



NANEX WP2 – Exposure Scenarios Summary

Please note this ES was not developed as part of a full risk assessment process, and may not necessarily describe exposure conditions for which there are no risks to human health and the environment

Standard Exposure Scenario Format 1: For Uses Of Substances By Workers

Title:	Production of MWCNT using a tube furnace	Date:	08/07/2010
SubstanceType	CNT	Entered By:	TNO

Internal reference ID: ES 10

List of all use descriptors related to the life cycle stage and all the uses under it; include market sector (by PC) if relevant:

SU 3; PC ?; PROC 15

List of names of contributing exposure scenarios and corresponding PROCs/PCs

CES 1: Production of MWCNT on a silicon substrate

CES 1: Name of contributing exposure

Production of MWCNT on a silicon substrate

Further specification

The process to be monitored involved the production of multiwall carbon nanotubes (MWCNT) inside a tube furnace. In this process, carbon is dissolved in toluene and fed (using a syringe feed) into a glass tube that passes through the furnace. Inert argon gas is used to transport the nanotubes to be deposited onto a silicone substrate. Nanotubes of diameter 60nm and length 90µm are collected in a vertical orientation. The resultant substrate is transferred to a fume cupboard where the MWCNTs are harvested into a vial using a microscope and a small handheld manipulator/cutter.

Product characteristics

Nanotubes of diameter 60nm and length 90µm, collected on silicon substrate

Amounts used

not reported

Frequency and duration of use/exposure

duration 46 minutes, frequency not reported

Human factors not influenced by risk management

not reported

Other given operational conditions affecting workers exposure

Laboratory is a heat treatment laboratory in a university. It is located on the top floor of a city centre building. The laboratory was approximately 25m x 9m x 6m high and contained a number of drying ovens and both tube furnaces and conventional furnaces that formed the centre of experimental rigs for various research projects. The windows were sealed, however several holes had been cut through the brickwork above the windows to allow plastic tubing to protrude (un sealed) outside, presumably to vent gases and/or liquids.

Technical conditions and measures at process level (source) to prevent release

not reported

Technical conditions and measures to control dispersion from source towards the worker

The room was well ventilated and cool air could be felt flowing through the room. Above the tube furnace was a large extract hood that covered the entire bench. The hood inlet was approximately 1.5 x 4.3m and 2 m above ground and therefore served many of the other furnaces on the bench. It was connected to two 0.5m x 0.5m ducts through which the air was drawn.

Organisational measures to prevent /limit releases, dispersion and exposure

not reported

Conditions and measures related to personal protection, hygiene and health evaluation

nitrile gloves and polyester/cotton coveralls were worn. No evidence of use of RPE

Additional good practice advice (for environment) beyond the REACH CSA

Not reported

Exposure Estimation

SMPS: particles < 100 nm during activity: 16063 #/cm3 (AM)
particles < 100 nm during non-activity: 12046 #/cm3 (AM)
particles > 100 nm during activity: 1962 #/cm3 (AM)
particles > 100 nm during non-activity: 1112 #/cm3 (AM)

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References

Ref Title: D2.2 Report of results and implications of main study to measure nanoparticle concentrations in workplaces - Part 1: Main summary
Author: NANOSH
Journal:
Ref Year: 2010