



GRAFPRI3D

Material Safety Data Sheet

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product Identifiers

Product name: graphene ink for extrusion printing

Manufacturer: GRAFPRI3D Inc.

Address: 945 Princess St., Kingston, ON. K7L 0E9

Brand: MC-LEX

Telephone: 1 613 900 4619

1.2 Emergency Contact Number

Emergency phone number: +1-703-527-3887 (CHEMTREC)

SECTION 2. HAZARDS IDENTIFICATION

2.1 Classification of the Substance or Mixture

GHS Classification in accordance with Hazardous Products Regulations (HPR) (SOR/2015/17)

Flammable liquids (Category 2), H225

Eye irritation (Category 2A), H319

2.2 GHS Label Elements, Including Precautionary Statements

Signal word: Warning

Hazard statement(s): H225 Highly flammable liquid. H319 Causes serious eye irritation

Precautionary Measures: P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

P233 Keep container tightly closed. P264 Wash skin thoroughly after handling. P280 Wear protective gloves/protective clothing/eye protection/face protection P303 + P361 + P353 **IF ON SKIN (or hair):** Take off immediately all contaminated clothing. Rinse skin with water.

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.

P370 + P378 **In case of fire:** use dry sand, dry chemical or alcohol-resistant foam to extinguish.

P403 + P235 Store in a well-ventilated place. Keep cool. P510 Dispose of contents/container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS: None

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Mixtures

Synonyms: graphene ink, conductive ink

Component	CAS#	%(w/w)
Ethanol	64-17-5	60-90
Ethyl Cellulose	9004-57-3	5-12
Graphene	1034343-98-0	2.5-20

SECTION 4. FIRST AID MEASURES

4.1 Description of First Aid Measures/General Advice

General Advice: Move out of dangerous area. Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled: If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact: Wash off with soap and plenty of water. Consult a physician.

In case of eye contact: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed: Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most Important Symptoms and Effects, Both Acute and Delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.

4.3 Indication of Any Immediate Medical Attention and Special Treatment Needed

No data available

SECTION 5. FIRE FIGHTING MEASURES

5.1 Conditions of Flammability

Not flammable or combustible. **Suitable Extinguish Media:** Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special Hazards Arising from the Substance or Mixture

Carbon dioxide, sulphur oxides.

5.3 Advice for Firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further Information

Use water spray to cool unopened containers.



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SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1 Personal Precautions, Protective Equipment and Emergency Procedures

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. For personal protection see section 8.

6.2 Environmental Precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and Materials for Containment and Cleaning Up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to Other Sections

For disposal see section 13

SECTION 7. HANDLING AND STORAGE

7.1 Precautions for Safe Handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge. For precautions see section 2.2.

7.2 Conditions for Safe Storage, Including Any Incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific End Uses

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

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

Components	CAS-No	Value	Control parameters	Basis
Ethanol	64-17-5	TWA	1,000 ppm 1,880 mg/m3	Canada, Alberta, Occupational Health and Safety Code (table 2: OEL)
		TWAEV	1,000 ppm 1,880 mg/m3	Québec, Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
		STEL	1,000 ppm	Canada, British Columbia OEL
		STEL	1,000 ppm	USA, ACGIH Threshold Limit Values (TLV)

8.2 Exposure Controls

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

Eye/Face Protection: SFace shield and safety glasses. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin Protection: 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. Wash and dry hands.

Body Protection: Impervious clothing. Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory Protection: Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of Environmental Exposure: Prevent further leakage or spillage if safe to do so. Do not let product enter drains.



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SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**9.1 Information on Basic Physical and Chemical Properties**

- a) **Appearance:** *Form:* liquid *Colour:* black
- b) **Odor:** No Data Available
- c) **Odor Threshold:** No Data Available
- d) **pH:** No Data Available
- e) **Melting/Freezing Point:** Melting point/range: -114 °C (-173 °F) - lit.
- f) **Initial Boiling Point & Boiling Range:** 78 °C (172 °F) - lit.
- g) **Flash Point:** 14.0 °C (57.2 °F) - closed cup
- h) **Evaporation Rate:** No Data Available
- i) **Flammability(solid/gas):** No data available
- j) **Upper/Lower Flammability or Explosive Limits:** No Data Available
- k) **Vapour Pressure:** No Data Available
- l) **Vapour Density:** No Data Available
- m) **Relative Density:** 0.9 – 1.0 g/cm³ at 25 °C (77 °F)
- n) **Water Solubility:** No Data Available
- o) **Partition Coefficient: n-octanol/water:** No Data Available
- p) **Auto-Ignition Temperature:** No Data Available
- q) **Decomposition Temperature:** No Data Available
- r) **Viscosity:** No Data Available
- s) **Explosive Properties :** No Data Available
- t) **Oxidizing Properties :** No Data Available

9.2 Other Safety Information

No Data Available

SECTION 11: TOXICOLOGICAL INFORMATION**11.1 Information on Toxicological Effects**

Acute Toxicity: LD50 Oral - Rat - male and female - 10,470 mg/kg (OECD Test Guideline 401)

LC50 Inhalation - Rat - male and female - 4 h - 124.7 mg/l (OECD Test Guideline 403)

LC50 Inhalation - Rat - 4 h - 30,000 mg/l
No data available

Skin Corrosion: Skin - Rabbit

Result: No skin irritation (OECD Test Guideline 404)

Serious Eye Damage/Eye Irritation: Eyes - Rabbit

Result: Causes serious eye irritation.(OECD Test Guideline 405)

Respiratory or Skin Sensitisation: Sensitisation test:

Result: negativeRemarks: (IUCLID)

Germ Cell Mutagenicity: Ames test Salmonella typhimurium

Result: negative. / In vitro mammalian cell gene mutation test
Mouse lymphoma test / Result: negative OECD Test Guideline 478
Mouse - male

11.2 Carcinogenicity

Carcinogenicity - Mouse - Oral

Tumorigenic: Equivocal tumorigenic agent by RTECS criteria.

Liver:Tumors. Blood:Lymphomas including Hodgkin's disease.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

11.3 Reproductive Toxicity

Carcinogenicity - Mouse - Oral

Reproductive toxicity - Human - female - Oral

Effects on Newborn: Apgar score (human only). Effects on New-

born: Other neonatal measures or effects. Effects on

Newborn: Drug dependence. Specific target organ toxicity - single exposure. Specific target organ toxicity - repeated exposure

11.4 Additional Information

No additional information available.

SECTION 10: STABILITY AND REACTIVITY**10.1 Reactivity**

No Data Available

10.2 Chemical Stability

Stable under recommended storage conditions.

10.3 Possibility of Hazardous Reactions

Vapours may form explosive mixture with air.

10.4 Conditions to Avoid

Heat, flames and sparks.

10.5 Incompatible Materials

Alkali metals, Oxidizing agents, Peroxides.

10.6 Hazardous Decomposition Products

Hazardous decomposition products formed under fire conditions.

Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

SECTION 12: ECOLOGICAL INFORMATION**12.1 Toxicity**

No data available

12.2 Persistence and Degradability

Biodegradability aerobic - Exposure time 15 d

Result: 95 % - Readily biodegradable. (OECD Test Guideline 301E)

12.3 Bioaccumulative Potential

Due to the distribution coefficient n-octanol/water, accumulation in organisms is not expected.

12.4 Mobility in Soil

No Data Available

12.5 Results of PBT and vPvB Assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted.

12.6 Other Adverse Effects

No data available

SECTION 13: DISPOSAL CONSIDERATIONS**Waste Treatment Methods**

Product: Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging: Dispose of as unused product.

SECTION 14: TRANSPORT INFORMATION

TDG (Canada): UN number: 1170

Class: 3 Packing group: II

Proper shipping name: GRAPHENE INK

IMDG: UN number: 1170

Class: 3 Packing group: II EMS-No: F-E, S-D

Proper shipping name: GRAPHENE INK

IATA: UN number: 1170 Class: 3 Packing group: II

Proper shipping name: GRAPHENE INK

SECTION 15: REGULATORY INFORMATION

This product has been classified in accordance with the hazard criteria of the Hazardous Products Regulations (HPR) and the SDS contains all the information required by the HPR.