

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

| | |
|----------------|-----------------------|
| Product form | : Substance |
| Substance name | : Exfoliated graphene |
| IUPAC name | : Graphene |
| EC-No. | : 801-282-5 |
| CAS-No. | : 1034343-98-0 |
| Formula | : Cx |

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

1.2.1. Relevant identified uses

| | |
|------------------------------|--|
| Intended for general public | |
| Main use category | : Industrial use, Professional use, Consumer use |
| Use of the substance/mixture | : General Chemical Agent |

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

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Orta Mah. Üniversite Cad. No: 27/1 34956 Tuzla
İstanbul
TÜRKİYE
T +90 (216) 483 9000 - F +90 (216) 483 9885
sunum@sabanciuniv.edu - sunum.sabanciuniv.edu

1.4. Emergency telephone number

Emergency number : +90 (216) 483 9000

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Not classified

Adverse physicochemical, human health and environmental effects

To our knowledge, this product does not present any particular risk, provided it is handled in accordance with good occupational hygiene and safety practice.

2.2. Label elements

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

No labelling applicable

2.3. Other hazards

Other hazards which do not result in classification : Dust from this product may cause minor eye irritation. Dust of the product, if present, may cause respiratory irritation after an excessive inhalation exposure.

SECTION 3: Composition/information on ingredients

3.1. Substances

Substance type : Mono-constituent

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according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878

| Name | Product identifier | Conc. (% w/w) | Classification according to Regulation (EC) No. 1272/2008 [CLP] |
|----------|--|---------------|---|
| Graphene | CAS-No.: 1034343-98-0 EC-No.: 801-282-5 | 100 | Not classified |

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

| | |
|---------------------------------------|---|
| First-aid measures general | : In all cases of doubt, or when symptoms persist, seek medical attention. |
| First-aid measures after inhalation | : Remove person to fresh air and keep comfortable for breathing. When symptoms occur: go into open air and ventilate suspected area. Give oxygen or artificial respiration if necessary. Call a poison center or a doctor if you feel unwell. |
| First-aid measures after skin contact | : Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse. If skin irritation or rash occurs: Get medical advice/attention. |
| First-aid measures after eye contact | : Direct contact with the eyes is likely to be irritating. Rinse immediately and thoroughly, pulling the eyelids well away from the eye (15 minutes minimum). Obtain medical attention if pain, blinking or redness persists. |
| First-aid measures after ingestion | : Never give anything by mouth to an unconscious person. Do not induce vomiting. Call a poison center or a doctor if you feel unwell. |

4.2. Most important symptoms and effects, both acute and delayed

| | |
|------------------------------------|---|
| Symptoms/effects after inhalation | : Dust of the product, if present, may cause respiratory irritation after an excessive inhalation exposure. |
| Symptoms/effects after eye contact | : Dust from this product may cause minor eye irritation. |
| Symptoms/effects after ingestion | : Gastrointestinal complaints. |

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

| | |
|--------------------------------|--|
| Suitable extinguishing media | : Water spray. Dry chemical powder, alcohol-resistant foam, carbon dioxide (CO ₂). |
| Unsuitable extinguishing media | : Do not use a solid water stream as it may scatter and spread fire. |

5.2. Special hazards arising from the substance or mixture

| | |
|--|--|
| Hazardous decomposition products in case of fire | : On heating or during combustion : Toxic fumes may be released. |
|--|--|

5.3. Advice for firefighters

| | |
|--------------------------------|---|
| Precautionary measures fire | : Keep away from combustible materials. Keep container closed when not in use. Approach from upwind. |
| Firefighting instructions | : Exercise caution when fighting any chemical fire. Keep upwind. Do not enter fire area without proper protective equipment, including respiratory protection. Eliminate all ignition sources if safe to do so. Contain the extinguishing fluids by bunding. |
| Protection during firefighting | : Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing. |
| Other information | : Do not allow run-off from fire fighting to enter drains or water courses. Notify authorities if product enters sewers or public waters. High temperature decomposition products are harmful by inhalation. Inhalation of vapour can cause breathing difficulties. |

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SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Avoid all contact with skin, eyes, or clothing. Do not handle until all safety precautions have been read and understood.

6.1.1. For non-emergency personnel

Protective equipment : For further information refer to section 8: "Exposure controls/personal protection".
Emergency procedures : Ventilate spillage area. Do not touch or walk on the spilled product.
Measures in case of dust release : In case of excessive dust production. Dust mask. Protective goggles. Dustproof clothing.

6.1.2. For emergency responders

Protective equipment : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".
Emergency procedures : Do not touch spilled material. Evacuate unnecessary personnel. Equip cleanup crew with proper protection. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Stop leak if safe to do so.

6.2. Environmental precautions

Avoid release to the environment.

6.3. Methods and material for containment and cleaning up

For containment : Do not touch or walk on the spilled product.
Methods for cleaning up : Take up mechanically (sweeping, shovelling) and collect in suitable container for disposal. Notify authorities if product enters sewers or public waters.
Other information : Dispose of materials or solid residues at an authorized site.

6.4. Reference to other sections

Concerning personal protective equipment to use, see section 8. Concerning disposal elimination after cleaning, see section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Additional hazards when processed : Ensure good ventilation of the work station.
Precautions for safe handling : Ensure good ventilation of the work station. Wear personal protective equipment.
Hygiene measures : Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Comply with applicable regulations.
Storage conditions : Keep only in the original container in a cool well ventilated place.
Incompatible products : Strong acids. Strong bases. Strong oxidizing agents.
Incompatible materials : Extremely high or low temperatures.
Heat and ignition sources : Keep away from heat and direct sunlight. Keep away from sources of ignition.
Information on mixed storage : Keep away from food, drink and animal feeding stuffs.
Storage area : Store, if possible, in a cool, well ventilated place away from incompatible materials.

7.3. Specific end use(s)

See Section 1.2.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

8.1.1 National occupational exposure and biological limit values

No additional information available

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8.1.2. Recommended monitoring procedures

No additional information available

8.1.3. Air contaminants formed

No additional information available

8.1.4. DNEL and PNEC

No additional information available

8.1.5. Control banding

No additional information available

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Appropriate engineering controls:

Ensure good ventilation of the work station.

8.2.2. Personal protection equipment

Personal protective equipment:

Gloves. In case of dust production: protective goggles. Dustproof clothing. Dust formation: dust mask.

Personal protective equipment symbol(s):



8.2.2.1. Eye and face protection

Eye protection:

Avoid contact with eyes. Use splash goggles when eye contact due to splashing is possible

8.2.2.2. Skin protection

Skin and body protection:

According to the conditions of use, protective gloves, apron, boots, head and face protection must be worn. EN 13034. EN 14605

Hand protection:

Protective gloves. Choosing the proper glove is a decision that depends not only on the type of material, but also on other quality features, which differ for each manufacturer. The breakthrough time of the selected gloves must be greater than the intended use period. Gloves must be replaced after each use and whenever signs of wear or perforation appear. ISO 374-1

8.2.2.3. Respiratory protection

Respiratory protection:

In case of insufficient ventilation, wear suitable respiratory equipment. Extra personal protection: A/P2 filter respirator for organic vapour and harmful dust. EN 143. EN 14387

8.2.2.4. Thermal hazards

No additional information available

8.2.3. Environmental exposure controls

Environmental exposure controls:

Avoid release to the environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

| | |
|-----------------|-----------------|
| Physical state | : Solid |
| Colour | : Black. |
| Appearance | : Powder. |
| Odour | : odourless. |
| Odour threshold | : Not available |

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| | |
|---|--------------------------|
| Melting point | : 4000 °C (ECHA) |
| Freezing point | : Not applicable |
| Boiling point | : Not available |
| Flammability | : Non flammable. |
| Explosive limits | : Not applicable |
| Lower explosion limit | : Not applicable |
| Upper explosion limit | : Not applicable |
| Flash point | : Not applicable |
| Auto-ignition temperature | : Not applicable |
| Decomposition temperature | : Not available |
| pH | : Not available |
| pH solution | : Not available |
| Viscosity, kinematic | : Not applicable |
| Solubility | : Water: < 3 mg/l (ECHA) |
| Partition coefficient n-octanol/water (Log Kow) | : Not available |
| Vapour pressure | : Not available |
| Vapour pressure at 50°C | : Not available |
| Density | : Not available |
| Relative density | : 2.259 (ECHA) |
| Relative vapour density at 20°C | : Not applicable |
| Particle size | : < 100 µm (ECHA) |

9.2. Other information

9.2.1. Information with regard to physical hazard classes

No additional information available

9.2.2. Other safety characteristics

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

The product is non-reactive under normal conditions of use, storage and transport.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

No dangerous reactions known under normal conditions of use.

10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

10.5. Incompatible materials

Strong acids. Strong bases. Strong oxidizing agents.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

| | |
|-----------------------------|---|
| Acute toxicity (oral) | : Not classified (Based on available data, the classification criteria are not met) |
| Acute toxicity (dermal) | : Not classified (Based on available data, the classification criteria are not met) |
| Acute toxicity (inhalation) | : Not classified (Based on available data, the classification criteria are not met) |
| Skin corrosion/irritation | : Not classified (Based on available data, the classification criteria are not met) |

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| | |
|-----------------------------------|---|
| Serious eye damage/irritation | : Not classified (Based on available data, the classification criteria are not met) |
| Respiratory or skin sensitisation | : Not classified (Based on available data, the classification criteria are not met) |
| Germ cell mutagenicity | : Not classified (Based on available data, the classification criteria are not met) |
| Carcinogenicity | : Not classified (Based on available data, the classification criteria are not met) |
| Reproductive toxicity | : Not classified (Based on available data, the classification criteria are not met) |
| STOT-single exposure | : Not classified (Based on available data, the classification criteria are not met) |
| STOT-repeated exposure | : Not classified (Based on available data, the classification criteria are not met) |
| Aspiration hazard | : Not classified (Not relevant) |

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| | |
|----------------------|----------------|
| Viscosity, kinematic | Not applicable |
|----------------------|----------------|

11.2. Information on other hazards

No additional information available

SECTION 12: Ecological information

12.1. Toxicity

| | |
|---|---|
| Ecology - general | : The product is not considered harmful to aquatic organisms nor to cause long-term adverse effects in the environment. |
| Hazardous to the aquatic environment, short-term (acute) | : Not classified (Based on available data, the classification criteria are not met) |
| Hazardous to the aquatic environment, long-term (chronic) | : Not classified (Based on available data, the classification criteria are not met) |
| Not rapidly degradable | |

12.2. Persistence and degradability

No additional information available

12.3. Bioaccumulative potential

No additional information available

12.4. Mobility in soil

No additional information available

12.5. Results of PBT and vPvB assessment

No additional information available

12.6. Endocrine disrupting properties

No additional information available

12.7. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

| | |
|--|---|
| Regional legislation (waste) | : Disposal must be done according to official regulations. |
| Waste treatment methods | : Dispose of contents/container in accordance with licensed collector's sorting instructions. |
| Product/Packaging disposal recommendations | : Completely empty the packaging prior to decontamination. Recycle the material as far as possible. Comply with local regulations for disposal. |
| Ecology - waste materials | : Avoid release to the environment. |

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SECTION 14: Transport information

In accordance with ADR / IMDG / IATA / ADN / RID

| ADR | IMDG | IATA | ADN | RID |
|---|---------------|---------------|---------------|---------------|
| 14.1. UN number or ID number | | | | |
| Not regulated | Not regulated | Not regulated | Not regulated | Not regulated |
| 14.2. UN proper shipping name | | | | |
| Not regulated | Not regulated | Not regulated | Not regulated | Not regulated |
| 14.3. Transport hazard class(es) | | | | |
| Not regulated | Not regulated | Not regulated | Not regulated | Not regulated |
| 14.4. Packing group | | | | |
| Not regulated | Not regulated | Not regulated | Not regulated | Not regulated |
| 14.5. Environmental hazards | | | | |
| Not regulated | Not regulated | Not regulated | Not regulated | Not regulated |
| No supplementary information available | | | | |

14.6. Special precautions for user

Overland transport

Not regulated

Transport by sea

Not regulated

Air transport

Not regulated

Inland waterway transport

Not regulated

Rail transport

Not regulated

14.7. Maritime transport in bulk according to IMO instruments

Not applicable

SECTION 15: Regulatory information

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

15.1.1. EU-Regulations

REACH Annex XVII (Restriction List)

Not listed on REACH Annex XVII

REACH Annex XIV (Authorisation List)

Not listed on REACH Annex XIV (Authorisation List)

REACH Candidate List (SVHC)

Not listed on the REACH Candidate List

PIC Regulation (Prior Informed Consent)

Not listed on the PIC list (Regulation EU 649/2012)

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POP Regulation (Persistent Organic Pollutants)

Not listed on the POP list (Regulation EU 2019/1021)

Ozone Regulation (1005/2009)

Not listed on the Ozone Depletion list (Regulation EU 1005/2009)

Explosives Precursors Regulation (2019/1148)

Contains no substance(s) listed on the Explosives Precursors list (Regulation EU 2019/1148 on the marketing and use of explosives precursors)

Drug Precursors Regulation (273/2004)

Contains no substance(s) listed on the Drug Precursors list (Regulation EC 273/2004 on the manufacture and the placing on market of certain substances used in the illicit manufacture of narcotic drugs and psychotropic substances)

15.1.2. National regulations

Germany

- Employment restrictions : Observe restrictions according Act on the Protection of Working Mothers (MuSchG).
Observe restrictions according Act on the Protection of Young People in Employment (JArbSchG).
- Water hazard class (WGK) : Not classified according to Regulation Governing Systems for Handling Substances Hazardous to Waters (AwSV).
- Storage class (LGK, TRGS 510) : LGK 13 - Non-combustible solids.
- Joint storage table :
- | | | | | |
|----------|---------|----------|----------|-----------|
| LGK 1 | LGK 2A | LGK 2B | LGK 3 | LGK 4.1A |
| LGK 4.1B | LGK 4.2 | LGK 4.3 | LGK 5.1A | LGK 5.1B |
| LGK 5.1C | LGK 5.2 | LGK 6.1A | LGK 6.1B | LGK 6.1C |
| LGK 6.1D | LGK 6.2 | LGK 7 | LGK 8A | LGK 8B |
| LGK 10 | LGK 11 | LGK 12 | LGK 13 | LGK 10-13 |
- Joint storage not permitted for : LGK 1, LGK 6.2, LGK 7.
- Joint storage with restrictions permitted for : LGK 4.1A, LGK 5.1C.
- Joint storage permitted for : LGK 2A, LGK 2B, LGK 3, LGK 4.1B, LGK 4.2, LGK 4.3, LGK 5.1A, LGK 5.1B, LGK 5.2, LGK 6.1A, LGK 6.1B, LGK 6.1C, LGK 6.1D, LGK 8A, LGK 8B, LGK 10, LGK 11, LGK 12, LGK 13, LGK 10-13.
- Hazardous Incident Ordinance (12. BImSchV) : Is not subject of the Hazardous Incident Ordinance (12. BImSchV)

15.2. Chemical safety assessment

No chemical safety assessment has been carried out

SECTION 16: Other information

Abbreviations and acronyms:

| | |
|--------|---|
| ADN | European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways |
| ADR | European Agreement concerning the International Carriage of Dangerous Goods by Road |
| ATE | Acute Toxicity Estimate |
| BCF | Bioconcentration factor |
| BLV | Biological limit value |
| BOD | Biochemical oxygen demand (BOD) |
| COD | Chemical oxygen demand (COD) |
| DMEL | Derived Minimal Effect level |
| DNEL | Derived-No Effect Level |
| EC-No. | European Community number |
| EC50 | Median effective concentration |
| EN | European Standard |

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| Abbreviations and acronyms: | |
|-----------------------------|--|
| IARC | International Agency for Research on Cancer |
| IATA | International Air Transport Association |
| IMDG | International Maritime Dangerous Goods |
| LC50 | Median lethal concentration |
| LD50 | Median lethal dose |
| LOAEL | Lowest Observed Adverse Effect Level |
| NOAEC | No-Observed Adverse Effect Concentration |
| NOAEL | No-Observed Adverse Effect Level |
| NOEC | No-Observed Effect Concentration |
| OECD | Organisation for Economic Co-operation and Development |
| OEL | Occupational Exposure Limit |
| PBT | Persistent Bioaccumulative Toxic |
| PNEC | Predicted No-Effect Concentration |
| RID | Regulations concerning the International Carriage of Dangerous Goods by Rail |
| SDS | Safety Data Sheet |
| STP | Sewage treatment plant |
| ThOD | Theoretical oxygen demand (ThOD) |
| TLM | Median Tolerance Limit |
| VOC | Volatile Organic Compounds |
| CAS-No. | Chemical Abstract Service number |
| N.O.S. | Not Otherwise Specified |
| vPvB | Very Persistent and Very Bioaccumulative |

Data sources : ECHA (European Chemicals Agency). Supplier's safety documents.

The classification complies with : ATP 12

Safety Data Sheet (SDS), EU

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