

RESEARCH GRADES

Carbon Nanotubes

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier:

Product identifier used on the label:	NC3100™
Other means of identification:	Multi-walled carbon nanotubes (MWCNTs) Short tangled MWCNTs obtained by catalytic chemical vapour deposition - Synthetic graphite in tubular shape. Purified MWCNT grade.
EC Number/ List Number:	- / 936-414-1
CAS Number:	-
REACH Registration Number (RRN):	01-2119879048-26-0001
Belgium Nanoregister Number:	Please contact Nanocyl S.A.

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant Identified Uses:	Additive for Industrial and Professional use.
Uses Advised against:	The product is not intended for food contact applications, prolonged or repeated contact with skin/oral cavity, use in toys or medical devices.

1.3 Details of the supplier of the safety data sheet

Manufacturer:	Nanocyl S.A. Rue de l'Essor, 4 - B-5060 Sambreville - Belgium
Phone:	+ 32 71 750 380 (office hours) - Fax: + 32 71 750 390
E-mail:	info@nanocyl.com

1.4 Emergency telephone number

Phone:	+ 32 71 750 380 (office hours, English and French)
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SECTION 2. Hazards identification

2.1 Classification of the substance or mixture

2.1.1 Classification according to Regulation (EC) No 1272/2008 (CLP)

This substance does not meet the criteria for classification according to Regulation (EC) 1272/2008 [CLP].

2.1.2 Additional information: See Section 2.3.

2.2 Label elements

- * Pictograms: not applicable
- * Signal words: not applicable
- * Hazard statements: not applicable
- * Precautionary statements (assigned based on expert judgement):
 - P233** Keep container tightly closed.
 - P260** Do not breathe dust/fume/gas/mist/vapours/spray.
 - P273** Avoid release to the environment.
 - P280** Wear protective gloves/protective clothing/eye protection/face protection.

2.3 Other hazards

Dust may form explosive mixture with air.

SECTION 3: Composition/information on ingredients

3.1 Substances

Main constituent	CAS nr / EC nr / List Nr	% (wt.)	Classification CLP
Short tangled Multi-walled carbon nanotubes (MWCNTs)	- / - / 936-414-1	> 95	-

SECTION 4. First aid measures

4.1 Description of first aid measures

- After skin contact: Remove contaminated clothing immediately. Wash contacted skin areas with plenty of cold to lukewarm water and soap. If irritation develops, consult a physician.
- After eye contact: Hold the eyes open and rinse with water for a sufficiently long period of time (at least 10 minutes). Obtain medical attention if pain, blurred vision, swelling, burning or redness persists.

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After inhalation: If high concentration of dust is inhaled, move the person into fresh air, keep warm and allow to rest. If breathing is difficult, oxygen may be administered and medical attention should be obtained.

Ingestion: Do not induce vomiting. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. Obtain medical attention.

4.2 Most important symptoms and effects, both acute and delayed: See Section 2.

4.3 Indication of any immediate medical attention and special treatment needed: See Section 4.1.

SECTION 5. Firefighting measures

5.1 Extinguishing media

Suitable media: Water fog, Foam, Carbon Dioxide, Dry Chemical.

Unsuitable media: High volume water jet

5.2 Special hazards arising from the substance or mixture

Specific hazards: Dust can form explosive mixture with air.

Combustion products: May form toxic fumes, carbon monoxide, carbon dioxide, metal oxides

5.3 Advice for firefighters

Protective equipment's: Wear self-contained breathing apparatus. Wear suitable protective clothing.

SECTION 6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Equip cleanup crew with proper protection (see Section 8). Ensure adequate ventilation/exhaust extraction. Prevent formation of explosive dust-air mixture.

6.2 Environmental precautions:

Collect for disposal. Avoid discharge to natural waters, sewers and biological waste water treatment plants.

6.3 Methods and material for containment and cleaning up:

Collect the spilled material using a vacuum with a suitable filter or damp sweep. Industrial HEPA vacuum cleaners are recommended. Avoid formation of dust. Use sealable dedicated containers.

6.4 Reference to other sections: See Sections 8 and 13.

SECTION 7. Handling and storage

7.1 Precautions for safe handling

Avoid dust formation. Do not inhale dust.

Avoid contact with eyes and skin. Ensure there is no direct skin contact with product. Avoid direct eye contact with product, also via contamination on hands. Contact with skin and eyes and inhalation of dust should be avoided under all circumstances.

Handle in accordance with good industrial hygiene and safety procedures. Wash hands with soap and water before eating, drinking, smoking, applying cosmetics, or using toilet facilities.

See also Section 8.

In case of contact, ensure prompt removal from eyes, skin and clothing. See also Section 4.

Handle in accordance with good industrial hygiene and safety procedures. Wash with soap and water before eating, drinking, smoking, applying cosmetics or using toilet facilities.

7.2 Conditions for safe storage, including any incompatibilities

Keep only in the original closed container in a dedicated place. Keep containers in a cool, dry place with adequate ventilation. Keep away from open flames and high temperature.

Storage class Germany (Lagerungsklasse - LGK): 11 Combustible solids

7.3 Specific end use(s):

Recommendations: use the product as supplied in powder form in industrial or professional settings only.

SECTION 8. Exposure controls / Personal protection

8.1 Control parameters

Components with workplace parameters:

No official Occupational Exposure Limit has been established yet. Obtain special instructions before use.

Worker exposure to dust should be evaluated taking into account all activities carried out on site. The type of dust (respirable / breathable, organic / inorganic, ...) depends on these activities.

Derived No Effect Level (DNEL) for MWCNT – Inhalation - long term exposure of workers: 0.05 mg/m³

8.2 Exposure controls

8.2.1 Appropriate engineering controls:

Technical measures to prevent release:

Process enclosure and automation are advised to prevent release.

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Organisational measures to prevent exposure:

Wash hands and other exposed areas with mild soap and water before leaving work.

Depending on the exposure and activity, use disposable coveralls for cleanliness. Always remove contaminated clothing before entering clean areas.

Technical measures to prevent exposure:

Good ventilation of the workplace is required.

Local Exhaust Ventilation may be used to further reduce exposure.

Facilities handling or storing this material should be equipped with an emergency eyewash station.

8.2.2 Personal protection equipment:

8.2.2.1 Eye and face protection: Chemical goggles or safety glasses.

Recommended: Use eye protection according to EN 166.

8.2.2.2 Skin protection:

Body protection:

Wear gloves and other clothing as required to avoid contact

Hand protection:

Wear suitable protecting gloves (EN 374-3) to prevent soiling of hands.
Recommended materials include nitrile rubber (NBR; > 0.35 mm).
Unsuitable material: neoprene may absorb nanoparticles.

8.2.2.3 Respiratory protection:

Use respiratory protection when required by the workplace risk assessment. The inhalative risk assessment should consider the cumulative exposure to aerosols, vapours and dust on the workplace.

When directly exposed or handling the powder wear suitable respiratory equipment.

Recommended: filter P3 (EN 143).

8.2.2.4 Thermal hazards: Not applicable.

SECTION 9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance/Form:	solid; powder – nanomaterial, no surface modification intended
Odour/Odour threshold:	odorless
pH:	Not applicable.*
Solubility in water:	insoluble.
Melting point/freezing point:	> 400°C (estimated)
Initial boiling point and boiling range:	> 400°C (estimated)
Flash point:	Not applicable.*
Decomposition temperature:	~ 480°C (TGA) (estimated)
Smouldering temperature:	> 400°C (EN 50281-2-1) (estimated)
Auto-ignition temperature:	> 390°C at 1013 hPa (estimated)
Evaporation rate	Not applicable.*
Viscosity:	Not applicable.*
Vapour pressure:	Not applicable.*
Vapour density:	Not applicable.*

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Density:	No data available
Flammability (solid, gas):	Not fulfilling GHS/CLP criteria.
Oxidising properties	Not fulfilling GHS/CLP criteria.
Explosive properties	Not fulfilling GHS/CLP criteria.

* Testing can be waived because substance is a solid.

Formation of explosive dust/air mixtures (estimated)

Explosibility class:	ST1	(VDI 2263)
Explosive properties:	Kst = 42 bar.m/s	(VDI 2263)
Minimum Ignition Energy:	> 10 J	(VDI 2263)
Upper explosion limit	No data available.	
Lower Explosion Limit:	180 g/m ³	(EN 14034-3)

9.2 Other information

Bulk density: ~ 150 g/L

NOTE: The physical data presented above are typical values and should not be construed as a specification.

SECTION 10. Stability and Reactivity

10.1 Reactivity: No hazardous reaction when handled and stored according to provisions.

10.2 Chemical stability: Stable under normal handling and storage conditions.

10.3 Possibility of hazardous reactions: Hazardous polymerization will not occur.

10.4 Conditions to avoid: Exposure to moisture. Avoid dust formation

10.5 Incompatible materials: Strong oxidizing and reducing agents.

10.6 Hazardous decomposition products:

No hazardous decomposition products known at room temperature.

SECTION 11. Toxicological information

11.1 Information on toxicological effects

The following data comes is related to the non-purified grade.

Acute toxicity:

Test material	Route of exposure	LD50
MWCNT	Oral	> 5000 mg/kg
MWCNT	Dermal	> 2000 mg/kg

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Skin corrosion/irritation - Serious eye damage/irritation:

Test material	Organ	Result
MWCNT	skin	Not irritant
MWCNT	eye	Not irritant

Respiratory or skin sensitization: No data available.

Germ cell mutagenicity:

Test material	Method	Result
MWCNT	<i>In vitro</i> , AMES test	Negative

Carcinogenicity:

Test material	Exposure	Species	Result
MWCNT	2-years, intraperitoneal	rat	No carcinogenic response

Reproductive toxicity: No data available.

Summary of evaluation of the CMR properties:

Practical experiences do not give any evidence for CMR activity of categories 1 or 2.

STOT-single exposure: No data available.

Test material	Method	Result
MWCNT	Possible hazard	May be harmful if inhaled.

STOT-repeated exposure:

Test material	Exposure	Species, Target organ	Result
MWCNT	28 days, oral	rat	NOAEL: 0.5 mg/kg
MWCNT	5 days, inhalation	rat, lung (pulmonary inflammation)	LOAEC: 2 mg/m ³
MWCNT	90 days, inhalation	rat, lung (multifocal granulomatous inflammation)	LOAEC: 0.1 mg/m ³

Aspiration hazard: No data available

SECTION 12. Ecological information

12.1 Toxicity

The following data comes is related to the non-purified grade.

Acute toxicity

Test material	Study type	Result
MWCNT	Fish, 14 days	LC50: > 100 mg/l
MWCNT	Daphnia, 48 hours	EC50: > 100 mg/l
MWCNT	Algae, 72 hours	EC50: 134 mg/l

Chronic toxicity

Test material	Study type	Result
MWCNT	Fish, semi static	EC10: 100 mg/l
MWCNT	Daphnia, semi static	NOEC: > 25 mg/l

12.2 Persistence and degradability: Not readily biodegradable (according to OECD criteria).

12.3 Bioaccumulative potential

Partition coefficient n-octanol /water (log Kow): Not applicable.

Bioconcentration factor (BCF): No data available.

12.4 Mobility in soil: No data available.

12.5 Results of PBT and vPvB assessment:

This substance does not meet the PBT/vPvB criteria of REACH, annex XIII.

12.6 Other adverse effects: The substance has no ozone depleting potential.

SECTION 13. Disposal considerations

13.1 Waste treatment methods

13.1.1 Product / Packaging disposal:

Product: Dispose in accordance with applicable international, national and local laws, ordinances and statutes. For disposal within the EC, use the appropriate code according to the European Waste Catalogue (EWC).

Waste Catalogue (EWC) code: 061399 "wastes not otherwise specified"

Container: Empty containers can be landfilled after have been emptied as thoroughly as possible, when in compliance with the Environmental Protection Regulation and with local, state and federal regulations.

13.1.2 Waste treatment-relevant information: Avoid losses to the environment

13.1.3 Sewage disposal-relevant information: Do not allow to enter ground soil, sewage, drains.

13.1.4 Other disposal recommendations: No data available

SECTION 14. Transport information

No dangerous good in sense of these transport regulations:

Land transport (ADR/RID); Inland waterway transport (ADN); Sea transport (IMDG); Air transport (ICAO-TI / IATA-DGR); USA Department of Transport (DOT); Canada Transportation of Dangerous Goods (TDG).

14.1. UN number : None.

14.2. UN proper shipping name: Not applicable.

14.3. Transport hazard class(es) : Not applicable.

14.4. Packing group: Not applicable.

14.5. Environmental hazards: No.

14.6. Special precautions for user: Not applicable.

14.7. Transport in bulk according to Annex II of MARPOL and the IBC Code": Not applicable.

SECTION 15. Regulation information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Specific regulatory dossiers were established based on data generated on the above-mentioned product. For all dossiers, no CAS number was provided to the authorities and this product was registered under the chemical name "*short tangled multi-walled carbon nanotubes obtained by catalytic chemical vapour deposition*".

European Union

REACH

The substance "short tangled multi-walled carbon nanotubes obtained by catalytic chemical vapour deposition" (MWCNT) has been registered under REACH (RRN: 01-2119879048-26-0001). The substance as registered had no corresponding CAS number. The European Agency ECHA has however assigned the provisional EC List Number 936-414-1.

This product has been registered under the nanoform "NC3100".

Other regulations (EU)

Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances (SEVESO III): Not listed on Annex I.

Regulation (EC) No 1005/2009 of the European Parliament and of the Council of 16 September 2009 on substances that deplete the ozone layer (Ozone Depleting Substances): Not applicable.

Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (PIC): Not listed in Annex III (consulted on 26/04/2019).

Inventories

All components of this product are compliant with the following chemical inventories:

Japanese Existing and New Chemical Substances (ENCS), Korean Existing Chemicals List (ECL), Philippines Inventory of Chemicals and Chemical Substances (PICCS), Chinese Chemical Inventory of Existing Chemical Substance (IECS) and Taiwan Existing chemical Substance Nomination (ECN).

15.2 Chemical Safety Assessment:

A Chemical Safety Assessment has been carried out for this substance.

Safe use information was integrated in the core sections of the Safety Data Sheet.

SECTION 16. Other information

Voluntary safety information following the Safety Data Sheet format according to Regulation (EC) No. 1907/2006 (REACH).

Abbreviations and acronyms:

EC	European Commission
CLP	Classification Labelling and Packaging
REACH	Registration, Evaluation, Authorisation and restriction of Chemicals
TSCA	Toxic Substance Control Act
SDS	Safety Data Sheet

Vertical lines in the left hand margin indicate an amendment from the previous version.

Safety Data Sheet revision history:

Previous version:	: 9 March 2018	(V10)
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Disclaimer:

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