Safety Data Sheet (SDS)
Freeze Dried Powder
Single-wall Carbon Nanotubes

SECTION 1 PRODUCT IDENTIFICATION

PRODUCT NAME: Freeze Dried Powder Single-wall Carbon Nanotubes – SG65i, SG76, CG100, CG200, CG300, CG301X, CS65-39X, EG150X

OTHER/GENERIC NAMES: SWNT Ink, SWCNT Ink, Single-wall Carbon Nanotube Ink

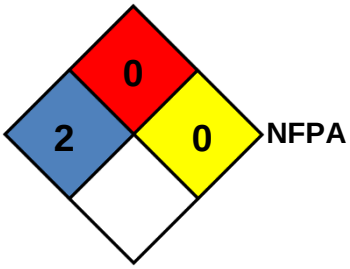
MANUFACTURER:
Chasm Advanced Materials, Inc.
480 Neponset Street, Bldg 6
Canton, MA 02021 USA
Tel: +1.781.821.0443
Fax: +1.781.821.0447
www.chasmtek.com
safety@chasmtek.com

EMERGENCY PHONE: +1.339.502.0440

PRODUCT USE: One or more components in this material have been approved for specific commercial uses under a US EPA TSCA Consent Order, apart from its non-restricted R&D use. Refer to section 15 for approved commercial uses and limitations/restrictions on its use.

SECTION 2 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Product is a freeze-dried powder. May cause eye, skin and respiratory tract irritation. The complete physical and toxicological properties of this material have not been fully evaluated.



NFPA

HMIS

OSHA HAZARDS: Irritant

GHS CLASSIFICATION

EYE IRRITATION: Category 2A

SPECIFIC TARGET ORGAN TOXICITY Single exposure, Category 3

GHS LABEL ELEMENTS

PICTOGRAMS 

SIGNAL WORD Warning

HAZARD STATEMENT(S)

H319 Causes serious eye irritation

H335 May cause respiratory irritation

PRECAUTIONARY STATEMENT(S)

P261	Avoid breathing dust/fume/gas/vapors/spray
P305+P351+P338	If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to. Continue rinsing

POTENTIAL HEALTH HAZARDS

***SKIN*:**	May cause skin irritation.
***EYES*:**	May cause eye irritation.
***INHALATION*:**	May cause irritation to the mucous membranes and upper respiratory tract. The product presents an increased inhalation hazard because of the small particle size.
INGESTION:	Not a probable route of exposure. This material may be harmful if swallowed (e.g. unintentional hand-to-mouth transfer).
***DELAYED EFFECTS*:**	None known.

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	*NTP STATUS*	*IARC STATUS*	*OSHA LIST*	*ACGIH STATUS*
Cobalt Compounds	Group 2[2]	2B[3]	None	A3[4]

[2] Reasonably anticipated to be human carcinogens

[3] Possibly carcinogenic to humans

[4] Confirmed animal carcinogen with unknown relevance to humans

SECTION 3 COMPOSITION AND INFORMATION ON INGREDIENTS

INGREDIENT NAME[1]	*CAS NUMBER*	*WEIGHT %*
Single-wall Carbon Nanotubes	NA	90-99
Impurities (including Magnesium, Silicon, Iron, Molybdenum and Cobalt, plus their oxides or carbides)	Various	1-10

This material is considered as hazardous under OSHA regulations.

[1] Trace impurities and additional material names not listed above may also appear in Section 15 towards the end of the SDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

SECTION 4 FIRST AID MEASURES

GENERAL:	Contaminated clothing should be removed and washed before reused.
SKIN:	Wash with soap and water. Get medical attention if irritation develops or persists.
EYES:	Flush eyes with plenty of water for at least 15 min. Get medical attention if irritation develops or persists.
INHALATION:	Remove to fresh air. If not breathing, give artificial respiration. Get medical attention if irritation develops or persists.
INGESTION:	If person is conscious, rinse mouth with water. Do not induce vomiting unless directed to do so by a physician. Get medical attention immediately.
ADVICE TO PHYSICIAN:	No specific advice, treat symptomatically.

SECTION 5 FIRE FIGHTING MEASURES

SUITABLE EXTINGUISHING MEDIA:

Water, Carbon Dioxide, Dry Chemical or Alcohol-Resistant Foam.

DECOMPOSITION PRODUCTS:

Carbon Monoxide, Carbon Dioxide and Metal Oxides.

UNUSUAL FIRE & EXPLOSION HAZARDS:

Airborne dust from the dried dispersion in an enclosed space and in the presence of an ignition source may constitute an explosion hazard.

Sealed container may rupture when heated.

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

As in any fire, wear NIOSH/MSHA approved positive pressure self-contained breathing apparatus and full protective clothing, as combustion may produce hazardous fumes.

SECTION 6 ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE:

Use appropriate personal protection during clean up (Section 8).

Avoid inhalation of powder, fume and vapor as well as skin or eye contact. Keep unprotected personnel away.

Extinguish all ignition sources. Avoid sparks, flames, heat and smoking.

Remove mechanically by a method that minimizes the generation of airborne dust (HEPA equipped vacuum, wet mopping, etc.).

Absorb material and place in appropriate containers for disposal. Do not allow spilled material or wash water to enter sewers, surface water, or ground water. Refer to section 13 for disposal information.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

SECTION 7 HANDLING AND STORAGE

NORMAL HANDLING:

Always wear recommended personal protective equipment.(Section 8).

Avoid formation of dust and aerosols. Keep in closed containers. Additional sealing may prevent accidental dust release. Use local exhaust or general room/dilution ventilation sufficient to maintain exposure below permissible exposure limits (29 CFR 1910.1001 for asbestos). If possible, use in a closed well-ventilated area (e.g. fume hood).

STORAGE RECOMMENDATIONS:

Store product in closed containers, in a dry and well ventilated place, away from any possible source of ignition.

SECTION 8 EXPOSURE CONTROLS AND PERSONAL PROTECTION[5]

ENGINEERING CONTROLS:

General room ventilation is adequate for storage and ordinary handling. Use local exhaust at points of use to maintain exposure below the PEL/TLV exposure limits.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV[6]	OSHA PEL[7]	OTHER LIMIT
Single-wall Carbon Nanotubes	Not Available	TWA[8]=5mg/m^3	TWA[9,7]=7 µg/m^3 (respirable)
Insoluble Molybdenum Compounds, as Mo	TWA = 10 mg/m^3 (inhalable) TWA = 3 mg/m^3 (respirable)	TWA = 10 mg/m^3 (total dust)	None
Cobalt Compounds, as Co	TWA = 0.02 mg/m^3	TWA = 0.05 mg/m^3	15 µg/L urine[10], 1 µg /L blood

[5] Detailed information on handling carbon nanotubes may be found at the ASTM Standard E2535-07 "Std guide for Handling Unbound Engineered Nano-Scaled Particles in Occupational Settings" www.astm.org

[6] Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH) are 8-hour TWA concentrations unless otherwise noted

[7] PEL values represent limits established by the 1989 Air Contaminants Rule (29 CFR 1910.1000, Subpart Z, Table Z-1-A) which was subsequently revoked on June 30, 1993. Several states continue to enforce Table Z-1-A limits

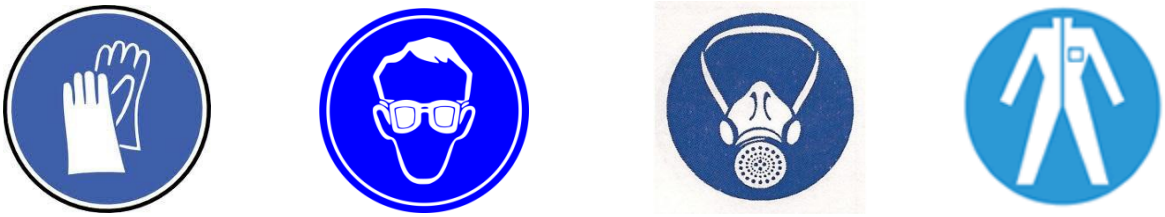
OSHA Permissible Exposure Limits (PELs) are 8-hour TWA (time-weighted average) concentrations unless otherwise noted.

[8] NIOSH Docket Number 161-A, "Occupational Exposure to Carbon Nanotubes and Nanofibers", November 2010

[9] NIOSH REL

[10] Biological Exposure Index (ACGIH)

PERSONAL PROTECTIVE EQUIPMENT



SKIN 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 comprised 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 comprised 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).

Wear full body clothing, impervious to the product.

***EYE PROTECTION*:**

Wear chemical goggles that conform to ANSI Z87.1 under normal conditions. Wear a full-face shield if there is a potential for contact with splashed material.

RESPIRATORY PROTECTION:

If there is potential for inhalation of dust, vapors, or aerosols wear a full-face NIOSH approved respirator with N100 cartridges or better.

The respirator must be selected based on contamination levels and use conditions found in the workplace. Use conditions must not exceed the working limits of the respirator. The respirator must be used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134).

HYGIENE MEASURES:

Keep away from foodstuffs, beverages and feed. Remove all soiled and contaminated material immediately. Wash hands before breaks and at the end of work.

***ADDITIONAL RECOMMENDATIONS*:**

Provide safety showers and eyewash stations in close proximity to the work area.

Detailed information on handling carbon nanotubes may be found at the ASTM Standard E2535-07 "Std guide for Handling Unbound Engineered Nano-Scaled Particles in Occupational Settings" www.astm.org

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:

None.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Black powder
PHYSICAL STATE:	Solid
ODOR:	None
SPECIFIC GRAVITY (water = 1.0):	0.114
SOLUBILITY IN WATER (weight %):	Insoluble
MELTING POINT:	3,652-3,697ºC
FLASH POINT[11]:	Not determined

[11] Flash point method and additional flammability data are found in Section 5

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY/CHEMICAL STABILITY

Normally stable.

THERMAL DECOMPOSITION/CONDITIONS TO AVOID

Decomposition will not occur if used and stored according to specifications.

INCOMPATIBILITIES/MATERIALS TO AVOID:

Strong oxidizing agents, acids, halogens, interhalogens, alkali metals.

HAZARDOUS DECOMPOSITION PRODUCTS:

Thermal decomposition products may include carbon monoxide, carbon dioxide and oxides of metallic impurities (including molybdenum and cobalt).

HAZARDOUS POLYMERIZATION:

Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION[12]

IMMEDIATE (ACUTE) EFFECTS: No data available

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS: No data available

OTHER DATA: None

12 Toxicological information on carbon nanotubes may be found at the website of International Council on Nanotechnology at http://cohesion.rice.edu/centersandinst/icon/.

SECTION 12 ENVIRONMENTAL INFORMATION[13]

No data available

13 Information on ecological harms can be found at the website of International Council on Nanotechnology at http://cohesion.rice.edu/centersandinst/icon/

SECTION 13 DISPOSAL CONSIDERATIONS

RCRA

Not classified as RCRA hazardous waste

OTHER DISPOSAL CONSIDERATIONS:

Except for small R&D samples, disposal of this product is not allowed by federal, state and local government regulations. It must be destroyed in hazardous waste incinerator and special care should be taken not to be released in the water.

NOTE: The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

SECTION 14 TRANSPORTATION INFORMATION

US DOT HAZARD CLASS: Not regulated.
US DOT ID NUMBER: Not applicable.

For additional information on shipping regulations affecting this material, contact the information number found In Section 1.

SECTION 15 REGULARTORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS:

This material is manufactured according to the terms of TSCA consent order, for PMN P10-0005 and should not be used for commercial purposes or in formulations used for commercial purposes, unless the recipient agrees in writing to comply with the requirements of the above consent order. As an exemption, the product can be further distributed only after it has been reacted, incorporated into an article or otherwise rendered into a physical form or state.

As a TSCA-exempt R&D substance, this product must be used by or directly under the supervision of technically qualified individual(s) as defined by TSCA, solely for R&D.

For additional information on TSCA status, contact the information number found on Section 1.

***OTHER TSCA ISSUES*:** None.

DSL STATUS

This product contains the following components that are not on the Canadian DSL nor NDSL lists

INGREDIENT NAME	*CAS-NO.*
Carbon Nanotubes.	NA

SARA TITLE III/CERCLA

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

***SECTION 311/312 HAZARD CLASS*:** Immediate (Acute)

SECTION 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.

STATE RIGHT-TO-KNOW

INGREDIENT NAME	*CAS-NO.*
Carbon Nanotubes.	NA

ADDITIONAL REGULATORY INFORMATION

WHMIS CLASSIFICATION (CANADA):

Not determined.

***FOREIGN INVENTORY STATUS*:**

All components of this product are listed on the following inventories:

Australian (AICS)	Canadian (DSL)
Chinese (IECSC)	European (EINECS)
Japanese (ENCS)	Korean (KECI)

SECTION 16 OTHER INFORMATION

CURRENT ISSUE DATE: November 30, 2016

PREVIOUS ISSUE DATE: April 22, 2016

CHANGES TO SDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:

November 30, 2016: Addition of CG301X product, updated logo and renamed document

April 22, 2016: Addition of EG150X product

March 28, 2016: Addition of CS65-39X product

February 3, 2016: Updated logo and manufacturer information

December 20, 2011: Scheduled updating of the document according to the most recent data. Addition of emergency phone number (Section 1). Addition of intended product use (Section 1). Addition of pictograms (Sections 3 and 8). Addition of GHS (Globally Harmonized System) elements (Section 3) Addition of information websites (Sections 8, 11 and 12).

OTHER INFORMATION:

None

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CAUTION! POTENTIAL HAZARDS OF THIS EXPERIMENTAL PRODUCT ARE UNKNOWN.

MANUFACTURED UNDER U.S. PATENT NOS. #6,333,016, #6,413,487, #6,955,800 AS WELL AS OTHER PENDING PATENT APPLICATIONS IN THE U.S. AND AROUND THE WORLD.