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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 Copper  
Brand : ACS Material LLC  
CAS-No. : 7782-42-5 (graphite), 7440-50-8 (copper)

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

Identified uses : Industrial use, Research use

### 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]

Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008. This substance is not classified as dangerous according to Directive 67/548/EEC.

### 2.2 Label elements

This substance is not classified as dangerous according to Directive 67/548/EEC.

### 2.3 Other hazards

Physical hazards: graphene is electrically conductive. Care should be taken to avoid accumulation of graphite dust in places where these accumulations could cause shorting of electrical circuits, switches, or components.



**SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS**

**3.1 Substances**

Substance name : ACS Material CVD Graphene on Copper  
 CAS-No : 7782-42-5 (graphite), 7440-50-8 (copper)  
 Synonyms : Graphene, Graphene sheets, Exfoliated Graphite, Copper, Cu.

<b>Description</b>	Graphene film on Copper foil substrate. Graphene (CAS 1034343-98-0) is a thin layer of pure carbon; it is a single, tightly packed layer of carbon atoms that are bonded together to form a hexagonal “honeycomb” lattice. It is a two-dimensional allotrope of carbon in the structure of a plane of sp <sup>2</sup> bonded atoms with a molecule bond length of 0.142 nanometers (1.42 Angstrom). Layers of graphene stacked on top of each other form graphite, with an interplanar spacing of 0.335 nanometers (3.35 Angstrom).
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Name	CAS #	EC #	N° Reach	Classification (CLP)
Graphene	1034343-98-0	231-55-93 (graphite bulk)	N/A*	Not Classified**
Copper	7440-50-8	231-159-6	N/A*	Not Classified

\* Annual tonnage does not require registration or the registration is envisaged for a later registration deadline.

\*\*Please note that substance properties used for the hazard assessment of the mixture come from graphite (bulk substance, CAS 7782-42-5). The properties of the nanoform graphene are under evaluation and to some extent not known.

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

**Hazardous impurities:** None known.

**SECTION 4: FIRST AID MEASURES**

**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

Treat as symptoms arise. Contact a poison control center immediately in case of ingestion or inhalation of large amounts of product. Specific treatment: no specific treatment.

## 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

### 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 Colour: Red/Orange Metal
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, Strong acids

**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: 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.

**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

Symptoms of systemic copper poisoning may include: capillary damage, headache, cold sweat, weak pulse, and kidney and liver damage, central nervous system excitation followed by depression, jaundice, convulsions, paralysis, and coma. Death may occur from shock or renal failure. Chronic copper poisoning is typified by hepatic cirrhosis, brain damage and demyelination, kidney defects, and copper deposition in the cornea as exemplified by humans with Wilson's disease. It has also been reported that copper poisoning has lead to hemolytic



anemia and accelerates arteriosclerosis.

## 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.
STOT SE	Specific target organ toxicity - single exposure

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

Xi	Irritant
R36/37	Irritating to eyes and respiratory system.

#### Further information

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