

MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: heXo-G V4 and heXo-G V20

Common Names: Graphene powders

Manufacturer: Group NanoXplore Inc

Address: 25 Rue Montpellier, Saint-Laurent, Quebec, Canada H4N 2G3

2. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: THIS MATERIAL MAY BE AN IRRITANT TO EYES, SKIN OR RESPIRATORY TRACT.

Potential Health Effects:

Eyes – may cause eye irritation.

Skin – may cause skin irritation.

Respiratory tract/inhalation – may cause irritation.

Ingestion – not hazardous in normal industrial use circumstances.

Physical Hazards:

Graphene is electrically conductive. Care should be taken, therefore, to avoid accumulations of graphene dusts or powders in places where these accumulations could cause shorting of electrical switches, circuits or components.

3. SPECIFICATIONS

	heXo-G V4	heXo-G V20	
Properties			
Average thickness	4-6	20	nm
Average flake size	3	50	µm
Bulk density	0.13	0.24	g/cm ³
Surface area (BET method)	100-150	30	m ² /g

Content

Appearance	Light Powder	Powder	
Carbon content	> 93	> 92	wt.%
Oxygen content	< 4	< 5	wt.%
Ash content	2.7	2.5	wt.%
Moisture	< 0.5	< 0.6	wt.%

4. FIRST AID MEASURES

General: In the case of prolonged irritation or other adverse effects, contact a physician. Inhalation: Remove from exposure to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, begin artificial respiration immediately. Seek medical attention.

Eye contact: Flush eyes with water for 15 minutes, lifting the eyelids to separate them. Do not rub eyes or keep them closed.

Skin contact: Wash with soap and water.

Ingestion: Rinse mouth with water. Ingestion of large amount may cause internal injury.

Clothing: contaminated clothing should be removed and washed thoroughly before re-use.

5. FIRE FIGHTING MEASURES

In general, graphene is difficult to combust. Normal care should be taken to avoid dust explosion risk through high concentrations of dust or finely-suspended airborne particles, although graphene dust is not normally considered an explosion hazard. Suitable Extinguishing Media: water, carbon dioxide, dry chemical powder or foam as appropriate for surroundings.

Other Combustion Hazards: in the event of combustion or thermal decomposition, this material may release carbon monoxide (CO) or carbon dioxide (CO₂) or other toxic gases. At high temperatures (>300°C), this material may react with potassium, sodium, rubidium, or cesium to create intercalation compounds that may ignite and may react explosively with water.

Protective Equipment: As with any fire, wear self-contained breathing apparatus and protective clothing to prevent contact with skin, eyes or lungs.

6. ACCIDENTAL RELEASE MEASURES

Spilled or released material should be collected mechanically and disposed of in suitable containers. Use care during cleanup to prevent the creation of concentrations of dust.

Personnel: Clean-up personnel should wear suitable protective equipment to prevent inhalation or skin contact. Cleanup personnel should beware of the risk of slippage due to the material's low coefficient of friction.

Environmental: Do not discharge into storm or sanitary sewers or groundwater.

7. HANDLING AND STORAGE

This material is stable at room temperature and does not pose a significant risk of combustion. This material should be stored in labeled, closed containers away from sources of ignition or heat. Care should be taken to avoid creating accumulations or concentrations of dust, since any dust can form a potentially explosive mixture in air. Graphene is electrically conductive. Care should be taken, therefore, to avoid accumulations of graphene dusts or powders in places where these accumulations could cause shorting of electrical switches, circuits or components.

Advice on Safe Handling: Provide good ventilation when handling. Personnel should take measures to avoid breathing dust created when handling and should wear suitable protective clothing to prevent skin and eye contact.

8. EXPOSURE CONTROL/PERSONAL PROTECTION

CAS Number: Not Assigned

Component Name: Graphene powders

Exposure Limits: None established, (The exposure limit of Graphene is different from exposure limits to Graphite due to fine particles of Graphene. It is recommended to reduce the exposure time to minimum possible by following good industrial hygiene practice to minimize any effect on lungs. Skin exposure should also be minimized.

Personal Protective Equipment

Respiratory protection: Protect against inhalation using an adequate workplace ventilation. If dusts are generated through handling, local exhaust ventilation should be employed.

Eye protection: Protect against contact with eyes by wearing suitable safety eyeglasses or chemical protective goggles or other face protection.

Skin protection: Protect against skin contact by wearing protective gloves. Protect against skin contact by wearing suitable clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Fluffy grey-black powder

Odor: odorless

Decomposition point: approximately 600°C

Flash point: not applicable

Boiling point: not applicable

Vapor density: not applicable

Solubility in water: Not soluble

Evaporation Rate: not applicable

10. STABILITY AND REACTIVITY

This material is stable and it is not reactive under normal condition. Avoid contact with strong oxidizing agents, fluorine, or chlorine trifluoride. Oxidizers may generate heat and may cause fire. Keep away from oxidizers. Avoid heat, sparks, flames, and all other source of ignition. Burned graphene may generate toxic gasses such as Carbon monoxide. There are no other known hazardous decomposition products.

11. TOXICOLOGICAL INFORMATION

The toxicity of Graphene has not been fully investigated. All exposure to graphene by inhalation or skin contact should be minimized.

Ingestion: Swallowing large amounts or repeated ingestion may cause internal injury.

Inhalation: Inhalation of dust may cause irritation of nose, throats, and upper respiratory tract.

Eye: May cause mild irritation.

Skin: No specific effects are known so far.

Chronic effects of exposure: There is no report studying the effects of exposure of graphene on chronic system. Exposure has to be minimized since there has been few cases of lung disease associated with exposure to graphite.

12. ECOLOGICAL INFORMATION

No data is currently available on Ecotoxicity of graphene. Components are expected to be biodegradable. To our knowledge, there is no reliable data regarding its bioaccumulation or mobility in environmental media, nor is there reliable data to suggest that it should be considered an environmental hazard.

13. DISPOSAL CONSIDERATIONS

Dispose of in accordance with all local, state, or federal regulations.

14. TRANSPORT INFORMATION

Not known regulation for transport of Graphene.

15. REGULATORY INFORMATION

No regulation information is available at this moment.

16. OTHER INFORMATION

The data offered above, is in good faith, as typical values and not as product specifications. No warranty, either expressed or implied, is hereby made. The recommended industrial hygiene and safe handling procedures are believed to be generally applicable. However, each user should review these recommendations in the specific context of the intended use and determine whether they are appropriate.