



SAFETY DATA SHEET

Trade name: Graphene Suspension

Revised September, 2021 GP 2.0.c

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


1.1 Product identifier:

Product Name Graphene suspension
 Product Code S-WB30

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

Relevant identified uses of the Additive for enhancing physical properties.
 product

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

Health hazards	Skin Corrosion/Irritation	Category 3
	Serious Eye Damage/Eye Irritation	Category 2
	Specific target organ toxicity, single exposure, respiratory system	Category 3

2.2 Label elements



Signal word Warning
 Hazard statements H319 Causes serious eye irritation.
 H335 May cause respiratory irritation.

Precautionary statements

Prevention

- P102 Keep out of reach of children
- P201 Obtain special instructions before use
- P202 Do not handle until all safety precautions have been read and understood
- P233 Keep container tightly closed.
- P240 Ground/bond container and receiving equipment.
- P242 Use only non-sparking tools.



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- P243 Take precautionary measures against static discharge.
- P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
- P270 Do not eat, drink or smoke when using this product
- P271 Use only outdoors or in a well-ventilated area.
- P272 Contaminated work clothing should not be allowed out of the workplace.
- P273 Avoid release to the environment.
- P280 Wear protective gloves/protective clothing/eye protection/face protection
- P281 Use personal protective equipment as required.
- P284 Wear respiratory protection
- P285 In case of inadequate ventilation wear respiratory protection

Response

- P301 IF SWALLOWED
 - P330 Rinse mouth.
 - P331 Do NOT induce vomiting.
 - P313 Get medical advice/attention
- P303 IF ON SKIN (or hair)
 - P351 Rinse cautiously with water for several minutes.
 - P352 Wash with plenty of soap and water.
 - P353 Rinse skin with water/shower.
- P304 IF INHALED
 - P314 Call a POISON CENTER/doctor if you feel unwell.
 - P340 Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- P305 IF IN EYES
 - P338 Remove contact lenses, if present and easy to do. Continue rinsing.
 - P351 Rinse cautiously with water for several minutes.
- P337 If eye irritation persists
 - P313 Get medical advice/attention.
- P370 In case of fire
 - P374 Fight fire with normal precautions from a reasonable distance.
 - P376 Stop leak if safe to do so.
 - P378 Use water, carbon dioxide, dry chemical powder or alcohol resistant foam to extinguish.

Storage

- P402 Store in a dry place.
- P403 Store in a well-ventilated place.
- P404 Store in a closed container.
- P405 Store locked up.

Disposal

- P501 Dispose of contents/ container to an approved waste disposal plant.

3. Composition/information on ingredients

<u>Chemical name</u>	<u>CAS No.</u>	<u>Content (wt%)</u>
Water	7732-18-5	85~95



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Graphene	1034343-98-0	5~15
Diocetyl sodium sulfosuccinate	577-11-7	0.1~1.5
Ammonium hydroxide	1336-21-6	0.1~0.8
Isopropanol	67-56-1	0.01~0.1

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

4.3 Indication of immediate medical attention and special treatment needed.

Treatment	Symptoms may be delayed. Treat symptomatically.
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5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media	Water, carbon dioxide, dry chemical powder or alcohol resistant foam.
Unsuitable extinguishing media	No data available

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).
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	Firefighters must use standard protective equipment including flame retardant coat,
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precautions for fire-fighters 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.

6. Accidental release measures

6.1 Personnel precautions, protective Evacuate personnel to safe areas.
equipment and emergency Remove all sources of ignition if safe to do.
procedures Should wear suitable protective equipment to prevent inhalation or skin contact.
Should beware of the risk of slippage due to the material's low coefficient of friction.
Keep upwind.

6.2 Environmental precautions Prevent further leakage or spillage if safe to do so.
Do not contaminate water sources or sewer.
Avoid discharge into drains, water courses or onto the ground

6.3 Methods and materials for Collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous
containment and cleaning up earth, vermiculite) and place in container for disposal according to local / national
regulations.
Do not discharge into storm or sanitary sewers or groundwater.

7. Handling and storage

7.1 Precautions for safe handling
Preventive measures (Exposure Control for handling personnel)
Do not breathe dust/fume/gas/mist/vapors/spray.
Avoid breathing dust/fume/gas/mist/vapors/spray.
(Protective measures against fire and explosion)
Ground/bond container and receiving equipment.
Take precautionary measures against static discharge.

Safety Measures/Incompatibility Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Use only outdoors or in a well-ventilated area.
Wear protective gloves and face protection.
Use personal protective equipment as required.
Remove contaminated clothing and wash the skin thoroughly with soap and water after
work.

7.2 Conditions for safe storage, including any incompatibilities

Recommendation for storage Store in a well-ventilated place and keep cool.
Keep container tightly closed



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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 Engineering controls Provide adequate workplace ventilation. If vapor/dusts are generated through handling, local exhaust ventilation should be employed.

Eye wash facilities and emergency shower must be available when handling this product. Respiratory protection may be needed for non-routine or emergency situations.

8.2 Exposure controls

Components	Type	Exposure limit(s)	Source
Graphene	TWA/TLV	2.0 mg/m ³	USA ACGIH
	TWA/REL	2.5 mg/m ³	USA NIOSH
	TWA	15 mg/m ³ (Total dust)	USA OSHA Occupational Exposure Limits - Table Z-1 Limits for Air Contaminants
	TWA	15 mg/m ³ (Respirable fraction)	USA OSHA Occupational Exposure Limits - Table Z-1 Limits for Air Contaminants
	TWA	15.0 mppcf (million particles per cubic foot)	USA OSHA Occupational Exposure Limits - Table Z-3 Mineral Dusts
Ammonium hydroxide	TWA	25 ppm 17 mg/m ³	Safe Work Australia Workplace Exposure Standards
	STEL	35 ppm 24 mg/m ³	Safe Work Australia Workplace Exposure Standards
	TWA	25 ppm	ACGIH
	STEL	35 ppm	ACGIH
	IDLH	300 ppm	NIOSH
	TWA/REL	25 ppm 18 mg/m ³	NIOSH
	STEL/REL	35 ppm 27 mg/m ³	NIOSH
TWA/PEL	50 ppm 35 mg/m ³	OSHA	
Isopropanol	TWA	200 ppm	ACGIH
	STEL	400 ppm	ACGIH
	TWA/PEL	400 ppm 980 mg/m ³	OSHA

8.3 Personal protective Equipment

General Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering



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	controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. An eye wash and safety shower must be available in the immediate work area.
Respiratory protection	To minimize risk of over exposure to dust, vapor 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/face protection	Wear suitable safety eyeglasses or chemical protective goggles or other face protection.
Skin and body protection	Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place.
Hand 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.
Hygiene	Do not eat, drink or smoke when using the product. Wash hands after handling. Observe good industrial hygiene practices.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance	Liquid
Color	Gray to black
Odor	Irritating
Odor threshold	No data available
pH	No data available
Melting point	Graphene: >3600°C
Initial boiling point	Water: 100°C
Flash point	No data available
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	1.0
Vapor pressure	No data available



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Decomposition temperature	No data available
Density	0.9~1.0 g/cm ³ @20°C
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.
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	Electronic circuits.
10.5 Incompatible materials	Strong oxidizing agents, Alkali metals, Strong acids.
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 cause irritation to the respiratory system. May cause drowsiness or dizziness.
Ingestion	Irritating. May cause nausea, stomach pain and vomiting.
Skin contact	Causes mild 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

Dermal	No data available.
Oral	OECD Guideline 423, LD 50, Female rat: >2,000 g/kg
Inhalation	OECD Guideline 403, LC 50, Male and female rat, 4 h: 2,000 mg/m ³
Skin Corrosion/Irritation	Causes mild skin irritation.
Serious Eye Damage/Eye Irritation	Causes serious eye irritation.
Respiratory or skin sensitization	Not a skin sensitizer.



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Germ cell mutagenicity	
in vitro	No data available.
in vivo	No mutagenic components identified.
Carcinogenicity	This substance has no evidence of carcinogenic properties.
Reproductive toxicity	No components toxic to reproduction
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

12.1 Ecotoxicity

Fish

Specific substance(s)

Graphene

OECD Test Guideline 203, Semi-static test, LC 50, Danio rerio (zebra fish), 96 h: >100 mg/l

Aquatic invertebrates

Specific substance(s)

Graphene

OECD Test Guideline 202, Static test, EC 50, Daphnia magna (Water flea), 48 h: >100 mg/l

Algae

Specific substance(s)

Graphene

OECD Test Guideline 201, Static test, EC50, Pseudokirchneriella subcapitata, 72h: >100 mg/l

12.2 Persistence and degradability

Biodegradation

No data available.

BOD/ThBOD

No data available.

12.3 Bioaccumulative potential

Bioaccumulation

No data available.

Bioconcentration factor (BCF)

No data available.

Partition coefficient

No data available.

n-octanol/water

12.4 Mobility in soil

The product is water soluble and may spread in water systems.

12.5 Results of PBT and vPvB

assessment

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at



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levels of 0.1% or higher.

12.6 Other adverse effects

No data available.

13. Disposal considerations

13.1 Waste Code

No data available.

13.2 Disposal methods

Dispose of only in accordance with local, state, and federal regulations. Do not contaminate any lakes, streams, ponds, groundwater or soil.

No mixing with other waste.

Leave chemicals in original containers.

13.3 Empty containers

Empty containers retain product residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Empty drums should be completely drained, triple-rinsed, properly bunged and promptly returned to a drum reconditioner, or properly disposed.

14. Transport Information

DOT (U.S. Department of Transportation)

UN number No data available.

UN proper shipping name No data available.

Transport hazard class(es)

Class No data available.

Label(s) No data available.

Packing group No data available.

Marine pollutant No

Special precaution for user No data available.

IATA (International Air Transport Association)

UN number No data available.

UN proper shipping name No data available.

Transport hazard class(es)

Class No data available. 3

Label(s) No data available. 3

Packing group No data available.

Marine pollutant No

Special precaution for user No data available.

IMDG (International Maritime Dangerous Goods)

UN number No data available.



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UN proper shipping name No data available.

Transport hazard class(es)

Class No data available.

Label(s) No data available.

EmS No. No data available.

Packing group No data available.

Marine pollutant No

Special precaution for user No data available..

14.1 Environmental hazards

MARPOL Annex III - Prevention of pollution by harmful substances

Marine pollutants (yes/no) no

14.2 Special precautions for user No data available.

14.3 Transport in bulk according to Annex II of MARPOL73/78 and IBC Code

Remarks No data available.

15. Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA 302 Components

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

SARA 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.

SARA 311/312 Hazards

Acute Health Hazard

15.2 Chemical Safety Assessment

For this product a chemical safety assessment was not carried out.

International Regulations

WHMIS classification

Flammable liquids No data available.

Eye irritation No data available.

Specific target organ toxicity -
single exposure No data available.

European Union

Flammable liquids No data available.

Eye irritation No data available.

Specific target organ toxicity - No data available.



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single exposure

Montreal protocol	Not applicable
Stockholm convention	Not applicable
Rotterdam convention	Not applicable
Kyoto protocol	Not applicable

Inventory status

Australia	Inventory of Chemical Substances (AICS)	No data available.
Japan	The inventory of existing and new chemical substances (ENCS)	No data available.
EU	European Inventory of Existing Commercial Chemical Substances (EINECS)	No data available.
EU	European List of Notified Chemical Substances (ELINCS)	No data available.
EU	No-longer Polymers (NLP)	No data available.
Canada	Domestic Substances List (DSL) Inventory	No data available.
Philippines	Inventory of Chemicals/ Chemical Substances (PICCS)	No data available.
Korea	Existing Chemicals Inventory (KECI)	No data available.
China	Inventory of Existing Chemical Substances (IECSC)	No data available.
Mexico	National Inventory of Chemical Substances of Mexico (INSQ)	No data available.
New Zealand	Inventory of Chemical Substances	No data available.
Taiwan	National Existing Chemical Inventory (NECI)	No data available.

16. Other Information

Hazard Ratings

	<u>Health</u>	<u>Flammability</u>	<u>Physical Hazard/ Instability</u>
HMIS	1	0	0
NFPA	1	0	0

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

Date of the latest revision 2021/04/13

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 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.