



SAFETY DATA SHEET

SPECIALTY ELECTRONIC MATERIALS UK LIMITED

Safety Data Sheet according to Regulation (EC) No 1907/2006 - Annex II

Product name: MOLYKOTE® 1000 Paste

Revision Date: 09.11.2022

Version: 8.0

Date of last issue: 20.10.2022

Print Date: 12.11.2022

SPECIALTY ELECTRONIC MATERIALS UK LIMITED encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Product name: MOLYKOTE® 1000 Paste

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

Identified uses: Lubricants and lubricant additives

1.3 Details of the supplier of the safety data sheet

COMPANY IDENTIFICATION

SPECIALTY ELECTRONIC MATERIALS UK
LIMITED
KINGS COURT, LONDON ROAD
STEVENAGE
England
SG1 2NG
UNITED KINGDOM

Manufacturer DuPont Specialty Products GmbH & Co. KG

Customer Information Number:

00800-3876-6838

SDSQuestion-EU@dupont.com

1.4 EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: +(44)-870-8200418

Local Emergency Contact: +(44)-870-8200418

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008:

Short-term (acute) aquatic hazard - Category 1 - H400

Long-term (chronic) aquatic hazard - Category 1 - H410

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

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008:

Hazard pictograms



Signal word: WARNING

Hazard statements

H410 Very toxic to aquatic life with long lasting effects.

Precautionary statements

P273 Avoid release to the environment.

P391 Collect spillage.

P501 Dispose of contents/ container to an approved waste disposal plant.

Supplemental information The following percentage of the mixture consists of ingredient(s) with unknown acute dermal toxicity: 13 %

2.3 Other hazards

Endocrine disrupting properties (human health):

The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Endocrine disrupting properties (environment):

The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

PBT and vPvB assessment:

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature: Inorganic and organic compounds, in mineral oil

3.2 Mixtures

This product is a mixture.

Identification number	Component	Classification according to Regulation (EU) 1272/2008 (CLP)	specific concentration limit/ M-Factors/ Acute toxicity estimate	%
CASRN – EC-No. – Index-No. 029-019-01-X REACH No 01-2119480154-42	copper flakes (coated with aliphatic acid)	Acute Tox. 4 - H302 Acute Tox. 3 - H331 Eye Irrit. 2 - H319 Aquatic Acute 1 - H400 Aquatic Chronic 1 - H410	M-Factor: 10[Acute] 10[Chronic] Oral ATE: 500 mg/kg Inhalation ATE: 0.733 mg/l (dust/mist)	>= 2.5 - < 10.0 %
CASRN 7440-66-6 EC-No. 231-175-3 Index-No. 030-001-01-9 REACH No –	zinc powder - zinc dust (stabilized)	Aquatic Acute 1 - H400 Aquatic Chronic 1 - H410	M-Factor: 1[Acute] 1[Chronic] Oral ATE: > 2,000 mg/kg Inhalation ATE: > 5.41 mg/l (dust/mist)	>= 2.5 - < 10.0 %
CASRN 61791-53-5 EC-No. 263-186-4 Index-No. – REACH No –	N-Tallow Alkytrimethylenediamine Oleate	Skin Irrit. 2 - H315 Eye Irrit. 2 - H319 STOT RE 2 - H373 Aquatic Acute 1 - H400 Aquatic Chronic 2 - H411	M-Factor: 10[Acute] Oral ATE: > 5,000 mg/kg Dermal ATE: > 2,000 mg/kg	>= 0.25 - < 1.0 %

Substances with a workplace exposure limit

Identification number	Component	Classification according to Regulation (EU) 1272/2008 (CLP)	Specific Concentration Limits/ M-Factors/ Acute Toxicity Estimate	%
CASRN 7789-75-5 EC-No. 232-188-7 Index-No. – REACH No –	Calcium difluoride	Not classified	Oral ATE: > 2,000 mg/kg Inhalation ATE: > 5.07 mg/l (dust/mist)	>= 20.0 - < 30.0 %
CASRN 7782-42-5 EC-No. 231-955-3 Index-No. – REACH No 01-2119486977-12	Graphite	Not classified	Oral ATE: > 2,000 mg/kg Inhalation ATE: > 2 mg/l (dust/mist)	>= 10.0 - < 20.0 %

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

General advice:

First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air; if effects occur, consult a physician.

Skin contact: Wash off with plenty of water.

Eye contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

Ingestion: If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

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

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician: No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

SECTION 5: FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media: Water spray Alcohol-resistant foam Carbon dioxide (CO₂) Dry chemical

Unsuitable extinguishing media: None known.

5.2 Special hazards arising from the substance or mixture

Hazardous combustion products: Fluorine compounds Carbon oxides Metal oxides

Unusual Fire and Explosion Hazards: Exposure to combustion products may be a hazard to health.

5.3 Advice for firefighters

Fire Fighting Procedures: Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage.

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use water spray to cool unopened containers. Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Remove undamaged containers from fire area if it is safe to do so. Evacuate area.

Special protective equipment for firefighters: In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures: Use personal protective equipment. Follow safe handling advice and personal protective equipment recommendations.

6.2 Environmental precautions: Do not release the product to the aquatic environment above defined regulatory levels. Prevent further leakage or spillage if safe to do so. Retain and dispose of contaminated wash water. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and materials for containment and cleaning up: Wipe up or scrape up and contain for salvage or disposal. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable. For large spills, provide dyking or other appropriate containment to keep material from spreading. If dyked material can be pumped, Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

6.4 Reference to other sections:

See sections: 7, 8, 11, 12 and 13.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling: Do not get on skin or clothing. Do not swallow. Avoid contact with eyes. Take care to prevent spills, waste and minimize release to the environment. Handle in accordance with good industrial hygiene and safety practice.

Use only with adequate ventilation. See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.

Advice on general occupational hygiene

Handle in accordance with good industrial hygiene and safety practice. Use good personal hygiene. Do not consume or store food in the work area. Wash hands before smoking or eating.

7.2 Conditions for safe storage, including any incompatibilities: Keep in properly labelled containers. Store in accordance with the particular national regulations.

Do not store with the following product types: Strong oxidizing agents.

Unsuitable materials for containers: None known.

7.3 Specific end use(s): Information on specific end use(s) of this product may be provided in a technical data sheet/annex to the SDS (if available).

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

If exposure limits exist, they are listed below. If no exposure limits are displayed, then no values are applicable.

Component	Regulation	Type of listing	Value
Calcium difluoride	ACGIH	TWA	2.5 mg/m ³ , Fluorine
	Further information: bone dam: Bone damage; fluorosis: Fluorosis; BEI: Substances for which there is a Biological Exposure Index or Indices (see BEI® section); A4: Not classifiable as a human carcinogen; varies: varies		
	2000/39/EC	TWA	2.5 mg/m ³ , Fluorine
	Further information: Indicative		
Graphite	ACGIH	TWA Respirable particulate matter	2 mg/m ³
	Further information: pneumoconiosis: Pneumoconiosis		
	GB EH40	TWA inhalable dust	10 mg/m ³
	GB EH40	TWA Respirable dust	4 mg/m ³

Biological occupational exposure limits

Components	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
Calcium difluoride	7789-75-5	Fluoride (Fluorine)	Urine	Prior to shift (16 hours after exposure ceases)	2 mg/l	ACGIH BEI
		Fluoride (Fluorine)	Urine	End of shift (As soon as possible after exposure ceases)	3 mg/l	ACGIH BEI

Derived No Effect Level

Calcium difluoride

Workers

Acute systemic effects		Acute local effects		Long-term systemic effects		Long-term local effects	
Dermal	Inhalation	Dermal	Inhalation	Dermal	Inhalation	Dermal	Inhalation
n.a.	n.a.	n.a.	n.a.	n.a.	5 mg/m ³	n.a.	n.a.

Consumers

Acute systemic effects			Acute local effects		Long-term systemic effects			Long-term local effects	
Dermal	Inhalation	Oral	Dermal	Inhalation	Dermal	Inhalation	Oral	Dermal	Inhalation
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.5 mg/m ³	0.02 mg/kg bw/day	n.a.	n.a.

Graphite

Workers

<i>Acute systemic effects</i>		<i>Acute local effects</i>		<i>Long-term systemic effects</i>		<i>Long-term local effects</i>	
Dermal	Inhalation	Dermal	Inhalation	Dermal	Inhalation	Dermal	Inhalation
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.2 mg/m3

Consumers

<i>Acute systemic effects</i>			<i>Acute local effects</i>		<i>Long-term systemic effects</i>			<i>Long-term local effects</i>	
Dermal	Inhalation	Oral	Dermal	Inhalation	Dermal	Inhalation	Oral	Dermal	Inhalation
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	813 mg/kg bw/day	n.a.	0.3 mg/m3

Predicted No Effect Concentration

Calcium difluoride

Compartment	PNEC
Fresh water	0.9 mg/l
Sewage treatment plant	51 mg/l
Soil	11 mg/kg

8.2 Exposure controls

Engineering controls: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations.

Individual protection measures

Eye/face protection: Use safety glasses (with side shields). Safety glasses (with side shields) should be consistent with EN 166 or equivalent.

Skin protection

Hand protection: Use chemical resistant gloves classified under Standard EN374: Protective gloves against chemicals and micro-organisms. NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Other protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.

Respiratory protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process.

Environmental exposure controls

See SECTION 7: Handling and storage and SECTION 13: Disposal considerations for measures to prevent excessive environmental exposure during use and waste disposal.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Physical state	solid (20 °C,) Form paste
Colour	brown
Odour	slight Odour Threshold No data available
Melting point/freezing point	Melting point/range: No data available
Boiling point or initial boiling point and boiling range	Boiling point/boiling range: Not applicable
Flammability	Gases/Solids Not classified as a flammability hazard Liquids No data available
Lower explosion limit and upper explosion limit / flammability limit	Lower explosion limit / Lower flammability limit No data available Upper explosion limit / Upper flammability limit No data available
Flash point	Not applicable
Auto-ignition temperature	No data available
Decomposition temperature	Thermal decomposition No data available
pH	Not applicable
Viscosity	Viscosity, kinematic Not applicable Viscosity, dynamic Not applicable
Solubility(ies)	Water solubility

	No data available
Partition coefficient: n-octanol/water	No data available
Vapour pressure	Not applicable
Density and / or relative density	Relative density 1.26
Relative vapour density	No data available
Particle characteristics	Particle size No data available

9.2 Other information

Oxidizing properties	The substance or mixture is not classified as oxidizing.
Self-heating substances	The substance or mixture is not classified as self heating.
Substances and mixtures, which in contact with water, emit flammable gases	The substance or mixture does not emit flammable gases in contact with water.
Evaporation rate	Not applicable
Molecular weight	No data available

NOTE: The physical data presented above are typical values and should not be construed as a specification.

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity: Not classified as a reactivity hazard.

10.2 Chemical stability: Stable under normal conditions.

10.3 Possibility of hazardous reactions: Can react with strong oxidizing agents.

10.4 Conditions to avoid: None known.

10.5 Incompatible materials: Oxidizing agents

10.6 Hazardous decomposition products: 1-Butene. Sodium.

SECTION 11: TOXICOLOGICAL INFORMATION

Toxicological information appears in this section when such data is available.

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

Acute toxicity

Acute toxicity (Acute oral toxicity)

Not classified

Not classified due to lack of data. / Not classified due to data which are conclusive although insufficient for classification.

Acute toxicity estimate, > 2,000 mg/kg Calculation method

Acute toxicity (Acute dermal toxicity)

Not classified

Not classified due to lack of data. / Not classified due to data which are conclusive although insufficient for classification.

Product test data not available. Refer to component data.

Acute toxicity (Acute inhalation toxicity)

Not classified

Not classified due to lack of data. / Not classified due to data which are conclusive although insufficient for classification.

Acute toxicity estimate, 4 Hour, dust/mist, > 5 mg/l Calculation method

Skin corrosion/irritation

Not classified

Not classified due to lack of data. / Not classified due to data which are conclusive although insufficient for classification.

Product test data not available. Refer to component data.

Serious eye damage/eye irritation

Not classified

Not classified due to lack of data. / Not classified due to data which are conclusive although insufficient for classification.

Product test data not available. Refer to component data.

Respiratory or skin sensitisation

Not classified

Not classified due to lack of data. / Not classified due to data which are conclusive although insufficient for classification.

Product test data not available. Refer to component data.

Germ cell mutagenicity

Not classified

Not classified due to lack of data. / Not classified due to data which are conclusive although insufficient for classification.

Product test data not available. Refer to component data.

Carcinogenicity

Not classified

Not classified due to lack of data. / Not classified due to data which are conclusive although insufficient for classification.

Product test data not available. Refer to component data.

Reproductive toxicity

Not classified

Not classified due to lack of data. / Not classified due to data which are conclusive although insufficient for classification.

Toxicity to reproduction assessment :

Product test data not available. Refer to component data.

Assessment Teratogenicity:

Product test data not available. Refer to component data.

STOT - single exposure

Not classified

Not classified due to lack of data. / Not classified due to data which are conclusive although insufficient for classification.

Product test data not available. Refer to component data.

STOT - repeated exposure

Not classified

Not classified due to lack of data. / Not classified due to data which are conclusive although insufficient for classification.

Product test data not available. Refer to component data.

Aspiration Hazard

Not classified

Not classified due to lack of data. / Not classified due to data which are conclusive although insufficient for classification.

Product test data not available. Refer to component data.

COMPONENTS INFLUENCING TOXICOLOGY:

copper flakes (coated with aliphatic acid)

Acute toxicity (Acute oral toxicity)

Acute toxicity estimate, 500 mg/kg Acute toxicity estimate according to Regulation (EC) No. 1272/2008

LD50, Rat, 481 mg/kg OECD Test Guideline 423

Acute toxicity (Acute inhalation toxicity)

Acute toxicity estimate, dust/mist, 0.733 mg/l Acute toxicity estimate according to Regulation (EC) No. 1272/2008

LC50, Rat, 4 Hour, dust/mist, 0.733 mg/l

Skin corrosion/irritation

Brief contact is essentially nonirritating to skin.

Serious eye damage/eye irritation

May cause moderate eye irritation.

Respiratory or skin sensitisation

Did not cause allergic skin reactions when tested in guinea pigs.

Germ cell mutagenicity

Animal genetic toxicity studies were negative. This material was not mutagenic in an Ames bacterial assay.

Carcinogenicity

Animal testing did not show any carcinogenic effects.

Reproductive toxicity

Toxicity to reproduction assessment :

In animal studies, did not interfere with reproduction.

Assessment Teratogenicity:

Did not cause birth defects in laboratory animals.

STOT - single exposure

The substance or mixture is not classified as specific target organ toxicant, single exposure.

STOT - repeated exposure

Based on available data, repeated exposures are not anticipated to cause additional significant adverse effects.

Information given is based on data obtained from similar substances.

Aspiration Hazard

No aspiration toxicity classification

zinc powder - zinc dust (stabilized)

Acute toxicity (Acute oral toxicity)

LD50, Rat, male and female, > 2,000 mg/kg OECD 401 or equivalent No deaths occurred at this concentration.

Acute toxicity (Acute dermal toxicity)

The dermal LD50 has not been determined.

Acute toxicity (Acute inhalation toxicity)

LC50, Rat, male and female, 4 Hour, dust/mist, > 5.41 mg/l OECD Test Guideline 403 No deaths occurred at this concentration.

Skin corrosion/irritation

Essentially nonirritating to skin.

Serious eye damage/eye irritation

May cause slight eye irritation.

Respiratory or skin sensitisation

Did not cause allergic skin reactions when tested in guinea pigs.

For respiratory sensitization:

No relevant data found.

Germ cell mutagenicity

For similar material(s): In vitro genetic toxicity studies were negative in some cases and positive in other cases.

For similar material(s): Animal genetic toxicity studies were negative.

Carcinogenicity

No relevant data found.

Reproductive toxicity

Toxicity to reproduction assessment :

For similar material(s): In animal studies, did not interfere with reproduction.

Assessment Teratogenicity:

For similar material(s): Did not cause birth defects or any other fetal effects in laboratory animals.

STOT - single exposure

The substance or mixture is not classified as specific target organ toxicant, single exposure.

STOT - repeated exposure

Based on available data, repeated exposures are not anticipated to cause additional significant adverse effects.

Information given is based on data obtained from similar substances.

Aspiration Hazard

No aspiration toxicity classification

N-Tallow Alkyltrimethylenediamine Oleate

Acute toxicity (Acute oral toxicity)

LD50, Rat, > 5,000 mg/kg

Acute toxicity (Acute dermal toxicity)

Based on data from similar materials LD50, Rat, > 2,000 mg/kg OECD Test Guideline 402

Skin corrosion/irritation

Based on data from similar materials

Serious eye damage/eye irritation

Based on data from similar materials

Respiratory or skin sensitisation

Based on data from similar materials

STOT - repeated exposure

Based on data from similar materials

Calcium difluoride

Acute toxicity (Acute oral toxicity)

Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.

LD50, Rat, female, > 2,000 mg/kg No deaths occurred at this concentration.

Acute toxicity (Acute dermal toxicity)

The dermal LD50 has not been determined.

Acute toxicity (Acute inhalation toxicity)

LC50, Rat, male and female, 4 Hour, dust/mist, > 5.07 mg/l OECD Test Guideline 403 No deaths occurred at this concentration.

Skin corrosion/irritation

Brief contact is essentially nonirritating to skin.

Serious eye damage/eye irritation

May cause slight temporary eye irritation.

Corneal injury is unlikely.

Respiratory or skin sensitisation

Did not demonstrate the potential for contact allergy in mice.

For respiratory sensitization:

No relevant data found.

Germ cell mutagenicity

For similar material(s): In vitro genetic toxicity studies were negative.

Carcinogenicity

Available data are inadequate to evaluate carcinogenicity.

Reproductive toxicity

Toxicity to reproduction assessment :

For similar material(s): In animal studies, did not interfere with fertility.

Assessment Teratogenicity:

Fluorides may cause mottling of teeth in children of mothers exposed excessively before or during pregnancy or during lactation.

STOT - single exposure

Evaluation of available data suggests that this material is not an STOT-SE toxicant.

STOT - repeated exposure

Observations in animals include:
May cause fluorosis of teeth and bones.

Aspiration Hazard

Based on physical properties, not likely to be an aspiration hazard.

Graphite

Acute toxicity (Acute oral toxicity)

LD50, Rat, > 2,000 mg/kg OECD Test Guideline 423

Acute toxicity (Acute dermal toxicity)

The dermal LD50 has not been determined.

Acute toxicity (Acute inhalation toxicity)

An LC50/inhalation/4h/rat could not be determined because no mortality of rats was observed at the maximum achievable concentration. LC50, Rat, 4 Hour, dust/mist, > 2 mg/l OECD Test Guideline 403

Skin corrosion/irritation

Brief contact is essentially nonirritating to skin.

Serious eye damage/eye irritation

May cause slight temporary eye irritation.

Respiratory or skin sensitisation

Did not demonstrate the potential for contact allergy in mice.

Germ cell mutagenicity

In vitro genetic toxicity studies were negative.

Reproductive toxicity

Toxicity to reproduction assessment :
In animal studies, did not interfere with reproduction.

Assessment Teratogenicity:

Did not cause birth defects or any other fetal effects in laboratory animals.

STOT - single exposure

The substance or mixture is not classified as specific target organ toxicant, single exposure.

STOT - repeated exposure

Based on available data, repeated exposures are not anticipated to cause significant adverse effects.

Aspiration Hazard

No aspiration toxicity classification

11.2. Information on other hazards

Endocrine disrupting properties

The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Further information

No data available

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicological information appears in this section when such data is available.

12.1 Toxicity

copper flakes (coated with aliphatic acid)

Acute toxicity to fish

LC50, Oncorhynchus mykiss (rainbow trout), 96 Hour, 0.068 mg/l

Acute toxicity to aquatic invertebrates

EC50, Daphnia magna (Water flea), 48 Hour, 0.034 mg/l, OECD Test Guideline 202

Acute toxicity to algae/aquatic plants

Information given is based on data obtained from similar substances.

EC50, Pseudokirchneriella subcapitata (green algae), 72 Hour, 0.03 mg/l, OECD Test Guideline 201

NOEC, Algae, 10 d, 0.022 mg/l, OECD Test Guideline 201

Chronic toxicity to fish

NOEC, Oncorhynchus mykiss (rainbow trout), 61 d, 0.024 mg/l

Chronic toxicity to aquatic invertebrates

NOEC, Daphnia magna (Water flea), 21 d, 0.0368 mg/l

zinc powder - zinc dust (stabilized)

Acute toxicity to fish

Material is very toxic to aquatic organisms (LC50/EC50/IC50 below 1 mg/L in the most sensitive species).

LC50, Oncorhynchus mykiss (rainbow trout), 96 Hour, 0.169 mg/l

Acute toxicity to aquatic invertebrates

EC50, Ceriodaphnia dubia (water flea), 48 Hour, 0.413 mg/l

Acute toxicity to algae/aquatic plants

EC50, Scenedesmus capricornutum (fresh water algae), 96 Hour, 0.136 mg/l

NOEC, Pseudokirchneriella subcapitata (green algae), 96 Hour, 0.019 mg/l

Chronic toxicity to fish

NOEC, Oncorhynchus mykiss (rainbow trout), 25 d, 0.025 mg/l

Chronic toxicity to aquatic invertebrates

NOEC, Daphnia magna (Water flea), 21 d, 0.037 - 0.4 mg/l

N-Tallow Alkyltrimethylenediamine Oleate**Acute toxicity to fish**

Material is highly toxic to aquatic organisms on an acute basis (LC50/EC50 between 0.1 and 1 mg/L in the most sensitive species tested).

Material is very toxic to aquatic organisms (LC50/EC50/IC50 below 1 mg/L in the most sensitive species).

Acute toxicity to aquatic invertebrates

Based on data from similar materials

EC50, Daphnia magna (Water flea), 48 Hour, > 0.1 - 1 mg/l

Acute toxicity to algae/aquatic plants

Based on data from similar materials

EC50, 72 Hour, > 0.01 - 0.1 mg/l, OECD Test Guideline 201

Based on data from similar materials

NOEC, 72 Hour, > 0.01 - 0.1 mg/l, OECD Test Guideline 201

Chronic toxicity to aquatic invertebrates

Based on data from similar materials

EC10, Daphnia (water flea), > 1 mg/l

Calcium difluoride**Acute toxicity to fish**

Not expected to be acutely toxic to aquatic organisms.

No toxicity at the limit of solubility

LC50, Oncorhynchus mykiss (rainbow trout), static test, 96 Hour, 105 - 698 mg/l

Acute toxicity to aquatic invertebrates

For similar material(s):

No toxicity at the limit of solubility

EC50, Daphnia magna (Water flea), 48 Hour, 53.4 - 98.5 mg/l

Acute toxicity to algae/aquatic plants

For similar material(s):

No toxicity at the limit of solubility

EC50, Scenedesmus capricornutum (fresh water algae), 96 Hour, 88.3 - 250 mg/l

For similar material(s):

No toxicity at the limit of solubility

NOEC, Scenedesmus capricornutum (fresh water algae), 96 Hour, 103 - 510 mg/l

For similar material(s):

No toxicity at the limit of solubility

EC50, Skeletonema costatum (marine diatom), 96 Hour, 166 mg/l

Graphite**Acute toxicity to fish**

No toxicity at the limit of solubility

LC50, Danio rerio (zebra fish), 96 Hour, > 100 mg/l, OECD Test Guideline 203

Acute toxicity to aquatic invertebrates

No toxicity at the limit of solubility

EC50, Daphnia magna (Water flea), 48 Hour, > 100 mg/l, OECD Test Guideline 202

Acute toxicity to algae/aquatic plants

EC50, Raphidocelis subcapitata (freshwater green alga), 72 Hour, > 100 mg/l, OECD Test Guideline 201

NOEC, Raphidocelis subcapitata (freshwater green alga), 72 Hour, >= 100 mg/l, OECD Test Guideline 201

Toxicity to bacteria

EC50, 3 Hour, > 1,012.5 mg/l, OECD Test Guideline 209

12.2 Persistence and degradability

copper flakes (coated with aliphatic acid)

Biodegradability: Biodegradation is not applicable.

zinc powder - zinc dust (stabilized)

Biodegradability: Biodegradation is not applicable.

N-Tallow Alkyltrimethylenediamine Oleate

Biodegradability: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

Based on data from similar materials 10-day Window: Pass

Biodegradation: 65 %

Exposure time: 28 d

Method: OECD Test Guideline 301D

Calcium difluoride

Biodegradability: Biodegradability is not applicable to inorganic substances.

Graphite

Biodegradability: Not applicable

12.3 Bioaccumulative potential

copper flakes (coated with aliphatic acid)

Bioaccumulation: Not applicable

zinc powder - zinc dust (stabilized)

Bioaccumulation: No relevant data found.

Bioconcentration factor (BCF): 177 Fish

N-Tallow Alkyltrimethylenediamine Oleate

Bioaccumulation: No relevant data found.

Calcium difluoride

Bioaccumulation: Partitioning from water to n-octanol is not applicable.

Graphite

Bioaccumulation: Not applicable Not applicable

12.4 Mobility in soil

zinc powder - zinc dust (stabilized)

No relevant data found.

N-Tallow Alkyltrimethylenediamine Oleate

No relevant data found.

Calcium difluoride

No relevant data found.

Graphite

No relevant data found.

12.5 Results of PBT and vPvB assessment

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

copper flakes (coated with aliphatic acid)

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

zinc powder - zinc dust (stabilized)

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

N-Tallow Alkyltrimethylenediamine Oleate

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

Calcium difluoride

This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

Graphite

This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

12.6 Endocrine disrupting properties

The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects

copper flakes (coated with aliphatic acid)

No data available

zinc powder - zinc dust (stabilized)

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

N-Tallow Alkyltrimethylenediamine Oleate

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Calcium difluoride

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Graphite

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Do not dump into any sewers, on the ground, or into any body of water. This product, when being disposed of in its unused and uncontaminated state should be treated as a hazardous waste according to EC Directive 2008/98/EC. Any disposal practices must be in compliance with all national and provincial laws and any municipal or local by-laws governing hazardous waste. For used, contaminated and residual materials additional evaluations may be required.

The definitive assignment of this material to the appropriate EWC group and thus its proper EWC code will depend on the use that is made of this material. Contact the authorized waste disposal services.

SECTION 14: TRANSPORT INFORMATION

Classification for ROAD and Rail transport (ADR/RID):

- | | |
|-----------------------------------|--|
| 14.1 UN number or ID number | UN 3077 |
| 14.2 UN proper shipping name | ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.(Zinc) |
| 14.3 Transport hazard class(es) | 9 |
| 14.4 Packing group | III |
| 14.5 Environmental hazards | Zinc |
| 14.6 Special precautions for user | Hazard Identification Number: 90 |

Classification for SEA transport (IMO-IMDG):

- | | |
|--|--|
| 14.1 UN number or ID number | UN 3077 |
| 14.2 UN proper shipping name | ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.(Zinc) |
| 14.3 Transport hazard class(es) | 9 |
| 14.4 Packing group | III |
| 14.5 Environmental hazards | Zinc |
| 14.6 Special precautions for user | EmS: F-A, S-F |
| 14.7 Maritime transport in bulk according to IMO instruments | Consult IMO regulations before transporting ocean bulk instruments |

Classification for AIR transport (IATA/ICAO):

14.1 UN number or ID number	UN 3077
14.2 UN proper shipping name	Environmentally hazardous substance, solid, n.o.s.(Zinc)
14.3 Transport hazard class(es)	9
14.4 Packing group	III
14.5 Environmental hazards	Not applicable
14.6 Special precautions for user	No data available.

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

SECTION 15: REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**REACH Regulation (EC) No 1907/2006**

This product contains only components that have been either registered, are exempt from registration, are regarded as registered or are not subject to registration according to Regulation (EC) No. 1907/2006 (REACH). The aforementioned indications of the REACH registration status are provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. It is the buyer's/user's responsibility to ensure that his/her understanding of the regulatory status of this product is correct. Polymers are exempted from registration under REACH. All relevant starting materials and additives have been either registered, or are exempt from registration according to Regulation (EC) No. 1907/2006 (REACH).

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.

Listed in Regulation: ENVIRONMENTAL HAZARDS

Number in Regulation: E1

100 t

200 t

15.2 Chemical safety assessment

No Chemical Safety Assessment has been carried out for this substance/mixture.

SECTION 16: OTHER INFORMATION

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

H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H331	Toxic if inhaled.
H373	May cause damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
H411	Toxic to aquatic life with long lasting effects.

Classification and procedure used to derive the classification for mixtures according to Regulation (EC) No 1272/2008

Aquatic Acute - 1 - H400 - Calculation method
 Aquatic Chronic - 1 - H410 - Calculation method

Revision

Identification Number: 2186241 / A670 / Issue Date: 09.11.2022 / Version: 8.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

2000/39/EC	Europe. Commission Directive 2000/39/EC establishing a first list of indicative occupational exposure limit values
ACGIH	USA. ACGIH Threshold Limit Values (TLV)
ACGIH BEI	ACGIH - Biological Exposure Indices (BEI)
GB EH40	UK. EH40 WEL - Workplace Exposure Limits
TWA	Limit Value - eight hours
Acute Tox.	Acute toxicity
Aquatic Acute	Short-term (acute) aquatic hazard
Aquatic Chronic	Long-term (chronic) aquatic hazard
Eye Irrit.	Eye irritation
Skin Irrit.	Skin irritation
STOT RE	Specific target organ toxicity - repeated exposure

Full text of other abbreviations

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of

Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of Very High Concern; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Information Source and References

This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

SPECIALTY ELECTRONIC MATERIALS UK LIMITED urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

GB