BAuA workshop on Safe handling of nanomaterials at workplaces

27-28 November 2012

Safe handling of nanomaterials at workplaces: state of the art and break up into parallel working sessions

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Starting point from occupational safety and health knowledge

- Scientific knowledge on risks of dusts, fibers and chemical substances
- Dust protection measures work
- No knowledge on long-term effects of most chemicals
- Precautionary approach for unknown hazards
- High diversity of adverse effects and potential for dust release of nanomaterials

Measures specifically tailored for workplace situations and categories of nanomaterials based on a precautionary approach

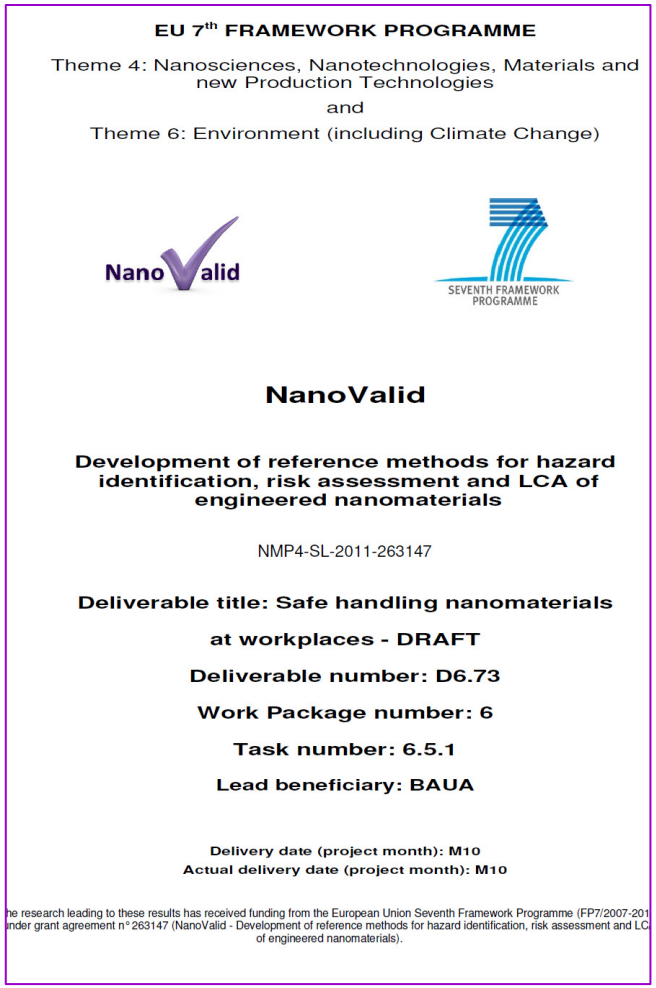
Figures:
up - local exhaust system (BAuA/Uwe Völkner – FOX-Fotoagentur, Lindlar/Cologne); **middle – laboratory assistant at fume hood** (BAuA/Uwe Völkner – FOX-Fotoagentur, Lindlar/Cologne); **bottom - glove box** (Sabine Plitzko, BAuA)

The way to practical solutions for safe handling

- Development of guideline draft ✓
- Questionnaire: First feedback ✓
- Evaluation and Feedback on

this Workshop

- Field studies starting soon:
  - Workplace exposure and efficacy of controls
  - Practical evaluation in cooperation with NanoValid partners
- Aim:
  - Generation of training concept
  - Transfer into practice



EU 7th FRAMEWORK PROGRAMME

Theme 4: Nanosciences, Nanotechnologies, Materials and new Production Technologies
and
Theme 6: Environment (including Climate Change)

NanoValid

Development of reference methods for hazard identification, risk assessment and LCA of engineered nanomaterials

NMP4-SL-2011-263147

Deliverable title: Safe handling nanomaterials at workplaces - DRAFT

Deliverable number: D6.73

Work Package number: 6

Task number: 6.5.1

Lead beneficiary: BAUA

Delivery date (project month): M10
Actual delivery date (project month): M10

he research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-201 nder grant agreement n° 263147 (NanoValid - Development of reference methods for hazard identification, risk assessment and LC of engineered nanomaterials).

Structure of the guideline: concept

Decision criteria to derive control strategies

↓

Adequate control strategies

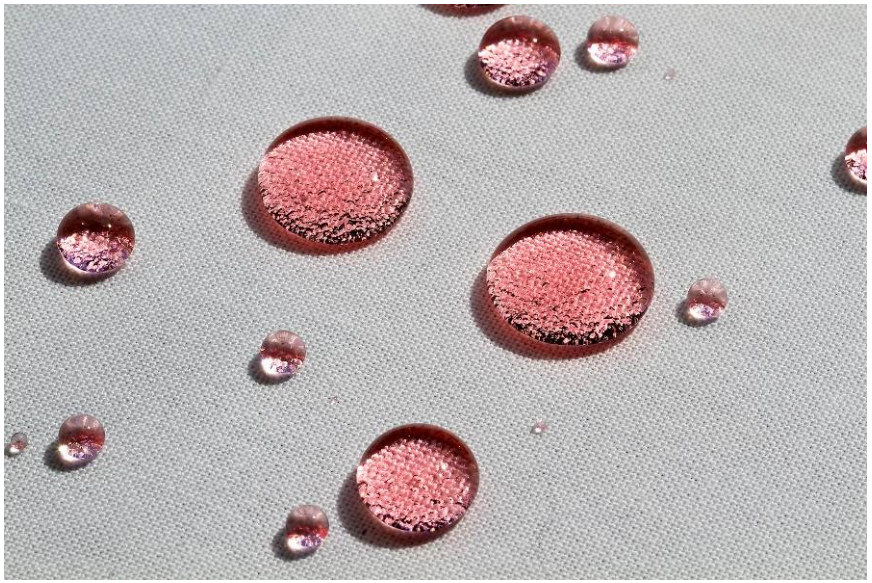


Figure: BAuA/Uwe Völkner – FOX-Fotoagentur, Lindlar/Cologne

Extras:

- Course of instruction and occupational-medical and toxicological advice
- Controls for storage and disposal
- Examples
- Sample letter for manufacturer
- Flowchart

Structure of the guideline: way of proceeding

Decision criteria to derive control strategies	Adequate control strategies…
5.1) Criterion 1: Handling nanomaterials in laboratories	→ 6) …for laboratories
5.2) Criterion 2: Physical condition (matrix, liquid, powder state)	→ 7) …for nanoparticles bound in a matrix → 8) …for nanoparticles dissolved in liquid
5.3) Criterion 3: Solubility	→ 9) …for handling soluble powders
5.4) Criterion 4: Specific information in the safety data sheet (SDS)	→ …information?: 9) + properties from SDS → …no information?: 10)
5.5) Criterion 5: Fibre morphology	→ …10) + if WHO criteria: treat as if carcinogenic

One of the examples: Operating instruction

Contains specific instructions, for example…

RISKS TO HUMAN HEALTH OR THE ENVIRONMENT

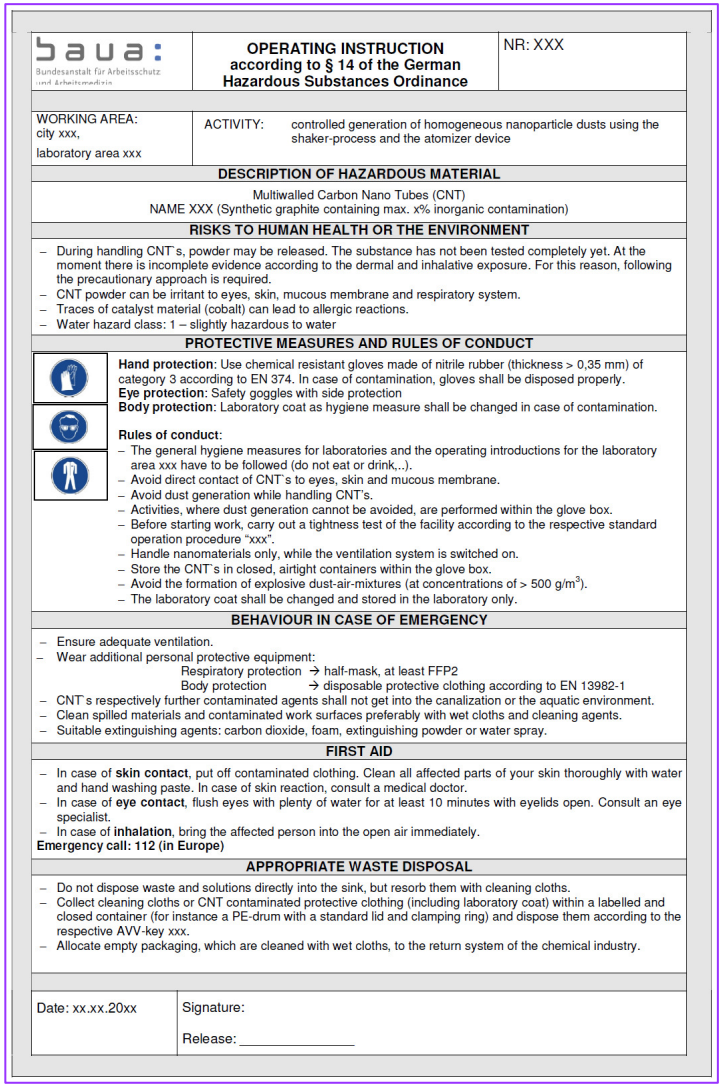
During handling CNT`s, powder may be released. The substance has not been tested completely yet. At the moment there is incomplete evidence according to the dermal and inhalative exposure. For this reason, following the precautionary approach is required.
CNT powder can be irritant to eyes, skin, mucous membrane and respiratory system.
Traces of catalyst material (cobalt) can lead to allergic reactions.
Water hazard class: 1 – slightly hazardous to water

PROTECTIVE MEASURES AND RULES OF CONDUCT

Hand protection: Use chemical resistant gloves made of nitrile rubber (thickness > 0,35 mm) of category 3 according to EN 374. In case of contamination, gloves shall be disposed properly.
Eye protection: Safety goggles with side protection
Body protection: Laboratory coat as hygiene measure shall be changed in case of contamination.

…there are of course more examples:

SOP's are widely spread in Europe…



baua: Bundesanstalt für Arbeitsschutz und Arbeitsmedizin

OPERATING INSTRUCTION according to § 14 of the German Hazardous Substances Ordinance — NR: XXX

WORKING AREA: city xxx, laboratory area xxx

ACTIVITY: controlled generation of homogeneous nanoparticle dusts using the shaker-process and the atomizer device

DESCRIPTION OF HAZARDOUS MATERIAL

Multiwalled Carbon Nano Tubes (CNT)
NAME XXX (Synthetic graphite containing max. x% inorganic contamination)

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Rules of conduct:

- The general hygiene measures for laboratories and the operating introductions for the laboratory area xxx have to be followed (do not eat or drink,..).
- Avoid direct contact of CNT`s to eyes, skin and mucous membrane.
- Avoid dust generation while handling CNT's.
- Activities, where dust generation cannot be avoided, are performed within the glove box.
- Before starting work, carry out a tightness test of the facility according to the respective standard operation procedure "xxx".
- Handle nanomaterials only, while the ventilation system is switched on.
- Store the CNT`s in closed, airtight containers within the glove box.
- Avoid the formation of explosive dust-air-mixtures (at concentrations of > 500 g/m^3).
- The laboratory coat shall be changed and stored in the laboratory only.

BEHAVIOUR IN CASE OF EMERGENCY

- Ensure adequate ventilation.
- Wear additional personal protective equipment:
  Respiratory protection → half-mask, at least FFP2
  Body protection → disposable protective clothing according to EN 13982-1
- CNT`s respectively further contaminated agents shall not get into the canalization or the aquatic environment.
- Clean spilled materials and contaminated work surfaces preferably with wet cloths and cleaning agents.
- Suitable extinguishing agents: carbon dioxide, foam, extinguishing powder or water spray.

FIRST AID

- In case of **skin contact**, put off contaminated clothing. Clean all affected parts of your skin thoroughly with water and hand washing paste. In case of skin reaction, consult a medical doctor.
- In case of **eye contact**, flush eyes with plenty of water for at least 10 minutes with eyelids open. Consult an eye specialist.
- In case of **inhalation**, bring the affected person into the open air immediately.

Emergency call: 112 (in Europe)

APPROPRIATE WASTE DISPOSAL

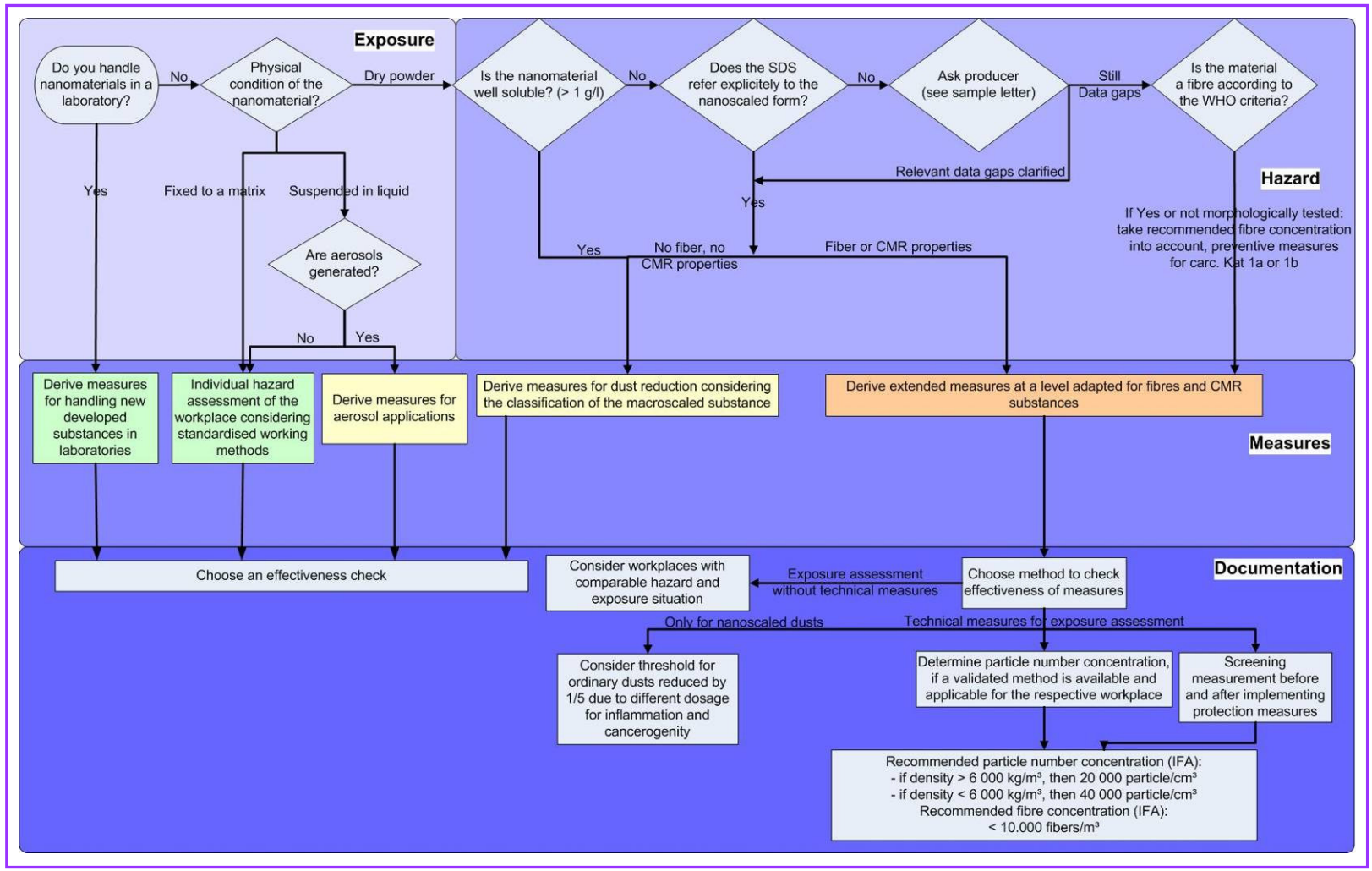
- Do not dispose waste and solutions directly into the sink, but resorb them with cleaning cloths.
- Collect cleaning cloths or CNT contaminated protective clothing (including laboratory coat) within a labelled and closed container (for instance a PE-drum with a standard lid and clamping ring) and dispose them according to the respective AVV-key xxx.
- Allocate empty packaging, which are cleaned with wet cloths, to the return system of the chemical industry.

Date: xx.xx.20xx

Signature:

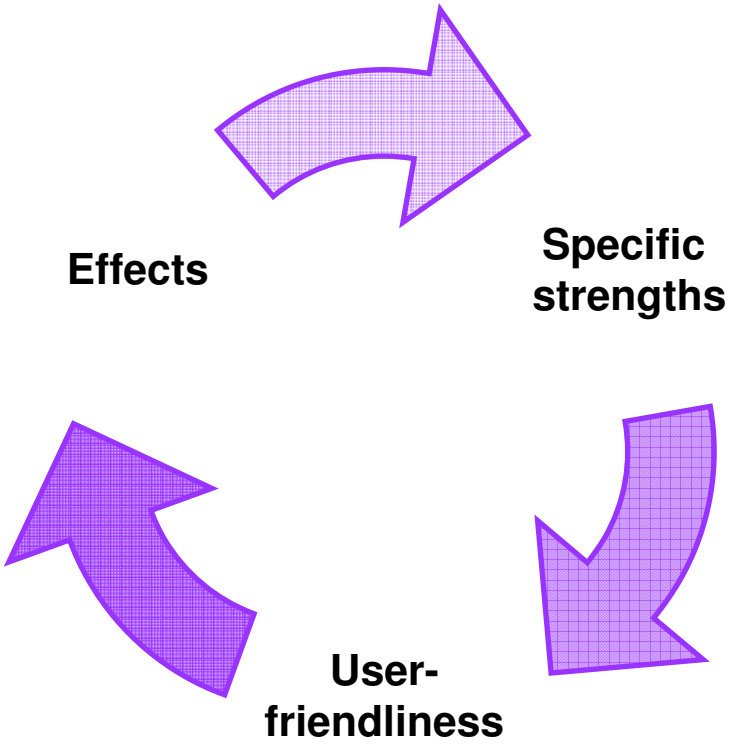
Release: _____

Structure of the guideline: flowchart



Questionnaire

- **Specific strengths?**:
  Quality of chapters for risk assessment, quality of chapters for occupational safety measures, evaluation of flowchart and examples
- **General user-friendliness?**:
  Comprehensibility, proposals for modification
- **Effects of the guideline?**:
  Dissemination, feedback, changes of practices and protection measures, Improvement of risk assessment



Topics in this workshop

- Recommendations and level of detail **adequate** for practical use?
- Additional or less information?
- More **legally binding** character better for practical usefulness?
- Optimal **design** for training materials (content, media and language)?
- How can **dissemination** be supported by NanoValid partners and beyond?

Figure: BAuA/Uwe Völkner – FOX-Fotoagentur, Lindlar/Cologne

Working Sessions

WS1: Field study – Design
(Chair: Christof Asbach, IUTA)
Room **B 301**

WS2: Training and education
(Chair: Clarissa Eickholt, systemkonzept)
Room **A 208**

WS 3: Practical guideline – What do we expect?
(Chair: Rolf Packroff, BAuA)
Room **A 400**

Thank you very much for your attention!

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