Safety Data Sheet

Prepared in accordance with WHMIS 2015

Performance Through Carbon Chemistry

Date of the latest revision: July 28th, 2021

GrapheneBlacK™

1. Identification

Product identifier used on the label:	**Graphene**
Brand/Grades:	GrapheneBlack™ 0X, GrapheneBlack™ 3X
Other means of identification:	
Other means:	Few-layer graphene platelets with predominant thickness of 6-10 layers and predominant lateral dimension of less than 2 micrometers
Synonyms:	None known
CAS No.:	1034343-98-0
Recommended use of the chemical and restrictions on use:	
Recommended use:	Additive/reinforcing agent for plastics, rubbers, coatings; Anthracite pigment; Additive for battery electrodes; Processing aid; Light and UV stabilizer; Conductive agent.
Restrictions on use:	Under section 86 of the *Canadian Environmental Protection Act*, any person in physical possession or control of the substance in Canada is obligated to comply with Significant New Activity Notice No. 20405, which is available at http://www.gazette.gc.ca/rp-pr/p1/2020/2020-11-28/html/notice-avis-eng.html#na1. Without limiting the generality of the immediately preceding sentence, Significant New Activity Notice No. 20405 identifies in particular applications involving the use of the substance in *consumer products* to which the *Canada Consumer Product Safety Act* applies, and *cosmetics* as defined in section 2 of the *Food and Drugs Act* (Canada), as a spray, mist or aerosol, where the substance is present in a concentration that is greater or equal to 1% by weight.
Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party:	NanoXplore Inc. 4500 Thimens Blvd., Montreal, QC, Canada, H4R 2P2
Telephone number:	+1-514-935-1377
E-mail address:	info@nanoxplore.ca
Emergency phone number:	+1-514-935-1377

2. Hazard(s) identification

Classification of the chemical in	Combustible dust

accordance with paragraph (d) of §1910.1200:

(b) Information elements referred to in section 3 of Annex 3 of the GHS and in paragraphs 3(1)(d) to (f) of these Regulations for each of those categories or subcategories. If the required information element is a symbol, either the name of the symbol or the symbol itself may be used:

GHS Hazard class symbols: No hazard symbols required

Signal Word: Warning

Hazard Statements: May form combustible dust concentrations in air

Hazards not otherwise classified:

Physical hazards not otherwise classified: None known

Other hazards: This product has a weak to moderate explosion risk.

Health hazards not otherwise classified None known

% unknown toxicity (Oral): 0 % of the mixture consists of ingredient(s) of unknown toxicity

% unknown toxicity (Dermal): 0 % of the mixture consists of ingredient(s) of unknown toxicity

% unknown toxicity (Inhalation Dust): 0 % of the mixture consists of ingredient(s) of unknown toxicity

3. Composition/information on ingredients

Chemical Name	Common name and synonyms	CAS #	concentration %
Graphene	None known	1034343-98-0	~ 100

4. First-aid measures

Description of necessary measures, subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion:

Inhalation: Remove to fresh air. If breathing is difficult, give oxygen. Get medical attention if symptoms persist.

Eye Contact: Flush eyes with plenty of water.

Skin Contact: Wash off with soap and water.

Ingestion: Do not induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Seek medical attention if symptoms

	develop.
Most important symptoms/effects, acute and delayed:	To the best of our knowledge, the substance does not cause any immediate/acute effects/symptoms.
Indication of immediate medical attention and special treatment needed, if necessary:	None known

5. Fire-fighting measures

Suitable (and unsuitable) extinguishing media:

Suitable extinguishing media:	Dry chemical, carbon dioxide, water spray or alcohol resistant foam
Unsuitable extinguishing media:	None known
Specific hazards arising from the chemical:	This product has a weak to moderate explosion risk. Conductive items should be bonded and grounded (<10 Ohms to the ground). Avoid "Propagating Brush Discharges" by restricting use of insulating liners and coatings.
Hazardous combustion products:	Carbon dioxide, Carbon monoxide
Special protective equipment and precautions for fire-fighters:	Do not enter fire area without proper protection including self-contained breathing apparatus (SCBA) and full protective equipment.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures:	Clean up spills immediately using protective equipment recommended in Section 8 at a minimum.
Methods and materials for containment and cleaning up:	The substance is insoluble in water and is not known to pose any significant environmental hazards. Keep it in suitable, closed containers for disposal. As a matter of good practice, minimize contamination of sewage water, soil, groundwater, drainage systems, or bodies of water.

7. Handling and storage

Precautions for safe handling:	As with all chemicals, good industrial hygiene practices should be followed when handling this material. Conducting items should be bonded and grounded (<10 Ohms to ground). Avoid "Propagating Brush Discharges" by restricting use of insulating liners and coatings.

Conditions for safe storage, including any incompatibilities:

Safe storage conditions:	Keep container closed when not in use. Keep in a dry, cool, and well-ventilated location.
Materials to Avoid/Chemical Incompatibility:	Strong oxidizing agents

8. Exposure controls/personal protection

Exposure Controls/Personal Protection:

Canada – Alberta – Occupational Exposure Limits:

Chemical component	Occupational Exposure Limits - TWAs	Occupational Exposure Limits - STEL	Occupational Exposure Limits - Ceiling
No data available			

Canada – British Columbia– Occupational Exposure Limits:

Chemical component	Occupational Exposure Limits - TWAs	Occupational Exposure Limits - STEL	Occupational Exposure Limits - Ceiling
No data available			

Canada – Manitoba – Occupational Exposure Limits:

Chemical component	Occupational Exposure Limits - TWAs	Occupational Exposure Limits - STEL	Occupational Exposure Limits - Ceiling
No data available			

Canada – New Brunswick – Occupational Exposure Limits:

Chemical component	Occupational Exposure Limits - TWAs	Occupational Exposure Limits - STEL	Occupational Exposure Limits - Ceiling
No data available			

Canada – Newfoundland & Labrador – Occupational Exposure Limits:

Chemical component	Occupational Exposure Limits - TWAs	Occupational Exposure Limits - STEL	Occupational Exposure Limits - Ceiling
No data available			

Canada – Northwest Territories – Occupational Exposure Limits:

Chemical component	Occupational Exposure Limits - TWAs	Occupational Exposure Limits - STEL	Occupational Exposure Limits - Ceiling
No data available			

Canada – Nova Scotia – Occupational Exposure Limits:

Chemical component	Occupational Exposure Limits - TWAs	Occupational Exposure Limits - STEL	Occupational Exposure Limits - Ceiling
No data available			

Canada – Nunavut – Occupational Exposure Limits:

Chemical component	Occupational Exposure Limits - TWAs	Occupational Exposure Limits - STEL	Occupational Exposure Limits - Ceiling
No data available			

Canada – Ontario – Occupational Exposure Limits:

Chemical component	Occupational Exposure Limits - TWAs	Occupational Exposure Limits - STEL	Occupational Exposure Limits - Ceiling
No data available			

Canada – Prince Edward Island – Occupational Exposure Limits:

Chemical component	Occupational Exposure Limits - TWAs	Occupational Exposure Limits - STEL	Occupational Exposure Limits - Ceiling
No data available			

Canada – Quebec – Occupational Exposure Limits:

Chemical component	Canada - Occupational Exposure Limits - TWAEVs	Occupational Exposure Limits - STEVs	Occupational Exposure Limits - Ceiling
No data available			

Canada – Saskatchewan – Occupational Exposure Limits:

Chemical component	Occupational Exposure Limits - TWAs	Occupational Exposure Limits - STEL	Occupational Exposure Limits - Ceiling
No data available			

Canada - Yukon – Occupational Exposure Limits:

Chemical component	Occupational Exposure Limits - TWAs	Occupational Exposure Limits - STEL	Occupational Exposure Limits - Ceiling
No data available			

Appropriate engineering controls: Use an exhaust ventilation system and/or process enclosure to minimize airborne dust. If handling results in dust generation, special ventilation may be needed to minimize dust exposure. If heated material generates vapor or fumes, use process enclosures, local exhaust ventilation, or other engineering controls to control exposure.

Individual protection measures, such as personal protective equipment:

Respiratory protection: To minimize risk of over exposure to dust, vapour or fumes it is recommended that a local exhaust system is placed above the equipment, and that the working area is properly ventilated. If ventilation is inadequate, use certified respirator that will protect against dust/mist.

Eye protection: Wear safety glasses or goggles.

Skin protection: Wear appropriate protective clothing and gloves to minimize skin contact.

Gloves: Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching 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.

General hygiene conditions: Handle in accordance with general industrial hygiene practice.

9. Physical and chemical properties

Appearance (physical state, color etc.):

Physical state: Powder

Color: Black

Odor: Odorless

Odor Threshold: No data available

pH: Not determined

Melting point/freezing point:

Melting Point: Approx. 4500 °C

Freezing point:	No data available
Initial boiling point and boiling range:	No data available
Flash Point:	Not applicable
Evaporation Rate:	No data available
Flammability (solid, gas):	May form combustible dust concentrations in air
Upper/lower flammability or explosive limits:	
Upper flammability or explosive limits:	Not applicable
Lower flammability or explosive limits:	Not applicable
Maximum Explosion Pressure-Pmax:	5.8 bar·g
Maximum Rate of Pressure Rise-dP/dt:	151 bar/s
Kst Value:	41 bar·m/s
Vapor pressure:	No data available
Vapor density:	No data available
Relative density:	2.2 g/cm^3
Solubility(ies):	Insoluble
Biodegradability:	Not readily biodegradable
Partition coefficient: n-octanol/water:	No data available
Auto-ignition temperature:	No data available
Minimum Ignition Energy-MIE:	>2000 mJ
Decomposition temperature:	600°C
Viscosity:	No data available

10. Stability and reactivity

Reactivity:	No data available
Chemical stability:	Stable under normal conditions
Possibility of hazardous reactions:	None expected under standard conditions of storage
Conditions to avoid (e.g., static discharge, shock, or vibration):	No data available
Incompatible materials:	Strong oxidizing agents
Hazardous decomposition products:	Carbon dioxide, Carbon monoxide

11. Toxicological information

Description of the various toxicological (health) effects and the available data used to identify those effects:

Information on the likely routes of exposure: Inhalation, Dermal, Oral

Inhalation: Female/Male Rat: Well tolerated (OECD 436):
Mortality = 0
Clinical Observation = No substance-related clinical signs
NOAEL (No-Observed-Adverse-Effect-Level) = 1.99 mg/L
Body Weights = No substance-related changes in body weight

Skin irritation: Albino Rabbits: No skin irritation (Score 0 according to OECD 404):
Mortality = 0
Clinical observations = No substance-related clinical signs
Erythema or Edema Observations = None
Body Weights = No substance-related changes in body weight
Assessment: Not irritating to skin

Dermal sensitization: Guinea Pigs: No dermal sensitization (Score 0 according to OECD 406):
Mortality = 0
Clinical observations = No substance-related clinical signs
Body Weights = No substance-related changes in body weight
Assessment: Not sensitizing to skin

Oral: Female/Male Mouse: LD50 > 5000 mg/kg (*Jiangsu provincial center for TSE, 2015)*

Repeated Dose Mammalian Toxicity:

Inhalation: Rat/Sprague-Dawley: No observed effect (OECD 412 (*Kim et al. ,2016*)):
NOAEC (No Observed Adverse Effect Concentration): > 1.88 mg/m^3
Assessment: No adverse toxicological effects at highest respirable dose

Target Organs Potentially Affected by Exposure: None known

Chemical Interactions that Change Toxicity:	No chemical interaction known to affect toxicity.
Symptoms related to the physical, chemical and toxicological characteristics:	The New Substance (NS) program of the Environment and Climate Change Canada (ECCC) did not identify any suspicion that the substance is toxic.

Delayed and immediate effects and also chronic effects from short- and long-term exposure:

Immediate effects from short term exposure:

Inhalation Toxicity:	No adverse effect has been observed in lung at maximum achievable aerosol concentration (OECD 436).
Skin Contact:	No skin irritation or skin sensitization was observed in animal studies (OECD 404 and 406).
Eye Contact:	Non eye irritant (OECD 492); UN GHS No Category
Ingestion Toxicity:	May be harmful if swallowed.

Delayed and chronic effects from long term exposure:

Chronic effects:	None known
Carcinogenicity:	The substance is not known to cause cancer.
Reproductive and Developmental Toxicity:	No data available to indicate product or any components present at greater than 0.1% may cause birth defects.
Teratogenicity:	No data available
Mutagenicity:	No data available to indicate product or any components present at greater than 0.1% is mutagenic or genotoxic.
***In Vitro* Test for Gene Mutations:**	Chinese Hamster, cell type V79 HPRT: Not mutagenic (OECD 476, *(Envoi, 2018)*)
***In Vitro* Mammalian Test for Chromosomal Aberrations:**	Human Peripheral Blood Lymphocytes: No evidence of genotoxic activity (OECD 473): Cytotoxicity: No cytotoxicity has been observed up to 2000 µg/mL of the substance concentration Incidental observations: No substantial increases in the incidence of chromatid or chromosome gaps, or polyploidy /endoreduplication/ premature centromere division Assessment: No evidence of genotoxic activity *in vitro* test for induction

	of chromosome damage was observed.
***In Vivo* Mammalian Test for Chromosomal Aberration OR Gene Mutations:**	Rats: No induction of the formation of micronuclei in polychromatic erythrocytes in the micronucleus test or DNA damage in the lung in the *in vivo* comet assay (OECD 474 and 489): Mortality = 0 Clinical observations = No substance-related clinical signs Assessment: No evidence of inducing the formation of micronuclei in polychromatic erythrocytes or DNA damage in the lung
STOT-single exposure:	Based on available data, the classification criteria are not met.
STOT-repeated exposure:	Based on available data, the classification criteria are not met.
Aspiration hazard:	Based on available data, the classification criteria are not met.
Synergistic Effects:	No data available

Numerical measures of toxicity (such as acute toxicity estimates):

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Graphene	Oral LD50 > 5000 mg/ kg	N/A- No dermal sensitization/irritation observed (OECD 406 and 404)	N/A- No mortality observed (OECD 436).

12. Ecological information

Ecotoxicity (aquatic and terrestrial, where available): This material is not expected to be harmful.

Ecological Toxicity Data:

Chemical Name	CAS #	Aquatic EC50 Crustacea	Aquatic ERC50 Algae	Aquatic LC50 Fish	Activated sludge (OECD 209)
Graphene	1034343-98-0	No data available	EC50-96H Chlorella pyrenoidosa Green algae, size 10^8 cells/100 mL 62.2 mg/L *(Zhao et al, 2017)*.	LC50 (48h) Daphnia magna > 16 mg/L [STATIC] *(Fan et al. 2016).*	3h NOEC = 1000 mg/L 3h EC10 > 1000 mg/L 3h EC50 > 1000 mg/L

Persistence and degradability:	Not soluble in water. Not readily biodegradable
Bioaccumulative potential:	No data available
Mobility in soil:	Not expected to migrate. Insoluble.
Other adverse effects (such as hazardous to the ozone layer):	None known

13. Disposal considerations

Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging:	It is the responsibility of the generator to determine at the time of disposal whether the product meets the criteria of a hazardous waste per regulations of the area in which the waste is generated and/or disposed of. Waste disposal must be in accordance with appropriate Federal, provincial, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

14. Transport information

Carriage of dangerous goods by road (DOT), rail or inland waterways:

UN number:	No data available
UN Proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group, if applicable:	Not applicable

International carriage of dangerous goods by sea (IMDG/IMO):

UN number:	No data available
UN Proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group, if applicable:	Not applicable

International carriage of dangerous goods by air (IATA):

UN number:	No data available
UN Proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group, if applicable:	Not applicable

Environmental hazards (e.g., Marine pollutant (Yes/No)):	No
Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code):	Not a marine pollutant
Special precautions which a user needs to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises:	Consult IMO regulations before transporting in bulk by ocean.

15. Regulatory information

Safety, health and environmental regulations, made within or outside Canada, specific to the product in question:

Canada - Domestic Substances List (DSL):

Chemical Name	CAS No	Canada - Domestic Substances List (DSL)
No data available		

Canada - Non-Domestic Substances List (NDSL):

Chemical Name	CAS No	Canada - Non-Domestic Substances List (NDSL)
No data available		

Canada - Controlled Drugs and Substances:

Chemical Name	CAS No	Schedule I	Schedule II	Schedule III	Schedule IV	Schedule V	Schedule VII	Schedule VIII
No data available								

Chemical Name	CAS No	Class A Precursors	Class B Precursors	Exempt Precursors	Class 1 Targeted Substances	Class 2 Targeted Substances
No data available						

Canada - CEPA - Schedule III Export Control List:

Chemical Name	CAS No	Part 1 Prohibited Substances	Part 2 Substances Subject to Notification or Consent	Part 3 Restricted Substances	Export Control List
No data available					

Canada CEPA - 2015 Greenhouse Gases (GHG) Subject to Mandatory Reporting:

Chemical Name	CAS No	Canada CEPA - 2015 Greenhouse Gases (GHG) Subject to Mandatory Reporting
No data available		

Canada - Narcotic Control Regulations (C.R.C., c. 1041):

Chemical Name	CAS No	Canada - Narcotic Control Regulations (C.R.C., c. 1041)
No data available		

Canada - Ontario - Toxics Reduction - List of Priority Toxics:

Chemical Name	CAS No	Canada - Ontario - Toxics Reduction - List of Priority Toxics
No data available		

16. Other information, including date of preparation or last revision.

Date of the latest revision of the safety data sheet: July 28th , 2021

Revision Number: 1

Reason for revision:

Disclaimer: The information contained in this Safety Data Sheet relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Information contained in this Safety Data Sheet is to the best of our knowledge and believed to be reliable but no representations, guarantees or warranties of any kind are made as to its accuracy or suitability for a particular application. It is the responsibility of the user/distributor to ensure that the information contained in the Safety Data Sheet is relevant to the product manufactured or sold, as the case may be. NanoXplore Inc.

makes no warranties, expressed or implied, in respect of the adequacy of this document for any particular purpose.