

RAW MULTI-WALL CARBON NANOTUBES (MWNT)

Material Safety Data Sheet

Nanothinx S.A.

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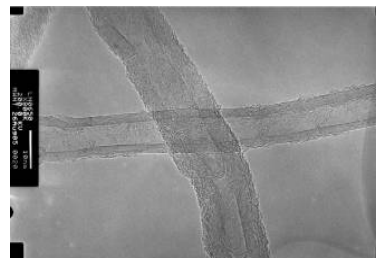
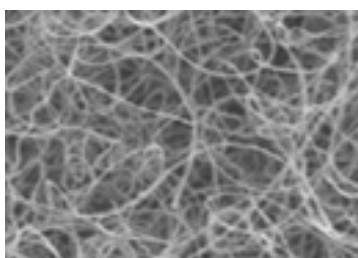
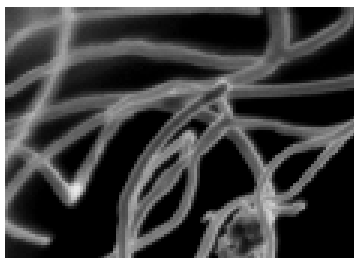
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1. Identification of Product

Trade name Multi-Wall Carbon Nanotubes
Manufacturer Nanothinx S.A.

2. Product Composition and Specifications

Raw MWNT		Characterization method
Production method	CCVD	
Available form	Black powder	
Diameter	NTX1: 15-35 nm NTX2: 15-30 nm NTX3: 25-40 nm NTX4 (thin MWNT): 6-10 nm	TEM, SEM
Length	$\geq 10 \mu\text{m}$	SEM, TEM
Layers	NTX1 & NTX2: 15-35 NTX3: 25-40 NTX4 (thin MWNT): 7-12	TEM
Nanotubes purity	NTX1: 97% NTX2: $\geq 95\%$ NTX3: $\leq 98.5\%$ NTX4 (thin MWNT): $> 90\%$	TGA, SEM
Metal particles	NTX1: 3% NTX2: $\leq 5\%$ NTX3: $\geq 1.5\%$ NTX4 (thin MWNT): $< 10\%$	TGA
Amorphous carbon	$< 1\%$	TGA, Raman
Surface area	NTX3, NTX2 & NTX1: 200-250 m ² /g NTX4: $\sim 300 \text{ m}^2/\text{g}$	BET
Bulk density	NTX1 & NTX2: $\sim 0.16 \text{ g/cm}^3$ NTX3: 0.20 g/cm^3 NTX4(thin MWNT): 0.15 g/cm^3	



3. Hazards Identification

Indications of Hazards to Humans and the Environment

Irritating to eyes and respiratory system.

4. First Aid Measures

After Inhalation

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

After Skin Contact

In case of contact, immediately wash skin with soap and copious amounts of water.

After Eye Contact

In case of contact, immediately flush eyes with copious amounts of water for at least 15 minutes.

After Ingestion

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

5. Fire Fighting Measures

Suitable extinguishing agents

Carbon monoxide (CO)

Extinguishing powder. Do not use water.

Special hazards caused by the material, its products of combustion or flue gases

Can be released in case of fire: carbon monoxide (CO)

Protective equipment

Wear self-contained breathing

6. Accidental Release Measures

Spill Procedure

Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

7. Handling and Storage

Handling

Do not breathe dust. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

Storage

Conditions of Storage: Keep tightly closed.

8. Exposure Control / Personal Protection

Engineering Control	Safety shower and eye bath. Mechanical exhaust required.
General Hygiene Measures	Wash thoroughly after handling.
Personal Protective Equipment	Respiratory Protection: Government approved respirator. Hand Protection: Compatible chemical-resistant gloves. Eye Protection: Chemical safety goggles.

9. Physical and Chemical Properties

Available form	Powder
Color	Black
Odor	Odorless
Melting point/Melting range	Not determined
Boiling point/Boiling range	Not determined
Ignition temperature	Not determined
Density	1.4 g/cm ³
Water	Insoluble

10. Stability

Stability	Thermal decomposition or combustion may produce smoke of carbon oxide and metal oxide
Materials to avoid	oxidizing and reducing agents, acids, halogens
Conditions to avoid	Avoid excessive heating
Dangerous reactions	No hazardous reaction when used as directed
Boiling point/Boiling range	Not determined

11. Toxicological Information

Primary irritant effect on the skin	Irritant for skin and mucous membranes.
Primary irritant effect on the eyes	Irritant effect
Sensitization	No sensitizing effect known.
Additional toxicological information	The acute and chronic toxicity of this substance is not fully determined

12. Ecological Information

Ecological effects information	The product is not expected to present an environmental hazard
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13. Disposal Considerations

As prepared the product is considered as non hazardous. It can then be either disposed in an approved landfill or destroyed by incineration. Volatile dust must be collected during incineration. Liquids containing significant amount of carbon nanotubes must be filtered before their released to the sewer.

14. Transport Information

Not regulated. Use precaution during transport in order to prevent accidental spill.
Not dangerous cargo. Keep separated from foodstuffs.

15. Regulatory Information

Risk Phrase(s)	Irritating to eyes, respiratory system and skin. S22 Do not breathe dust
Security Phrase(s)	S29 Do not empty into drains S36/37/39 Wear suitable protective clothing, gloves, eye/face protection.
National regulations	For use only by technically qualified individuals.
Information about limitation of use	Employment restrictions concerning young persons must be observed.
Water hazard class	Generally not hazardous for water.

16. Other Information

Nanothinx S.A. provides the information contained herein in good faith and makes no representation as to its comprehensiveness or accuracy. Employers should use this information only as a supplement to other information gathered by them, and should make independent judgment of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.