



SAFETY DATA SHEET

Trade name: Graphene Lubricant Additive

Revised 2023

1. Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier:

Product Name Graphene Lubricant Additive
Product Code C-SI10

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses of the product Additive provides lubrication and protection of wearing surfaces between devices. Meanwhile, it significantly decreases the coefficient of friction.

1.3 Details of the supplier of the safety data sheet

Manufacturer/ Supplier Enerage Inc.
Address No.5, Ligong 3rd Rd., Wujie Township, Yilan County 26841, Taiwan, R.O.C.
Phone number 886-3-990-2100
Fax 886-3-990-2500

1.4 Emergency phone number 886-3-990-2100

2. Hazards identification

GHS classification and label elements of the product

2.1 Classification of the substance or mixture

Physical and Chemical hazards Not classified
Health hazards Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Category 2, 3

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008 [CLP]

Pictogram



Signal word Warning
Hazard statements H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
Precautionary statements
Prevention P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes.
Remove contact lenses, if present and easy to do. Continue rinsing.
Supplemental Hazard Statements none
According to European Directive 67/548/EEC as amended.



SAFETY DATA SHEET

Trade name: Graphene Lubricant Additive

Revised 2023

Hazard symbol(s)



R-phrase(s)

R36/37/38

Irritating to eyes, respiratory system and skin.

S-phrase(s)

S26

In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S36

Wear suitable protective clothing.

2.3 Other hazards

none

3. Composition/information on ingredients

Chemical name	CAS No.	Content (wt%)
Hexadecyltrimethoxysilane (HDTMS)	16415-12-6	>97
Graphene	1034343-98-0	~2

4. First-aid measures

4.1 Descriptions of first-aid measures

General measures

In the case of prolonged irritation or other adverse effects, contact a doctor.

IF ON SKIN (or hair)

Wash with soap and water.

If skin irritation occurs, get medical advice/ attention.

Contaminated clothing should be removed and washed thoroughly before re-use.

IF INHALED

Remove from exposure to fresh air and call a poison center/ doctor to get medical advice/ attention.

If breathing is difficult, administer oxygen.

If breathing has stopped, begin artificial respiration immediately, and seek medical attention.

IF IN EYES

Flush eyes with water for at least 15 minutes.

If easy to do, remove contact lens.

Get medical attention

IF SWALLOWED

Rinse mouth with water and consult a physician.

Never give anything to an unconscious person.

4.2 Most important symptoms/ effects, acute and delayed

Symptoms

May cause irritation to skin, eyes and respiratory tract.

Hazards

No information about adverse effects due to exposure



SAFETY DATA SHEET

Trade name: Graphene Lubricant Additive

Revised 2023

4.3 Indication of immediate medical attention and special treatment needed.

Treatment Symptoms may be delayed. Treat symptomatically.

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media Extinguish with alcohol-resistant foam, carbon dioxide, dry powder.

Unsuitable extinguishing media water fog

5.2 Specific hazards arising from the substance or mixture In the event of combustion or thermal decomposition, this material may release carbon monoxide (CO) or carbon dioxide (CO₂).

Flammable liquid and vapor.

Can be ignited easily and burns vigorously.

Vapors may cause a flash fire or ignite explosively.

Vapors may travel considerable distance to a source of ignition and flash back.

Prevent buildup of vapors or gases to explosive concentrations.

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

Specific fire-fighting measures Cool containers exposed to flames with water until well after the fire is out.

In case of fire and/or explosion do not breathe fumes.

Keep away from any heat source or electronic circuits.

Water may be ineffective in fighting the fire.

6. Accidental release measures

6.1 Personnel precautions, protective equipment and emergency procedures Ensure suitable personal protection (including respiratory protection) during removal of spillages in a confined area. Ventilate well. Stop leak if possible, without risk. Avoid contact with skin and eyes. Do not breathe vapor. For personal protection, see section 8.

6.2 Environmental precautions Avoid discharge into drains, water courses or onto the ground. Contact local authorities in case of spillage to drain/aquatic environment.

6.3 Methods and materials for containment and cleaning up Dam and absorb spillages with sand, earth or other non-combustible material. Collect spillage in containers, seal securely and deliver for disposal according to local regulations.

7. Handling and storage

7.1 Precautions for safe handling

Preventive measures Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.

Normal measures for preventive fire protection.

7.2 Conditions for safe storage, including any incompatibilities



SAFETY DATA SHEET

Trade name: Graphene Lubricant Additive

Revised 2023

Recommendation for storage Store in a dry and well-ventilated place and keep cool.
Keep container tightly closed
Store locked up.
Graphene is electrically conductive. Avoid accumulations of graphene in places where these accumulations could cause shorting of electrical switches, circuits or components since any dust can form a potentially explosive mixture in air.

8. Exposure controls/personal protection

8.1 Control parameters Components with workplace control parameters

8.2 Exposure controls

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

8.3 Personal protective Equipment

Eye/face 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 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.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Immersion protection

Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: > 480 min
Material tested: Dermatril® (Aldrich Z677272, Size M)

Splash protection

Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: > 30 min
Material tested: Dermatril® (Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 873000, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an Industrial Hygienist familiar with the specific



SAFETY DATA SHEET

Trade name: Graphene Lubricant Additive

Revised 2023

situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

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.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose 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).

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance	Liquid
Color	Black
Odor	No data available
Odor threshold	No data available
pH	No data available
Melting point	Hexadecyltrimethoxysilane: -1 °C Graphene: >3600°C
Initial boiling point	180 °C @ 100hPa
Flash point	Hexadecyltrimethoxysilane: 165 °C Closed cup
Auto-ignition temperature	Graphene: dispersed dust cloud: >600°C
Flammability (solid, gas)	No data available
Flammable limit	No data available
Evaporation rate	No data available
Vapor density	No data available
Vapor pressure	1.11hPa @22°C
Decomposition temperature	No data available
Density	0.8866 @ 20°C (water = 1)
Solubility in water	Graphene: Insoluble
Solubility (other)	No data available
Partition coefficient (n-Octanol/water)	No data available

10. Stability and Reactivity

10.1 Reactivity

Stable under recommended storage conditions.



SAFETY DATA SHEET

Trade name: Graphene Lubricant Additive

Revised 2023

10.2 Chemical stability	No decomposition if stored and applied as directed.
10.3 Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
10.4 Conditions to avoid	Avoid heat, flames and other sources of ignition.
10.5 Incompatible materials	Strong oxidizing agents, Alkali metals, Strong acids, Nitrates.
10.6 Hazardous decomposition products	Mainly carbon oxides occur under high temperature/fire conditions.

11. TOXICOLOGICAL INFORMATION

11.1 Information on the likely routes of exposure

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin contact	May be harmful if absorbed through skin. Causes skin irritation.
Eye contact	Causes serious eye irritation.

11.2 Symptoms related to the physical, chemical and toxicological characteristics

Inhalation	No data available.
Ingestion	No data available.
Skin contact	No data available.
Eye contact	No data available.

11.3 Information on toxicological effects

Acute toxicity	No data available.
Skin Corrosion/Irritation	No data available.
Serious Eye Damage/Eye Irritation	No data available.
Respiratory or skin sensitization	No data available.
Germ cell mutagenicity	No data available.
Carcinogenicity	No data available.

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

Reproductive toxicity No data available.

Specific target organ toxicity

Single exposure	Inhalation - May cause respiratory irritation.
Repeated exposure	No data available.
Aspiration hazard	No data available.
Other effects	No data available.

12. Ecological Information



SAFETY DATA SHEET

Trade name: Graphene Lubricant Additive

Revised 2023

- 12.1 Ecotoxicity No data available.
- 12.2 Persistence and degradability No data available.
- 12.3 Bioaccumulative potential No data available.
- 12.4 Mobility in soil No data available.
- 12.5 Results of PBT and vPvB assessment No data available.

12.6 Other adverse effects No data available.

13. Disposal considerations

- 13.1 Waste treatment methods Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.
- 13.2 Contaminated packaging Dispose of as unused product.

14. Transport Information

This material is not defined under US DOT, IMDG, GGVSee, or ICAO/IATA regulations as a hazardous substance.

Transport Hazard Category	None
Packing Category	None
Marine Pollutants (Yes/No)	No

15. Regulatory Information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

- 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available.
- 15.2 Chemical Safety Assessment
No data available.

16. Other Information

Hazard Ratings

	<u>Health</u>	<u>Flammability</u>	<u>Physical Hazard/ Instability</u>
HMIS	2	0	0
NFPA	2	0	0

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe; RNP - Rating not possible

Date of the latest revision 2023/10/25

DISCLAIMER:

This information 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 representation, guarantee or warranties of any kind are made as to its accuracy, suitability for a particular application etc. It is up to the user/distributor to ensure that the information contained in the material safety data sheet is relevant



SAFETY DATA SHEET

Trade name: Graphene Lubricant Additive

Revised 2023

to the product manufactured or sold as the case may be. Enerage Inc. makes no warranties, expressed or implied, in respect of the adequacy of this document for any particular purpose.



Graphage