

SECTION 1: Identification of the substance/mixture and of the company/undertaking**1.1. Product identifier**

Product name:	Graphene oxide basic pH
Trade Names:	Graphenea-Graphene Oxide in basic media
EC #	947-768-1
CLP C&L inventory	02-2120093081-63-0000

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

Identified uses:
Research use

1.3. Details of the supplier of the safety data sheet

Graphenea S.A.
Mlkeleteri 83
20009 Donostia-San Sebastian (Spain)
Phone: +34 943 359 937
Email for SDS: info@graphenea.com

1.4. Emergency telephone number

+34 943 359 937 (business hours, Central European Time - CET)

SECTION 2: Hazards identification**2.1. Classification of the substance or mixture**

Graphene oxide

Not classified as a hazardous substance according to GHS (rev. 7).

Please notice that substance properties used for the hazard assessment come from graphite (bulk substance). The properties of the nanoform are under evaluation and to some extent not known.

NaOH

H315: Causes skin irritation
H319: Causes serious eye irritation
H290: May be corrosive to metals.
H314: Causes severe skin burns and eye damage

2.2. Label elements

GHS05: corrosion

2.3. Other hazards

Graphene Oxide

Please notice that mixture properties used for the hazard assessment come from NaOH and graphite (bulk substance). The properties of the graphite nanoform are under evaluation and to some extent not known.

NaOH

No additional information available.

SECTION 3: Composition/information on ingredients

3.1. Substances

Substance name	Graphene oxide
Description	Graphene oxide is a thin layer of oxidized carbon; it is a single, tightly packed layer of carbon atoms that are bonded together in a hexagonal honeycomb lattice.
EC	947-768-1

3.2. Mixtures

(*)Identifiers	Name	(**)Classification	Concentration
CAS:1310-73-2 EC-Nº: 200-664-3	Sodium hydroxide NaOH	Met. Corr. 1, H290 Skin Corr. 1, H314 Aquatic Acute 3, H402	<1%

(*)Substances presenting a health or environmental hazard within the meaning of Regulation (EC) No 1272/2008; substances for which there are European Union workplace exposure limits; substances that are persistent, bioaccumulative and toxic or very persistent and very bioaccumulative; or included in the Candidate List for authorisation

(**) For the full text of the H-Statements mentioned in this section, see section 16.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation	In case of discomfort provide fresh air, warmth and rest, preferably in a comfortable upright sitting position. Rinse nose and mouth with water. Get medical attention if any discomfort continues. If breathing stops, provide artificial respiration.
Ingestion	NEVER MAKE AN UNCONSCIOUS PERSON VOMIT OR DRINK FLUIDS! Rinse nose, mouth and throat with water, and then drink plenty of water. Get medical attention.
Skin contact	Wash skin with soap and water. Continue to rinse for at least 15 minutes. Get medical attention if irritation appears after washing.

Eye contact

Do not rub eye. Immediately flush with plenty of water for up to 15-20 minutes. Remove any contact lenses after 5 minutes, maintain open eyes wide apart. Get medical attention promptly if symptoms occur after washing.

SECTION 5: Firefighting measures**5.1. Extinguishing media**

Water spray. Dry powder. Foam. Carbon dioxide.

5.2. Special hazards arising from the substance or mixture

Graphene oxide: In the event of combustion or thermal decomposition, this material may release carbon monoxide (CO) or carbon dioxide (CO₂) or other toxic gases. At temperatures over 180-300°C, this material may release energy and may react with potassium, sodium, rubidium, or cesium to create intercalation compounds that may ignite and may react explosively with water.

5.3. Advice for firefighters

In the event of fire, wear self-contained breathing apparatus.

SECTION 6: Accidental release measures**6.1. Personal precautions, protective equipment and emergency procedures**

Emergency responders should wear suitable protective equipment to prevent inhalation or skin contact. In case of spills, beware of slippery floors and surfaces.

Use proper personal protective equipment as indicated in Section 8.

6.2. Environmental precautions

Do not allow to enter drains, sewers or watercourses. The product should not be dumped in nature but collected and delivered according to local regulations.

6.3. Methods and material for containment and cleaning up

Use water spray to disperse the gas/vapor. Remove all sources of ignition. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as sawdust. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors. Water spray may reduce vapor but may not pre

6.4. Reference to other sections

For personal protection, see section 8.
For waste disposal, see section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Do not ingest or inhale. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, sparks and flame. Avoid use in confined spaces.

7.2. Conditions for safe storage, including any incompatibilities

Tightly closed.
Store under inert gas. hygroscopic

7.3. Specific end use(s)

For research use only.

SECTION 8: Exposure controls/personal protection


8.1. Control parameters

Substance: Graphite (CAS 7782-42-5)	Limit value - Eight hours		Limit value - Short term	
	ppm	mg/m ³	ppm	mg/m ³
Australia		3 (1)(2)(3)(4)		
Belgium		2		
Canada - Ontario		2 (1)		
Canada - Québec		2		
Denmark		2,5 respirable aerosol		5 respirable aerosol
Finland		2		
France		2 respirable aerosol		
Germany (DFG)		4 inhalable aerosol 1,5 respirable aerosol		
Ireland		10 (1) 4 (2)		
Latvia		2 (1)		
New Zealand		3 (1)(2)		
People's Republic of China		4 (1)		
Singapore		2 (2) 2 respirable aerosol		

South Korea		2 (1)(2)		
Spain		2 inhalable aerosol		
Sweden		5 inhalable aerosol		
Switzerland		5 inhalable aerosol		
USA - NIOSH		2,5 respirable aerosol		
USA - OSHA		2,5 (1)		
		15 total dust		
		5 respirable dust		
United Kingdom		10 inhalable aerosol		
		4 respirable aerosol		

Remarks	
Australia	(1) all forms except fibres (2) respirable aerosol (3) natural and synthetic (4) containing no asbestos and<="">
Canada - Ontario	(1) Respirable aerosol
Ireland	(1) Inhalable fraction (2) Respirable fraction
Latvia	(1) natural and industrial diamond, graphite
New Zealand	(1) Respirable dust containing <1 % free silica (2) all form except graphite fibres
People's Republic of China	(1) Inhalable fraction (2) Respirable fraction
South Korea	(1) Natural & synthetic except graphite fibers (2) Respirable fraction
USA - NIOSH	(1) natural graphite

8.2. Exposure controls

Protective equipment	
	
Engineering measures	
Provide adequate ventilation. Observe Occupational Exposure Limits and minimise the risk of inhalation of dust. Local exhaust ventilation should be employed if dust is generated when handling. Provide eyewash station.	
Personal Protective Equipment	
Respiratory equipment	Respiratory protection must be used if the general level exceeds the recommended occupational exposure limit. A respiratory protection program that meets applicable OHSA (USA) or CEN (UE) requirements should be maintained in the workplace.
Hand protection	Wear protective gloves. The selected protective gloves have to satisfy the specifications of Regulation (EU) 2016/425 and the standard EN 374 derived from
Eye protection	Wear approved safety goggles. Use face shield in case of splash risk.
Body protection	Wear full body industrial type work clothing.
Environmental exposure controls	

All ventilation systems should be filtered before discharge to atmosphere. Avoid releasing to the environment. Avoid uncontrolled releases. Inform competent authorities in case large spillage into water courses.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Graphene oxide

Appearance	Dispersion
Solvent	water
Colour	Brown
Odour	Odourless
Initial boiling point and boiling range (°C)	Not applicable.
Melting point (°C)	Not applicable.
Vapour density (air=1)	Not applicable.
Vapour pressure	Not applicable.
Evaporation rate	Not applicable.
pH-Value, Conc. Solution	Not applicable.
Viscosity 40°C	Not applicable.
Bulk density (gr/mL)	1.0-2.0 g/cm ³
Solubility Value	Negligible.
Decomposition temperature (°C)	-
Flash point (°C)	Not applicable.
Auto Ignition Temperature (°C)	Not applicable.
Oxidising properties	Not data available

9.2. Other information

No information required.

SECTION 10: Stability and reactivity

10.1. Reactivity

Maybe corrosive to metals

10.2. Chemical stability

Stable under normal temperatures and pressures.

10.3. Possibility of hazardous reactions

At temperatures over 180-300°C, this material may release energy and may react with potassium, sodium, rubidium, or cesium to create intercalation compounds that may ignite and may react explosively with water

10.4. Conditions to avoid

High temperatures, ignition sources, confined spaces.

10.5. Incompatible materials

Oxidizing agents, reducing agents, acids, alkali metals, potassium, sodium, metals as powders (e.g. hafnium, raney nickel), acid anhydrides, acid chlorides, powdered aluminum, powdered magnesium. Avoid contact with strong oxidizing agents, fluorine, or chlorine trifluoride.
Different metals - aluminium - zinc - tin - Brass

10.6. Hazardous decomposition products

Carbon oxides, Sulfur oxides

SECTION 11: Toxicological information

11.1. Information on toxicological effects

NaOH

Acute toxicity

Shall not be classified as acutely toxic.

Skin corrosion/irritation

Causes severe burns.

Serious eye damage/eye irritation

Causes serious eye damage.

Respiratory or skin sensitisation

Shall not be classified as a respiratory or skin sensitiser.

Summary of evaluation of the CMR properties

Shall not be classified as germ cell mutagenic, carcinogenic nor as a reproductive toxicant

Specific target organ toxicity - single exposure

Shall not be classified as a specific target organ toxicant (single exposure).

Specific target organ toxicity - repeated exposure

Shall not be classified as a specific target organ toxicant (repeated exposure).

Aspiration hazard

Shall not be classified as presenting an aspiration hazard.

Graphene oxide

Absorption, distribution, metabolism

Absorption	No data available
Distribution	No data available
Potential for accumulation	No data available
Toxicologically significant metabolite	No data available

Acute toxicity	
Rat LD50 oral	>2 gr/kg; rat (graphite bulk)
Rat LD50 dermal	No data available
Rat LC50 inhalation	No data available
Skin irritation	No data available
Eye irritation	No data available
Skin sensitization	No data available
Genotoxicity	
OECD 476: In vitro mammalian cell gene mutation test Negative	
OECD 487: In vitro mammalian cell micronucleus test Negative	
Genotoxicity	
No data available	
Long term toxicity and Carcinogenicity	
No data available	
Reproductive toxicity	
No data available	

SECTION 12: Ecological information

12.1. Toxicity

NaOH:

Toxicity to fish

Toxicity to daphnia and other aquatic invertebrates

Graphene oxide: no data available

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

The mixture does not contain any components considered as PBT or vPvB.

12.6. Other adverse effects

No information required.

SECTION 13: Disposal considerations**13.1. Waste treatment methods****General information**

When handling waste, consideration should be made to the safety precautions applying to handling of the product. Waste should not be disposed of by release to sewers. Uncleaned packagings: Disposal must be made according to official regulations. European legislation: Directive 2008/98/EC.

SECTION 14: Transport information**14.1. UN number**

14.2. UN proper shipping name

14.3. Transport hazard class(es)

14.4. Packing group

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14.5. Environmental hazards

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14.6. Special precautions for user

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14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

No information required.

SECTION 15: Regulatory information**15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture**

REACH authorisations: Not required.
REACH Restrictions of use: None.
SVHC list: No
Please check your national requirements for nanomaterials.

15.2. Chemical safety assessment

No chemical safety assessment has been carried out for the mixture itself.

SECTION 16: Other information

Advice on any training appropriate for workers	To ensure protection of human health and environment, workers must be provided with proper training about how to handle and store chemicals used at work.
Hazard statements in full (section 3)	--
Revision Date	18 June 2021
Substituted version	1.0
Changes to the previous version	Complete revision to adapt the SDS to Regulations 453/2010 and 830/2015
Abbreviations and acronyms	European Chemicals Agency (ECHA) glossary: http://echa.cdt.europa.eu/
Key literature references	Guidance on compilation of Safety Data Sheet (V. 3.1 November 2015). IFA - Databases on hazardous substance (GESTIS): http://limitvalue.ifa.dguv.de/

This information is based on our present state of knowledge and our research into available scientific literature as well as information obtained from our vendors. Graphenea S.A. makes no responsibility regarding the accuracy of the scientific literature or any third-party information and, therefore, cannot guarantee any specific material properties. Use of this information shall not establish a legally binding relationship.

The information provided in this SDS must be considered as a starting point for a comprehensive program of health and safety in your company. If further data on the product is required to perform your risk assessment, contact us and we will try to assist as much as possible.