



# SAFETY DATA SHEET

## Trade name: Graphene Suspension

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


#### 1.1 Product identifier:

Product Name                      Graphene suspension  
Product Code                      S-BA60

#### 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	Flammable liquids	Category 3
Health hazards	Specific target organ toxicity, single exposure	Category 3 (central nervous system)

#### 2.2 Label elements



Signal word                              Warning  
Hazard statements                      H226 Flammable liquid and vapor.  
    H336 May cause drowsiness or dizziness.  
    H402 Harmful to aquatic life.

#### 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  
    P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking  
    P211 Do not spray on an open flame or other ignition source.  
    P233 Keep container tightly closed.  
    P240 Ground/bond container and receiving equipment.



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- P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
- P242 Use only non-sparking tools.
- P243 Take precautionary measures against static discharge.
- P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
- P264 Wash hand thoroughly after handling.
- 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.

P361 Take off immediately all contaminated clothing.

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 dry sand, dry chemical 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.



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### 3. Composition/information on ingredients

<u>Chemical name</u>	<u>CAS No.</u>	<u>EC No.</u>	<u>Index No.</u>	<u>Content (wt%)</u>
n-butyl acetate	123-86-4	204-658-1	607-025-00-1	80~95
Graphene	1034343-98-0	801-282-5		5~20

### 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 drowsiness or dizziness.
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 (CO<sub>2</sub>).

Flammable liquid and vapor.

Prevent buildup of vapors or gases to explosive concentrations.



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### 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.

The product will float on water and can be reignited on surface water.

### 6. Accidental release measures

6.1 Personnel precautions, protective equipment and emergency procedures Evacuate personnel to safe areas.

Remove all sources of ignition if safe to do.

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.

### 6.2 Environmental precautions

Keep upwind.

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 containment and cleaning up

Collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous 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)

Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

Ground/bond container and receiving equipment.

Use explosion-proof electrical/ventilating/lighting equipment.

Use only non-sparking tools.

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.



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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

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

<u>Components</u>	<u>Type</u>	<u>Exposure limit(s)</u>	<u>Source</u>
n-butyl acetate	TWA	150 ppm	ACGIH
	STEL	200 ppm	ACGIH
	TWA	150 ppm 710 mg/m <sup>3</sup>	NIOSH REL
	ST	200 ppm 950 mg/m <sup>3</sup>	NIOSH REL
	TWA	150 ppm 710 mg/m <sup>3</sup>	OSHA Z-1
	TWA	150 ppm 710 mg/m <sup>3</sup>	OSHA P0
	STEL	200 ppm 950 mg/m <sup>3</sup>	OSHA P0

### 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 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



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Eye/face protection	properly ventilated. If ventilation is inadequate, use certified respirator that will protect against dust/mist.
Skin and body protection	Wear suitable safety eyeglasses or chemical protective goggles or other face 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	Fruity
Odor threshold	No data available
pH	No data available
Melting point	Butyl acetate: -74°C; Graphene: >3600°C
Initial boiling point	Butyl acetate: 125°C
Flash point	Butyl acetate: 23°C Closed cup
Auto-ignition temperature	Butyl acetate: 407 °C Graphene: dispersed dust cloud: >600°C
Flammability (solid, gas)	No data available
Explosive limit	1.7~7.6 %(V)
Evaporation rate	1 (butyl acetate=1)
Vapor density	4.01
Vapor pressure	20 hPa @ 25 °C
Decomposition temperature	No data available
Density	0.9~1.0 g/cm <sup>3</sup> @20°C
Solubility in water	Butyl acetate: 5.3 g/l @20°C; Graphene: Insoluble
Solubility (other)	No data available
Partition coefficient	2.3



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(n-Octanol/water)

### 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	No data available.
10.4 Conditions to avoid	Heat, flames and sparks.
10.5 Incompatible materials	Strong oxidizing agents, strong reducing agent, strong bases.
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	No data available.
Ingestion	No data available.
Skin contact	No data available.
Eye contact	No data available.

#### 11.2 Symptoms related to the physical, chemical and toxicological characteristics

Inhalation	May cause drowsiness or dizziness.
Ingestion	No data available.
Skin contact	Repeated exposure may cause skin dryness or cracking.
Eye contact	No data available.

#### 11.3 Information on toxicological effects

##### Acute toxicity

Dermal	OECD Test Guide 402, LD 50, Rabbit, Male and female: >14,112 mg/kg.
Oral	OECD Test Guide 423, LD 50, Rat, Female: 10,760 mg/kg.
Inhalation	OECD Test Guide 403, LD 50, Rat, Male and female, 4 h: >21 mg/l.

Skin Corrosion/Irritation OECD Test Guide 404, Rabbit, 4h: No skin irritation.

Serious Eye Damage/Eye Irritation OECD Test Guide 405, Rabbit: No eye irritation.

##### Irritation

Respiratory or skin sensitization Not a skin sensitizer.

##### Germ cell mutagenicity

in vitro Ames test, Salmonella typhimurium: Negative

in vivo No data available.

##### Carcinogenicity

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



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Reproductive toxicity	No data available.
Specific target organ toxicity	
Single exposure	May cause drowsiness or dizziness. Central nervous system
Repeated exposure	No data available.
Aspiration hazard	No data available.
Other effects	No data available.

## 12. Ecological Information

### 12.1 Ecotoxicity

Specific substance(s)	Butyl acetate
Fish	Flow-through test, LC 50, Pimephales promelas, 96 h: 18 mg/l
Aquatic invertebrates	Static test, EC 50, Daphnia (water flea), 48 h: 44 mg/l
Algae	Static test, ErC50, Pseudokirchneriella subcapitata (green algae), 72h: 397 mg/l
Bacteria	Static test IC50 - Tetrahymena pyriformis, 40h: 356 mg/l

### 12.2 Persistence and degradability

Biodegradation	OECD Test Guideline 301D, Aerobic, exposure time 28d: 83% - Readily biodegradable.
BOD	730 mg/g
COD	1,010 mg/g
BOD/COD	72%
ThOD	2,200 mg/g

### 12.3 Bioaccumulative potential

Bioaccumulation	No data available.
Bioconcentration factor (BCF)	No data available on bioaccumulation.
Partition coefficient n-octanol/water	No data available

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 levels of 0.1% or higher.

12.6 Other adverse effects      Harmful to aquatic life.

## 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.





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### 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

#### ADR/RID

UN number	UN 1123
UN proper shipping name	BUTYL ACETATES
Transport hazard class(es)	
Class	3
Label(s)	3
Packing group	III
Marine pollutant	No
Special precaution for user	No data available.

#### IATA (International Air Transport Association)

UN number	1123
UN proper shipping name	Butyl Acetates
Transport hazard class(es)	
Class	3
Label(s)	3
Packing group	III
Marine pollutant	No
Special precaution for user	No data available.

#### IMDG (International Maritime Dangerous Goods)

UN number	1123
UN proper shipping name	BUTYL ACETATES
Transport hazard class(es)	
Class	3
Label(s)	3
EmS No.	F-E, S-D
Packing group	III
Marine pollutant	No
Special precaution for user	No data available.



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UN/ID/NA number	1123
Proper shipping name	Butyl Acetates
Class	3
Label(s)	3
ERG code	129
Packing group	III
Marine pollutant	No

### 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

Product name	BUTYL ACETATES
Pollution category	Y
Ship type	3

## 15. Regulatory Information

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

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

National legislation Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.

FLAMMABLE LIQUIDS

Other regulations Take note of Dir 94/33/EC on the protection of young people at work.

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.

### 15.2 Chemical Safety Assessment

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

### Inventory status

Australia	Inventory of Chemical Substances (AICS)	On or in compliance with the inventory
Japan	The inventory of existing and new chemical substances (ENCS)	On or in compliance with the inventory
Japan	Industrial Safety and Health Law (ISHL)	
Canada	Domestic Substances List (DSL) Inventory	On or in compliance with the inventory
Philippines	Inventory of Chemicals/ Chemical Substances (PICCS)	On or in compliance with the inventory
Korea	Existing Chemicals Inventory (KECI)	On or in compliance with the inventory
China	Inventory of Existing Chemical Substances (IECSC)	On or in compliance with the inventory



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USA	The Toxic Substances Control Act (TSCA) Chemical Substance Inventory	All substances listed as active on the TSCA inventory
Taiwan	Taiwan's Chemical Substance Inventory (TCSI)	On or in compliance with the inventory

**16. Other Information**

Full Text of H-Statements referred to under sections 2 and 3

- EUH066 Repeated exposure may cause skin dryness or cracking.
- H226 Flammable liquid and vapor.
- H336 May cause drowsiness or dizziness.

Hazard Ratings

	<u>Health</u>	<u>Flammability</u>	<u>Physical Hazard/ Instability</u>
HMIS	2	3	0
NFPA	1	3	0

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

Date of the latest revision 2023/03/08

**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.

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