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## SECTION 1: IDENTIFICATION OF THE PRODUCT AND OF THE COMPANY

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### 1.1 Product identifiers

Product Name : ACS Material CVD Graphene on Silicon  
Brand : ACS Material LLC  
CAS-No. : 7782-42-5 (graphite), 7440-21-3 (silicon)

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

Identified uses : Laboratory chemicals, Manufacturing of substances

### 1.3 Details of the supplier of the safety data sheet

Company : ACS MATERIAL LLC  
959 E Walnut Street, Suite 100  
Pasadena, CA 91106  
USA  
Telephone : +1 (866)-227-0656  
Fax : +1 (781)-518-0284

### 1.4 Emergency telephone number

Emergency Phone #: +1 (866)-227-0656

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## SECTION 2: HAZARDS IDENTIFICATION

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### 2.1 Classification of the substance or mixture

#### Classification according to Regulation (EC) No 1272/2008 [EU-GHS/CLP]

Eye irritation (Category 2), H319

Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

Specific target organ toxicity - repeated exposure (Category 2), H373

For the full text of the H-Statements mentioned in this Section, see Section 16.

#### Classification according to EU Directives 67/548/EEC or 1999/45/EC

Xi Irritant R36/37

Xn Harmful R48/20

For the full text of the R-phrases mentioned in this Section, see Section 16.

### 2.2 Label elements



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

Pictogram



Signal word                      Warning

Hazard statement(s)

H319                              Causes serious eye irritation.  
 H335                              May cause respiratory irritation.  
 H373                              May cause damage to organs through prolonged or repeated exposure.

Precautionary statement(s)

P261                              Avoid breathing dust.  
 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

### 2.3 Other hazards

None.

## SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Substance name        :        ACS Material CVD Graphene on Silicon  
 CAS-No                    :        7782-42-5 (graphite), 7440-21-3 (silicon)  
 Synonyms                :        Graphene, Graphite Nanoplates, Graphene sheets, Exfoliated Graphite

### 3.2 Mixtures

#### Hazardous ingredients according to Regulation (EC) No 1272/2008

Component	Classification	Concentration
<b>Quartz</b>		
CAS-No.            14808-60-7	STOT RE 2; H373	<= 100 %
EC-No.              238-878-4		
<b>Graphene-like carbon</b>		
	Eye Irrit. 2; STOT SE 3; H319, H335	<= 100 %

**Hazardous ingredients according to Directive 1999/45/EC**

Component	Classification	Concentration
<b>Quartz</b>		
CAS-No. 14808-60-7 EC-No. 238-878-4	Xn, R48/20	<= 100 %
<b>Graphene-like carbon</b>		
	Xi, R36/37	<= 100 %

For the full text of the phrases mentioned in this Section, see Section 16.

**SECTION 4: FIRST AID MEASURES**

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**4.1 Description of first aid measures****General advice**

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

**If inhaled**

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

**In case of skin contact**

Flush eyes with water as a precaution.

**If swallowed**

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: FIREFIGHTING MEASURES**

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**5.1 Extinguishing media****Suitable extinguishing media**

Use carbon dioxide, dry chemical extinguishing agents, dry sand or dry ground dolomite.

**5.2 Special hazards arising from the substance or mixture**



Carbon oxides, silicon oxides

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

No data available

## SECTION 6: ACCIDENTAL RELEASE MEASURES

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### 6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

For personal protection see section 8.

### 6.2 Environmental precautions

Do not let product enter drains.

### 6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections

For disposal see section 13.

## SECTION 7: HANDLING AND STORAGE

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### 7.1 Precautions for safe handling

#### Suitable extinguishing media

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection. 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.

### 7.3 Specific end use(s)

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

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

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### 8.1 Control parameters

#### Components with workplace control parameters

Contains no substances with occupational exposure limit values.

### 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.

### Body Protection

Impervious clothing recommended. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

### Respiratory protection

For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

### Control of environmental exposure

Do not let product enter drains.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

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### 9.1 Information on basic physical and chemical properties

1) Appearance	Form: Solid
2) Odour	Odorless
3) Odour Threshold	No data available
4) pH	No data available
5) Melting point/freezing point	No data available
6) Initial boiling point and boiling range	No data available
7) Flash point	Not applicable
8) Evaporation rate	No data available
9) Flammability (solid, gas)	No data available
10) Upper/lower flammability or explosive limits	No data available
11) Vapour pressure	No data available



12) Vapour density	No data available
13) Relative density	No data available
14) Water solubility	No data available
15) Partition coefficient: n- octanol/water	No data available
16) Auto-ignition temperature	No data available
17) Decomposition temperature	No data available
18) Viscosity	No data available
19) Explosive properties	No data available
20) Oxidizing properties	No data available

## 9.2 Other safety information

No data available

## SECTION 10: STABILITY AND REACTIVITY

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### 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

No data available

### 10.5 Incompatible materials

Strong oxidizing agents, Fluorine, Chlorine trifluoride

### 10.6 Hazardous decomposition products

Other decomposition products - No data available

In the event of fire: see section 5.

## SECTION 11: TOXICOLOGICAL INFORMATION

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### 11.1 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 sensitisation**

No data available

**Germ cell mutagenicity**

No data available

**Carcinogenicity**

IARC: 1 - Group 1: Carcinogenic to humans (Quartz)

**Reproductive toxicity**

No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

No data available

**Additional Information**

RTECS: No available

Prolonged inhalation of crystalline silica may result in silicosis, a disabling pulmonary fibrosis characterized by fibrotic changes and miliary nodules in the lungs, a dry cough, shortness of breath, emphysema, decreased chest expansion, and increased susceptibility to tuberculosis. In advanced stages, loss of appetite, pleuritic pain, and total incapacity to work. Advanced silicosis may result in death due to cardiac failure or destruction of lung tissue. Crystalline silica is classified as group 1 "known to be carcinogenic to humans" by IARC and "sufficient evidence" of carcinogenicity by the NTP., The chronic health risks are associated with respirable particles of 3-4 um over protracted periods of time. Currently, there is a limited understanding of the mechanisms of quartz toxicity, including its mechanisms for lung carcinogenicity.

Additional studies are needed to determine whether the cell transforming activity of quartz is related to its carcinogenic potential.

Liver - Irregularities - Based on Human Evidence

**SECTION 12: ECOLOGICAL INFORMATION**

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**12.1 Toxicity**

See section 11.

**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

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

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#### 13.1 Waste treatment methods

##### Product

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

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#### 14.1 UN number

ADR/RID: -

IMDG: -

IATA: -

#### 14.2 UN proper shipping name

ADR/RID: Not dangerous goods

IMDG: Not dangerous goods

IATA: Not dangerous goods

#### 14.3 Transport hazard class(es)

ADR/RID: -

IMDG: -

IATA: -

#### 14.4 Packaging group

ADR/RID: -

IMDG: -

IATA: -

#### 14.5 Environmental hazards

ADR/RID: no

IMDG Marine pollutant: no

IATA: no

#### 14.6 Special precaution for user

No data available

### SECTION 15: REGULATORY INFORMATION

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





No data available

## 15.2 Chemical Safety Assessment

For this product a chemical safety assessment was not carried out

## SECTION 16: OTHER INFORMATION

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### Full text of H-Statements referred to under sections 2 and 3.

Eye Irrit.	Eye irritation
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H373	May cause damage to organs through prolonged or repeated exposure.
STOT SE	Specific target organ toxicity - single exposure
STOT RE	Specific target organ toxicity - repeated exposure

### Full text of R-phrases referred to under sections 2 and 3

Xi	Irritant
R36/37	Irritating to eyes and respiratory system.
R48/20	Harmful: danger of serious damage to health by prolonged exposure through inhalation.
Xn	Harmful

### Further information

**Disclaimer:** ACS Material, LLC believes that the information in this Safety Data Sheet is accurate and represents the best and most current information available to us. ACS Material makes no representations or warranties either express or implied, regarding the suitability of the material for any purpose or the accuracy of the information contained within this document. Accordingly, ACS Material will not be responsible for damages resulting from use of or reliance upon this information.