotubes) in specific work scenarios. In addition to manufactured nanomaterials, the tool can also be used to assess and manage emissions from nanoparticle-forming processes.

NB! NanoSafer v 1.1 is under implementation and small changes will occur over the next month! Please send us feed-back if you observe system errors or have ideas for improving the usability of the web-tool.

Login

Register



SDS
GV
DNEL
LOAEL

Process
Scenario
(Værn)



NanoSafer CB

Skalering af potentiel farlighed, eksponering og det anbefalede beskyttelsesniveau

NanoSafer

Navigation

Modules

Dashboard

Materials

Processes

Risk Assessment

Help

Search material or process

kaj@nrcwe.dk

Tox

Score: 0.2

Near-field

Acute: 18.60206

RL5: Very high toxicity suspected and/or moderate to very high exposure. The work should be conducted under strict dust release control, such as in a fume-hood, separate enclosure etc. Air-supplied respirators or highly efficient filter masks (PP3 or higher quality) may be used as a supplement and must be readily available in case of accidents. Expert advice is recommended.

Near-field

Daily: 4.78548

RL5: Very high toxicity suspected and/or moderate to very high exposure. The work should be conducted under strict dust release control, such as in a fume-hood, separate enclosure etc. Air-supplied respirators or highly efficient filter masks (PP3 or higher quality) may be used as a supplement and must be readily available in case of accidents. Expert advice is recommended.

Far-field

Acute: 0.91184

RL4: High toxicity suspected and/or high exposure potential. The work should be performed during use of highly efficient local exhaust ventilation, fume-hood, glove-box etc. Use of respiratory protection equipment (PP3 or higher quality) may be relevant depending on the work situation. Make sure to have the personal respiratory protection equipment (PP3 or higher quality) available in case of accidents.

Far-field

Daily: 0.33027

RL3: Intermediate toxicity suspected and/or moderate exposure potential. The work should be conducted in a fume-hood or with highly efficient local exhaust ventilation in combination with use of respiratory protection equipment (PP3 or higher quality) depending on the work situation. Make sure to have the personal respiratory protection equipment available in case of accidents.

List all Material and safety data entered / selected

List all exposure situation data entered / selected

Disclaimer

It should be noted that the NanoSafer 1.1 output consist of an automated risk assessment and risk management recommendations considering user-dependent input. The National Research Centre for the Working Environment and other contributors as well as the program developers are not liable for any damage to humans or material or loss of income that would arise as a result of the assessments provided using NanoSafer 1.1. The outcome must be considered as a guide, but the final responsibility belongs to the safety managers using the results.

 Det Nationale Forskningscenter
for Arbejdsmiljø

Præsentationstitel
11



NanoSafer Control Banding Report for Airborne Occupational Exposure Assessment

version 1.1

Assessment prepared by

Name: Keld Alstrup Jensen
Address: NFA
Phone: 0045 39165302
E-mail: kaj@nrcwe.dk
Date: Thursday, Dec 6, 2018

Assessment of

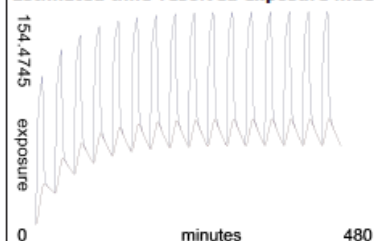
Material assessed: Halloysite - Dragonite-HP:KT
Producer: Applied Minerals
Classified as nanomaterial consisting of: Atypical shape

Work situation assessed: Ihældning af 16 sække a 10 kg; 10 min per ihældning; gennemsnitlig pause på 20 min mellem ihældning
Process type: Powder Handling

Result of assessment

Estimated hazard level 0.56
The hazard level is estimated based on
High aspect ratio material: No
A high volume specific surface area of 198.75 m²/cm³
OEL of analogue bulk material: 2 mg/m³
Solubility: Insoluble (< 1 g/L)
Presence of surface coating: Yes
Known hazards of analogue bulk material

Estimated time-resolved exposure index



Near-field Acute	Near-field Daily	Far-field Acute	Far-field Daily
38.56	42.81	18.97	29.53
EB5: Very high exposure	EB5: Very high exposure	EB5: Very high exposure	EB5: Very high exposure

X	X	X	X

RL5: Very high toxicity suspected and/or moderate to very high exposure. The work should be conducted under strict dust release control, such as in a fume-hood, separate enclosure etc. Air-supplied respirators or highly efficient filter masks (PP3 or higher quality) may be used as a supplement and must be readily available in case of accidents. Expert advice is recommended.

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Based on the estimated hazard and exposure potential it is recommended to apply engineered protection equipment with a protection factor of 42.81
- corresponding to an efficacy of 97 %

Elaborated description of work situation assessed

Vurdering af sikkerhed ved dosering til mixer

Material, safety and contextual information used in the assessment

Material and safety data entered

Manufacturer: Applied Minerals
Relevance: Yes
Coated: Yes
Known shape: Yes
Morphology: Tube
Shortest dimension: 70 nm
Longest dimension: 2000 nm
Size is known: No
Average size: No
Size range known: No
Surface area: 75 m²/g
Relative density: 2.65 g/cm³
Solubility: Insoluble (< 1 g/L)
Respirable dustiness: 937.5 mg/kg

Exposure situation data entered

Process type: Powder handling
Energy level: H2 (0.25) : Low energy - (eg. < 5 cm drop height; handling of contaminated or leaking bags)
Amount used in cycle: 10 kg
Cyclus duration: 10 min
Number of cycles per day: 16 times
Pause between cycles: 20 min
Mass handled per task in cycle: 10 kg
Time required per task in cycle: 10 min
Length room: 10 meters
Width room: 10 meters
Height room: 2.3 meters
Room air exchange rate: 2 times per hour
Activity level room: Moderate

NanoSafer CB

Skalering af potentiel farlighed, eksponering og det anbefalede beskyttelsesniveau

X RL5: Very high toxicity suspected and/or moderate to very high exposure. The work should be conducted under strict dust release control, such as in a fume-hood, separate enclosure etc. Air-supplied respirators or highly efficient filter masks (PP3 or higher quality) may be used as a supplement and must be readily available in case of accidents. Expert advice is recommended.	X RL5: Very high toxicity suspected and/or moderate to very high exposure. The work should be conducted under strict dust release control, such as in a fume-hood, separate enclosure etc. Air-supplied respirators or highly efficient filter masks (PP3 or higher quality) may be used as a supplement and must be readily available in case of accidents. Expert advice is recommended.	X RL5: Very high toxicity suspected and/or moderate to very high exposure. The work should be conducted under strict dust release control, such as in a fume-hood, separate enclosure etc. Air-supplied respirators or highly efficient filter masks (PP3 or higher quality) may be used as a supplement and must be readily available in case of accidents. Expert advice is recommended.	X RL5: Very high toxicity suspected and/or moderate to very high exposure. The work should be conducted under strict dust release control, such as in a fume-hood, separate enclosure etc. Air-supplied respirators or highly efficient filter masks (PP3 or higher quality) may be used as a supplement and must be readily available in case of accidents. Expert advice is recommended.
Based on the estimated hazard and exposure potential it is recommended to apply engineered protection equipment with a protection factor of 42.81 - corresponding to an efficacy of 97 %			
Elaborated description of work situation assessed Vurdering af sikkerhed ved dosering til mixer			

Næste trin:

Mulighed for at (re-)vurdere med brug af værnemidler

Kalibrering af NanoSafer CB - 2019

Upubliceret: Venligst udlånt af Ana Sofia Fonseca (NFA)

- This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 686239



MODELED EXPOSURES

Pouring 700g CuO under a fume hood

ASSESSMENT BY TIER 2

NanoSafer v 1.1

Result of assessment

Estimated hazard level 0.2
The hazard level is estimated based on
High aspect ratio material: No
A high volume specific surface area of 97,50 m²/cm³
OEL of analogue bulk material: 1 mg/m³
Solubility: Insoluble (< 1 g/L)
Presence of surface coating: No
Known hazards of analogue bulk material

Estimated time-resolved exposure index



Near-field Acute

0.0025
EB1: Very low exposure potential

Near-field Daily

0.0000
EB1: Very low exposure potential

Far-field Acute

0.0002
EB1: Very low exposure potential

Far-field Daily

0.0000
EB1: Very low exposure potential

NF=1.5 µg m⁻³ < M_{NF real work environment} (9.2 µg m⁻³)

Toxicity Exposure	0.76-1.00	0.51-0.75	0.25-0.50	0.00-0.25
>1.00	RL5	RL5	RL5	RL5
0.51-1.00	RL5	RL5	RL4	RL4
0.26-0.50	RL5	RL4	RL4	RL3
0.11-0.25	RL4	RL4	RL3	RL2
< 0.11	RL4	RL3	RL2	RL1



RL1: Very low toxicity and low exposure potential

$$OEL_{nano} = OEL \cdot \frac{30}{SSA} \cdot \frac{1}{8}$$

Specific density of the nanomaterial (g/cm³)

$$EXP_{Acute} = \frac{C_{Acute}}{2 \cdot OEL_{nano}}$$

Specific surface area of the nanomaterial [SSA]; m²/g

$$EXP_{8-hour} = \frac{C_{8-hour}}{OEL_{nano}}$$

Tak fordi I lyttede