

SAFETY DATA SHEET



according to Regulation (EC) No. 1907/2008

Version: 1.02
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SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product Identifiers

Product Name Nanomaterial Masterbatch in Polyethylene
Product Number TM-MEC

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

SU12 Manufacture of plastic products, including compounding and conversion

1.3 Details of the supplier of the safety data sheet

Company Haydale Limited
Clos Fferws, Parc Hendre,
Capel Hendre,
Ammanford,
Carmarthenshire,
SA18 3BL
UNITED KINGDOM

Telephone +44 (0)1269 842946
Fax +44 (0)1269 831062
E-mail address info@haydale.com

1.4 Emergency telephone number

Emergency # +44 (0)1269 842946

MEDICAL APPLICATION CAUTION: Do not use this material in medical applications involving permanent implantation in the human body or permanent contact with internal body fluids or tissues fluids or tissues.

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according in accordance with the Hazard communication standard 29 CFR 1910.1200
Combustible dust

Classification according to Regulation (EC) No 1272/2008
Not classified

Classification according to EU Directives 67/548/EEC or 1999/45/EC
Not classified

2.2 Label elements

Hazard pictograms



Signal words

Warning

Hazard statements

H319: Causes serious eye irritation
H335: May cause respiratory irritation
May form combustible dust concentrations in air.
While this product may not be a combustible dust assold,

further processing or handling may form combustible dust concentration in air

Precautionary statements

P284: [In case of inadequate ventilation] wear respiratory protection.

2.3. Other Hazards

Ultrafine dust may cause irritation of the eyes and respiratory system. Electrostatic discharges may be generated from dry material during handling. CAUTION: this form of carbon has not yet been fully tested regarding health, safety and environmental effects.

Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Contact with the skin is not expected to cause an allergic response. If this material is heated, thermal burns may result from contact. Thermal burns may include pain or feeling of heat, discolorations, swelling, and blistering.

Eyes: Contact with the eyes may cause irritation due to the abrasive action. Not expected to cause prolonged or significant eye irritation. Thermal burns may result if heated material contact's eye.

Ingestion: Ingestion of this product is not a likely route of exposure.

Carcinogenicity:

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

PBT identification: This substance is not identified as a PBT substance.

NTP No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

ACGIH No ingredient of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

SECTION 3: Composition and information on ingredients

3.1. Substances

Chemical Characterization

Synonyms Graphene, Graphene Nanoplatelets, Few Layered Graphene, Graphene powder and Polyethylene Hexene Copolymer

Component	Polyethylene Hexene Copolymer
Concentration	70 – 100%
CAS-No	25213-02-9 EC No.: 607-647-3

Component	Carbon (in the form of Graphene)
Concentration	1-30%
CAS-No	7782-42-5 EC No.: 231-955-3

No components need to be disclosed according to the applicable regulations.

3.1.1 Additional information:

Full text of R-, H- and EUH-phrases: see section 16.

SECTION 4: First aid measures

4.1. Description of first aid measures

- Following inhalation** Only if safe to do remove casualty from exposure ensuring one's own safety whilst doing so. Move to fresh air in case of accidental inhalation of dust or fumes from overheating or combustion. Place unconscious person on the side in the recovery position and ensure breathing can take place. If respiratory problems, artificial respiration/oxygen symptoms persist. Get medical attention call a physician.
- Following skin contact** Immediately remove contaminated clothing. Wash off promptly and flush contaminated skin with water. If the liquid material gets on skin, quickly cool in water. Seek immediate medical attention. Do not try to peel the solidified material from the skin or use solvents or thinners to dissolve it.
- Following eye contact** Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Get medical attention promptly if symptoms occur after washing.
- Following Ingestion** Immediately rinse mouth and drink plenty of water or milk. Keep person under observation. **Do not induce vomiting.** If vomiting occurs, keep head low. Transport immediately to hospital and bring along these instructions. Medical staff must contact poison centre.

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

No further information available

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

No further information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing agents: Carbon dioxide, extinguishing foam and powder, water mist.

If possible, water should be applied as a spray from a fogging nozzle since this is a surface burning material. The application of high velocity water will spread the burning surface layer. Avoid the use of straight streams that may create a dust cloud and the risk of a dust explosion. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

5.2. Special hazards arising from the substance

In combustion, emits toxic fumes.

Flash point: No data available.

Autoignition temperature: No data available.

5.3. Advice for firefighters

Wear self-contained breathing apparatus. Wear protective clothing to prevent contact with skin and eyes. Keep run-off water out of sewers and water sources.

Specific hazards during firefighting - Risks of ignition followed by flame propagation or secondary explosions can be caused by the accumulation of dust, e.g. on floors and ledges.

SECTION 6: Accidental release measures

6.1. Personal precautions

Avoid generation and spreading of dust and breathing dust

Use personal protective equipment, see section 8

Wear self-contained breathing apparatus for firefighting if necessary.

Provide adequate ventilation

6.2. Environmental precautions

Do not discharge into drains or rivers. Prevent further spillage if safe. Advise local authorities if large spills cannot

be contained.

6.3. Clean-up procedures

Clean-up should be dealt with only by qualified personnel familiar with the specific substance. Transfer to a closable, labelled salvage container for disposal by an appropriate method. Under some circumstances additional, more robust PPE is required when dealing with serious spills.

6.4. Reference to other sections Additional advice

Refer to section 8 of SDS for personal protection details.

6.5. Additional advice

Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air).

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Avoid direct contact with substance. Do not handle in confined spaces. Ensure there is sufficient ventilation of the area. Use PPE as required

7.2. Conditions for safe storage, including any incompatibilities

Store in cool dry place, well-ventilated area.
Keep container tightly closed.
Do not store together with oxidizing and self-igniting products.

7.3. Specific end use(s)

See section 1.2, no other specific uses are stipulated

7.4. Advice on safe handling

Use good housekeeping for safe handling of the product. Keep out of water sources and sewers. Spilled pellets and powders may create a slipping hazard. Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary, but may not by themselves be sufficient. At elevated temperatures (>350°F, >177°C), polyethylene can release vapours and gases, which are irritating to the mucous membranes of the eyes, mouth, throat, and lungs. These substances may include acetaldehyde, acetone, acetic acid, formic acid, formaldehyde and acrolein. Based on animal data and limited epidemiological evidence, formaldehyde has been listed as a carcinogen. Following all recommendations within this MSDS should minimize exposure to thermal processing emissions.

7.5. Advice on protection against Fire and Explosion

Treat as a solid that can burn. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Exposure limits not yet established. Keep exposure to this product as low as technically feasible.
Control as Particulate Not Otherwise Classified (PNOC). The ACGIH Guideline* for respirable dust is 3.0 mg/m³ and 10.0 mg/m³ for total dust. The OSHA PEL for respirable dust is 5.0 mg/m³ and 15.0 mg/m³ for total dust.
* This value is for inhalable (total) particulate matter containing no asbestos and < 1.0% crystalline silica

8.2 Exposure controls

Process conditions Provide eyewash station.

Engineering measures The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances. Provide adequate ventilation, including appropriate local extraction, to ensure that the defined occupational exposure limit is not exceeded. All handling to take place in well-ventilated area.

Respiratory equipment Provide adequate ventilation. Observe Occupational Exposure Limits and minimise

the risk of inhalation of vapours. At work in confined or poorly ventilated spaces, respiratory protection with air supply must be used. Wear mask supplied with: Gas cartridge suitable for organic substances. Use a positive pressure, air-supplying respirator if there is potential for uncontrolled release, exposure levels are not known, or other circumstances where air-purifying respirators may not provide adequate protection

Hand protection	For prolonged or repeated skin contact use suitable protective gloves. Use protective gloves made of: Neoprene. Nitrile. Rubber (natural, latex).
Eye protection	Wear splash-proof eye goggles with side shields to prevent any possibility of eye contact. If this material is heated, wear chemical goggles or safety glasses with side shields or a face shield. If there is potential for dust, use chemical goggles.
Other Protection	Wear appropriate clothing to prevent any possibility of skin contact.
Hygiene measures	Wash hands at the end of each work shift and before eating, smoking and using the toilet. Promptly remove any clothing that becomes contaminated. At ambient temperatures use of clean and protective clothing is good industrial practice. If the material is heated or molten, wear thermally insulated, heat-resistant gloves that are able to withstand the temperature of the molten product. If this material is heated, wear insulated clothing to prevent skin contact if engineering controls or work practices are not adequate. Use appropriate skin cream to prevent drying of skin. When using do not eat, drink or smoke

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

General Information

Appearance

Physical State	Solid (Pellets)
Colour	Black
Odour	Mild to no odour
Odour Threshold	No data available

Important health, safety and environmental information

pH	Not applicable
Melting point/range	90 - 140 °C (194 - 284 °F)
Freezing Point	Not applicable
Initial boiling point and boiling range	Not applicable
Flash point	No data available
Evaporation rate	Not applicable
Flammability (solid, gas)	No data available
Upper/lower flammability or explosive limits	No data available
Vapour pressure	Not applicable
Vapour density	No data available
Relative density	Not applicable
Water solubility	Negligible
Partition coefficient: n-octanol/water	No data available
Solubility in other solvents	No data available
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity both dynamic & kinematic	Not applicable
Upper explosive limit	Not applicable
Lower explosive limit	Not applicable
Oxidizing properties	No data available
Density	0.91 – 0.97 g/cm ³

9.2 Other information

Thermal decomposition: Low molecular weight hydrocarbons, alcohols, aldehydes, acids and ketones can be formed during thermal processing.

SECTION 10: Stability and reactivity

10.1 Reactivity

Stable under normal and anticipated storage and handling conditions. This material is considered non-reactive under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.2 Chemical Stability

Stable under normal and anticipated storage and handling conditions. This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.3 Possibility of hazardous reactions

Stable under normal and anticipated storage and handling conditions.

10.4 Conditions to avoid

Heat, sparks and open flames. Avoid prolonged storage at elevated temperature.

10.5 Incompatible materials

Acids, alkali metals, oxidising agents, alkalis and halogens.

10.6 Hazardous decomposition products

In combustion emits toxic fumes. Low molecular weight hydrocarbons, alcohols, aldehydes, acids and ketones can be formed during thermal processing.

Normal combustion forms carbon dioxide, water vapor and may produce carbon monoxide, other hydrocarbons and hydrocarbon oxidation products (ketones, aldehydes, organic acids) depending on temperature and air availability. Incomplete combustion can also produce formaldehyde.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

General information Prolonged and repeated contact with solvents over a long period may lead to permanent health problems.

Inhalation May cause respiratory irritation, but presumed Not Toxic

Ingestion No known significant effects or critical hazards presumed Not Toxic

Skin contact No skin irritation.

Eye contact No serious eye irritation

Additional information

This product contains POLYMERIZED OLEFINS. During thermal processing (>350°F, >177°C) polyolefins can release vapours and gases (aldehydes, ketones and organic acids) which are irritating to the mucous membranes of the eyes, mouth, throat, and lungs. Generally, these irritant effects are all transitory. However, prolonged exposure to irritating off-gases can lead to pulmonary edema. Formaldehyde (an aldehyde) has been classified as a carcinogen based on animal data and limited epidemiological evidence.

11.2. Acute Toxicity Data

No data available

SECTION 12: Ecological information

12.1 Eco-Toxicity

This material is not expected to be harmful to aquatic organisms., Fish or birds may eat pellets which may obstruct their digestive tracts.

12.2 Persistence and degradability

No data available.

- 12.3 Bioaccumulative potential**
Does not bio accumulate.
- 12.4 Mobility in soil**
The product is insoluble and floats on water
- 12.5. Results of PBT and vPvB assessment**
This substance is not identified as a PBT substance.
- 12.6. Other adverse effects**
No data available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods**Product**

Dispose of this product and all contaminated materials in compliance with all local and national regulations.
Cannot be recycled

Contaminated packaging

Dispose of this product and all contaminated materials in compliance with all local and national regulations.
Cannot be recycled

13.2 Additional information

None

SECTION 14: Transport Information

General

This material is not covered by international regulations on the transport of dangerous goods (IMDG, IATA, ADR/RID)

14.1 UN Number

ADR/RID: Not regulated Information not available IMDG: Information not available IATA: Information not available

14.2 UN proper shipping name

ADR/RID: Not regulated Information not available

IMDG: Not regulated Information not available

IATA: Not regulated Information not available

14.3 Transport hazard class(es)

ADR/RID: Information not available IMDG: Information not available IATA: Information not available

14.4 Packing group

ADR/RID: Information not available IMDG: Information not available IATA: Information not available

14.5 Environmental hazards

ADR/RID: Information not available IMDG: Information not available IATA: Information not available

14.6 Special precautions for user

No data available

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

This chemical is not intended for bulk transportation

SECTION 15: Regulatory Information

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

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

SECTION 16: Other information

Indication of changes

Revision Number 1.02
Revision Date 06 April 2021
Supersedes Revision 1.01

Notification status

Europe REACH	:	On the inventory, or in compliance with the inventory
United States of America TSCA	:	On the inventory, or in compliance with the inventory
Canada DSL	:	On the inventory, or in compliance with the inventory
Australia AICS	:	On the inventory, or in compliance with the inventory
New Zealand NZIoC	:	On the inventory, or in compliance with the inventory
Japan ENCS	:	On the inventory, or in compliance with the inventory
Korea KECI	:	On the inventory, or in compliance with the inventory
Philippines PICCS	:	On the inventory, or in compliance with the inventory
China IECSC	:	On the inventory, or in compliance with the inventory

Further information

Further information on this product can be found on the Haydale website

The content supplied in this safety data sheet ("Information") supersedes all previous versions supplied

The Information is designed only as guidance for the safe handling, storage, processing and/or use of the **Product**. The Information is correct to the best of the Haydale Group's knowledge and belief at the date of publication (**Haydale Group** means **Haydale Limited** as a subsidiary of **Haydale Graphene Industries plc.** and any subsidiary or holding company from time to time and any subsidiary from time to time of any holding company of Haydale Limited), however no express or implied warranty or guarantee or representation is made regarding the fitness for any particular purpose, merchantability, accuracy or completeness of the Information provided. The Information relates solely to the specific Product designated and may not be valid or applicable where the Product is handled, stored, processed or used in combination with any other materials or in any process other than those described in the Information.

- End of Safety Datasheet -