



1. Identification

Product Identifier

Carbon Nanotubes >1mm in length (CAS#: 308068-56-6)

Note: The closest CAS number for our formulation is CAS#: 308068-56-6, but our carbon nanotubes are different, primarily in their length, in ways that make them more suitable for certain applications and potentially safer to work with since they are too long to be inhaled.

Manufacturer

Company: Industrial CNT LLC (maker of Troll Hair)

Description: Industrial CNT LLC manufactures Troll Hair carbon nanotubes in Nevada and ships anywhere in the United States and internationally.

Main Contact: Lee Nolan

Phone: (917) 601-9449

Email: lee@trollhair.com

Recommended Use

Composite material strengthening, reinforcing agent, tensile strength additive, thermal conductivity, EM shielding, as a conductive additive.

Emergency Contact

Contact: Dr. Bradley Edwards

Phone number: (206) 661-5008

2. Hazard(s) identification

OSHA Hazards: Irritant

GHS Classification

- Eye irritation (Category 2A)
- Specific target organ toxicity - single exposure (Category 3)

Label elements:



Signal Word: Warning

Hazard Statements

- H319: Causes serious eye irritation
- H335: May cause respiratory irritation

Precautionary Statements

- P261: Avoid breathing dust.
- P280: Wear protective gloves/eye protection.
- P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
- P337+P313: If eye irritation persists: Get medical advice/attention.
- P304+P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
- P403+P233: Store in a well-ventilated place. Keep container tightly closed.
- P501: Dispose of contents/container in accordance with local/regional/national/international regulations.

HMIS Classification

- Health hazard: 2
- Flammability: 0
- Physical hazards: 0

NFPA Rating

- Health hazard: 2
- Fire: 0
- Reactivity Hazard: 0

Potential Health Effects

- Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
- Skin: May be harmful if absorbed through skin. May cause skin irritation.
- Eyes: May cause eye irritation.
- Ingestion: May be harmful if swallowed.

3. Composition/Information On Ingredients

Composition: Multi-walled carbon nanotubes (graphitic carbon) 94% - 100%

Metal Impurities: Balance

4. First-aid measures

After inhalation: Remove to fresh air. If required, provide artificial respiration. Keep patient warm. Seek immediate medical advice.

After skin contact: Immediately wash with water and soap and rinse thoroughly. Seek immediate medical advice.

After eye contact: Rinse opened eye for several minutes under running water. Then consult a doctor.

After swallowing: Seek immediate medical advice.

Most important symptoms/effects, acute and delayed

- Eye exposure: May cause irritation, redness, tearing, and temporary discomfort
- Inhalation: May cause respiratory tract irritation and coughing
- Skin contact: May cause temporary irritation, redness, or dryness of the affected area
- Ingestion: May cause gastrointestinal irritation and discomfort

Note: The symptoms/effects of carbon nanotubes are not well studied or understood. These are potential symptoms based on general knowledge of similar materials. Precautions should be taken to prevent inhalation, contact with skin or eyes, or ingestion.

Indication of immediate medical attention and special treatment needed: No data available

5. Fire-fighting measures

Suitable extinguishing media: Use alcohol-resistant foam, dry chemical or carbon dioxide

Specific hazards arising from the chemical: Hazardous decomposition products formed under fire conditions (Carbon oxides).

Hazardous combustion products: Carbon oxides (CO and CO₂ gas).

Special protective equipment: Wear self-contained breathing apparatus for firefighting if necessary

Further information: Fire fighting methods for carbon nanotubes are not well studied.

Note: Due to the hydrophobic nature of carbon nanotubes, water may have limited effectiveness as an extinguishing agent but can be used to cool exposed containers.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: Use personal protective equipment. Avoid dust formation. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions: Do not let product enter drains.

Methods and materials for containment and cleaning up: Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. Handling and storage

Precautions for safe handling: Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage, including any incompatibilities: Keep container tightly closed in a dry and well-ventilated place.

8. Exposure controls/personal protection

Occupational exposure limit values: No data available (Specific Occupational Exposure Limits (OELs) for carbon nanotubes are still evolving and may exist from organizations like NIOSH or under specific regulations.)

Appropriate engineering controls: Provide appropriate exhaust ventilation at places where dust is formed.

Individual protection measures (Personal protective equipment - PPE)

Respiratory protection: The EPA mandates the use of full face respirators with minimum N100 grade cartridges if there is any risk of exposure to carbon nanotube dust. For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection: For any handling steps where the substance is in particulate form or in a suspension with pure water where the substance is not solubilized, the gloves must be

composed of material that successfully passes ASTM F-1671. For any handling steps where the substance is part of a carrier liquid, other than the aqueous suspension noted in the previous paragraph, gloves must be composed of material that successfully passes ASTM F-739 (continuous liquid contact method). Gloves must be changed before they show degradation and before the designated breakthrough time for the carrier liquid (as determined by the ASTM F-739 testing or by the manufacturer). Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching the glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices.

Eye protection: Safety glasses with side-shields conforming to EN166. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection: Impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures: Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. Physical and chemical properties

Appearance

- Form: Solid, clumps up to several millimeters in the largest dimension.
- Color: Dark gray to black

Odor: Odorless

Odor threshold: Not applicable (odorless)

pH: Not applicable (insoluble in water)

Melting point/freezing point: Not applicable (decomposes before melting)

Initial boiling point and boiling range: Not applicable

Flash point: Not applicable (solid, requires very high temperatures for ignition)

Evaporation rate: Not applicable (solid)

Flammability (solid, gas): May burn at extremely high temperatures

Upper/lower flammability or explosive limits: Not applicable

Vapor pressure: Not applicable at normal conditions

Vapor density: Not applicable

Relative density/Bulk density: 1.7-2.1 g/cm³ (typical for MWCNTs)

Solubility: Insoluble in water

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

Auto-ignition temperature: No data available

Decomposition temperature: >450°C in air (oxidation begins)

Viscosity: Not applicable (solid)

Explosive properties: Not explosive

Oxidizing properties: To be determined

Specific properties

- Nanotube length: greater than 1mm
- Nanotube diameter: 50 – 120 nm

10. Stability and reactivity

Reactivity: Generally low reactivity under normal conditions. May react with strong oxidizing agents.

Chemical stability: Stable under recommended storage conditions.

Possibility of hazardous reactions: May react with strong oxidizers. No hazardous polymerization.

Conditions to avoid: Extreme temperatures (above 450°C) and strong oxidizing environments.

Incompatible materials: May conflict with strong oxidizing agents, strong oxidizing acids, or strong bases.

Hazardous decomposition products: No data available

Note: The reactivity and decomposition properties of carbon nanotubes have not been thoroughly investigated. This information represents the best available knowledge at the time of preparation and should be treated with appropriate caution.

11. Toxicological information

Acute toxicity

- Oral LD50: No data available
- Inhalation LC50: No data available
- Dermal LD50: No data available

Other information on acute toxicity: No data available

Skin corrosion/irritation: No data available

Serious eye damage/eye irritation: May cause eye irritation. Limited data available.

Respiratory or skin sensitization: May cause respiratory issues. Limited data available.

Germ cell mutagenicity: No data available

Carcinogenicity: Not classified — Carbon nanotubes, other than MWCNT-7 (Mitsui-7), are classified by IARC as Group 3 (not classifiable as to its carcinogenicity to humans).

Reproductive toxicity: No data available

Specific target organ toxicity - single exposure (STOT-SE): No data available

Specific target organ toxicity - repeated exposure (STOT-RE): No data available

Aspiration hazard: No data available

Additional Information: The chemical, physical, and toxicological properties of carbon nanotubes have not been thoroughly investigated.

12. Ecological information

Ecotoxicity: No specific data available for this product.

Persistence and degradability: Carbon nanotubes are expected to be persistent in the environment.

Bioaccumulative potential: No specific data available. Likely to accumulate due to physical properties.

Mobility in soil: Low mobility expected due to physical properties.

Other adverse effects: No specific data available. Prevent release to the environment as a precautionary measure.

13. Disposal considerations

Waste disposal recommendations: Dispose of contents/container in accordance with local/regional/national/international regulations. Consult an environmental professional for assistance with appropriate disposal methods.

Contaminated packaging: Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT (US): Not dangerous goods

IMDG: Not dangerous goods

IATA: Not dangerous goods

15. Regulatory information

OSHA Hazards: Irritant

SARA 302 Components: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards: No data available

TSCA: This material is, or may be, a "new chemical substance" under Section 5 of the Toxic Substances Control Act for which no Premanufacture Notice or other TSCA Section 5 authorization for commercial manufacture has been granted. It is supplied solely under the research and development exemption at TSCA § 5(h)(3) and 40 CFR 720.36, and its use is limited to research and development by the accompanying R&D-Only Material Supply and Use Agreement. Regulatory and inventory status in other jurisdictions has not been established; contact us before any export or use outside the United States.

Massachusetts Right To Know Components: No components are subject to the Massachusetts Right to Know Act.

Proposition 65 (California): Not listed

PFAS: Does not contain PFAS (per- and polyfluoroalkyl substances).

16. Other information

Disclaimer: All information herein is accurate to the best of our knowledge at the time of publication. Industrial CNT provides the information contained herein in good faith and makes no representation as to its comprehensiveness, accuracy, or completeness. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. Industrial CNT makes no representations or warranties, either express or implied, regarding the suitability of the material for any purpose or the accuracy of the information contained within this document. Accordingly, Industrial CNT will not be responsible for damages resulting from use of or reliance upon this information.