

**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

---

**SECTION 1. IDENTIFICATION**

Product name : 0021Z MICROMAX™ RESISTOR PASTE

Product code : 000000000027047013

**Manufacturer or supplier's details**

Company name of supplier	: Celanese Sales U.S. Ltd.
Address	: 222 West Las Colinas Boulevard Suite 900N Irving TX 75039
Telephone	: '+1 972-443-4000
Emergency telephone number	: DOMESTIC NORTH AMERICA: 800-424-9300 INTERNATIONAL, CALL +1 703-527-3887 (collect calls accepted)

**Recommended use of the chemical and restrictions on use**

Recommended use	: For industrial use only. Paste for electronic industry
-----------------	---

---

**SECTION 2. HAZARDS IDENTIFICATION****GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)**

Flammable liquids	: Category 4
Skin irritation	: Category 2
Eye irritation	: Category 2A
Skin sensitisation	: Category 1
Germ cell mutagenicity	: Category 2
Carcinogenicity	: Category 2
Reproductive toxicity	: Category 1A
Specific target organ toxicity - repeated exposure (Oral)	: Category 1 (Blood)

**Other hazards**

None known.

**GHS label elements**

Hazard pictograms :



Signal word : Danger

Hazard statements	: H227 Combustible liquid. H315 Causes skin irritation. H317 May cause an allergic skin reaction.
-------------------	---

## 0021Z MICROMAX™ RESISTOR PASTE

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

H319 Causes serious eye irritation.  
H341 Suspected of causing genetic defects.  
H351 Suspected of causing cancer.  
H360 May damage fertility or the unborn child.  
H372 Causes damage to organs (Blood) through prolonged or repeated exposure if swallowed.

## Precautionary statements

:

**Prevention:**

P201 Obtain special instructions before use.  
P202 Do not handle until all safety precautions have been read and understood.  
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.  
P260 Do not breathe mist or vapours.  
P264 Wash skin thoroughly after handling.  
P270 Do not eat, drink or smoke when using this product.  
P272 Contaminated work clothing must not be allowed out of the workplace.  
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.  
P280 Wear protective gloves, protective clothing, eye protection and face protection.

**Response:**

P302 + P352 IF ON SKIN: Wash with plenty of water.  
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P308 + P313 IF exposed or concerned: Get medical advice/ attention.  
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.  
P337 + P313 If eye irritation persists: Get medical advice/ attention.  
P362 + P364 Take off contaminated clothing and wash it before reuse.  
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

**Storage:**

P403 Store in a well-ventilated place.  
P405 Store locked up.

**Disposal:**

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

## SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

**Components**

Chemical name	CAS-No.	Concentration (% w/w)
Terpineol	8000-41-7	>= 20 - < 30
Ruthenium (IV) oxide	12036-10-1	>= 10 - < 20

**0021Z MICROMAX™ RESISTOR PASTE**

Version 8.0      Revision Date: 04-17-2025      SDS Number: 300000003402      Date of last issue: 04-12-2024  
 Date of first issue: 01-29-2024

Bisphenol A-epichlorohydrin resin	25068-38-6	$\geq 1 - < 10$
Bis(2-butoxyethyl) ether	112-73-2	$\geq 1 - < 10$
Polyethylene	9002-88-4	$\geq 1 - < 10$
Silver powder (particle diameter $>100$ nm $<1$ mm)	7440-22-4	$\geq 1 - < 10$
Polyethylene oxide, mono(nonylphenyl) ether, branched, phosphate	68412-53-3	$\geq 1 - < 10$
Glass or Ceramic ingredient(s)		30 - 40%
Lead		

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

**SECTION 4. FIRST AID MEASURES**

- If inhaled : If inhaled, remove to fresh air.  
 If breathing is difficult, give oxygen.  
 If not breathing, give artificial respiration.  
 Get medical attention.
- In case of skin contact : Wash off with soap and water.  
 Get medical attention if irritation develops and persists.  
 Wash contaminated clothing before re-use.
- In case of eye contact : Immediately flush eyes for at least 15 minutes. Get medical attention.
- If swallowed : If swallowed  
 Rinse mouth with water.  
 Call a physician or poison control centre immediately.  
 DO NOT induce vomiting unless directed to do so by a physician or poison control center.
- Most important symptoms and effects, both acute and delayed : Causes skin irritation.  
 May cause an allergic skin reaction.  
 Causes serious eye irritation.  
 Suspected of causing genetic defects.  
 Suspected of causing cancer.  
 May damage fertility or the unborn child.  
 Causes damage to organs through prolonged or repeated exposure if swallowed.

**SECTION 5. FIREFIGHTING MEASURES**

- Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Dry sand

**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

---

- Dry chemical  
Alcohol-resistant foam
- Specific hazards during fire-fighting : Hazardous decomposition products formed under fire conditions.  
(see also section 10)  
Avoid breathing decomposition products.
- Further information : Evacuate personnel to safe areas.  
Stop spill/release if it can be done with minimal risk.  
Do not allow run-off from fire fighting to enter drains or water courses.
- Special protective equipment for firefighters : Exposure to decomposition products may be a hazard to health.  
Wear self-contained breathing apparatus for firefighting if necessary.
- 

**SECTION 6. ACCIDENTAL RELEASE MEASURES**

- Personal precautions, protective equipment and emergency procedures : Avoid contact with skin, eyes and clothing.  
Ensure adequate ventilation.  
Wear suitable protective equipment.  
Dispose of in accordance with local regulations.
- Environmental precautions : Prevent further leakage or spillage if safe to do so.  
Prevent product from entering drains.  
Clean contaminated floors and objects thoroughly while observing environmental regulations.
- Methods and materials for containment and cleaning up : Contain spill.  
Soak up with inert absorbent material.  
Collect and contain contaminated absorbent and dike material for disposal.  
Keep in suitable, closed containers for disposal.  
Ventilate the area.  
Clean contaminated surface thoroughly.
- 

**SECTION 7. HANDLING AND STORAGE**

- Advice on protection against fire and explosion : Avoid formation of dust and aerosols.  
Keep away from heat and sources of ignition.
- Advice on safe handling : Avoid inhalation, ingestion and contact with skin and eyes.  
Use only with adequate ventilation/personal protection.  
Keep container closed when not in use.  
Take care to avoid waste and spillage when weighing, loading and mixing the product.
- Conditions for safe storage : Store in original container.  
Keep containers tightly closed in a dry, cool and well-ventilated place.  
Keep away from sources of ignition - No smoking.  
Do not store or consume food, drink or tobacco in areas
-

## 0021Z MICROMAX™ RESISTOR PASTE

Version 8.0      Revision Date: 04-17-2025      SDS Number: 300000003402      Date of last issue: 04-12-2024  
 Date of first issue: 01-29-2024

where they may become contaminated with this material.  
 Keep container closed when not in use.  
 Do not reuse empty container.  
 Further information on storage stability : Stable under normal conditions.

## SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

## Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Silver powder (particle diameter >100 nm <1mm)	7440-22-4	TWA (Dust and fume)	0.1 mg/m <sup>3</sup>	ACGIH
		TWA (Dust)	0.01 mg/m <sup>3</sup>	NIOSH REL
		TWA	0.01 mg/m <sup>3</sup>	OSHA P0
Lead	7439-92-1	TWA	0.05 mg/m <sup>3</sup> (Lead)	ACGIH
		PEL	0.05 mg/m <sup>3</sup> (Lead)	OSHA CARC
		TWA	0.05 mg/m <sup>3</sup> (Lead)	NIOSH REL

## Biological occupational exposure limits

Components	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
Lead	7439-92-1	Lead (Lead)	In blood	Not critical	200 µg/l	ACGIH BEI

**Engineering measures** : Local exhaust or a laboratory hood should be used when handling the materials.  
 Maintain air concentrations below occupational exposure standards.

## Personal protective equipment

**Respiratory protection** : Provide adequate ventilation.  
 No personal respiratory protective equipment normally required.  
 Where there is potential for airborne exposures in excess of applicable limits, wear approved respiratory protection with dust/mist cartridge.  
 When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.  
 Consult the respirator manufacturer to determine the appropriate type of equipment for a given application. Observe respirator use limitations specified by the manufacturer.  
 Persons performing maintenance or repairs on exhaust system equipment (e.g. ducts) may need to use respirators and protective clothing to prevent exposure to any accumulated residues.

**Hand protection**  
**Material** : Impervious gloves

**Remarks** : Gloves must be inspected prior to use. Gloves should be discarded and replaced if there is any indication of degradation.

**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

tion or chemical breakthrough. The choice of an appropriate glove does not only depend on its material but also on other quality features and is different from one producer to the other. The exact break through time can be obtained from the protective glove producer and this has to be observed. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time.

Eye protection : Wear safety glasses with side shields.

Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place.  
Lightweight protective clothing  
Safety shoes

Hygiene measures : Handle in accordance with good industrial hygiene and safety practice.  
Avoid contact with skin, eyes and clothing.  
Contaminated work clothing should not be allowed out of the workplace.  
Remove contaminated clothing and protective equipment before entering eating areas.  
Remove and wash contaminated clothing before re-use.

**SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**

Appearance : viscous liquid

Colour : black

Odour : solvent-like

pH : No data available Substance/mixture is non-polar/aprotic.

Flash point : 194 °F / 90 °C  
Method: Setaflash closed cup - SCC

Density : 1.93 g/cm<sup>3</sup> (68 °F / 20 °C)

Solubility(ies)  
Water solubility : slightly soluble

Viscosity  
Viscosity, dynamic : No data available

Viscosity, kinematic : > 20.5 mm<sup>2</sup>/s (104 °F / 40 °C)  
estimated

Oxidizing properties : The substance or mixture is not classified as oxidizing.  
Not classified due to data which are conclusive although insufficient for classification.

**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

**SECTION 10. STABILITY AND REACTIVITY**

Possibility of hazardous reactions : Polymerization will not occur.  
Stable at normal temperatures and storage conditions.

Conditions to avoid : None reasonably foreseeable.

Incompatible materials : Acids

Hazardous decomposition products : No decomposition if stored and applied as directed.

Under fire conditions:  
Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke).  
Metal oxides

**SECTION 11. TOXICOLOGICAL INFORMATION****Acute toxicity**

Not classified due to lack of data.

**Product:**

Acute oral toxicity : Acute toxicity estimate: > 5,000 mg/kg  
Method: Calculation method

Acute inhalation toxicity : Acute toxicity estimate: 36.85 mg/l  
Exposure time: 4 h  
Test atmosphere: dust/mist  
Method: Calculation method

Acute dermal toxicity : Acute toxicity estimate: > 5,000 mg/kg  
Method: Calculation method

**Components:****Terpineol:**

Acute oral toxicity : LD50 (Rat): > 2,000 mg/kg  
Method: OECD Test Guideline 401  
Assessment: The substance or mixture has no acute oral toxicity

Acute dermal toxicity : LD50 (Rabbit): > 2,000 mg/kg  
Method: OECD Test Guideline 402  
Assessment: The substance or mixture has no acute dermal toxicity

**Bisphenol A-epichlorohydrin resin:**

Acute oral toxicity : LD50 (Rat): > 2,000 mg/kg  
Method: Fixed Dose Method  
Assessment: The substance or mixture has no acute oral toxicity

Acute inhalation toxicity : Assessment: The substance or mixture has no acute inhalation toxicity  
Remarks: An LC50/inhalation/4h/rat could not be determined because no mortality of rats was observed at the maximum

**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

---

achievable concentration.

Acute dermal toxicity : LD50 (Rat): > 2,000 mg/kg  
Method: OECD Test Guideline 402  
Assessment: The substance or mixture has no acute dermal toxicity

**Silver powder (particle diameter >100 nm <1mm):**

Acute oral toxicity : LD50 (Rat): > 2,000 mg/kg  
Method: OECD Test Guideline 401  
Assessment: The substance or mixture has no acute oral toxicity

Acute inhalation toxicity : LC50 (Rat): > 5.16 mg/l  
Exposure time: 4 h  
Test atmosphere: dust/mist  
Method: OECD Test Guideline 436  
Assessment: The substance or mixture has no acute inhalation toxicity

Acute dermal toxicity : LD50 (Rat): > 2,000 mg/kg  
Method: OECD Test Guideline 402  
Assessment: The substance or mixture has no acute dermal toxicity

**Polyethylene oxide, mono(nonylphenyl) ether, branched, phosphate:**

Acute oral toxicity : LD50 (Rat): 4,450 mg/kg

**Lead:**

Acute oral toxicity : LD50 (Rat): > 5,000 mg/kg  
Method: OECD Test Guideline 401  
Remarks: Information given is based on data obtained from similar substances.

Acute inhalation toxicity : LC50 (Rat): > 5.05 mg/l  
Exposure time: 4 h  
Test atmosphere: dust/mist  
Method: OECD Test Guideline 403  
Remarks: Information given is based on data obtained from similar substances.

Acute dermal toxicity : LD50 (Rat): > 2,000 mg/kg  
Method: OECD Test Guideline 402  
Remarks: Information given is based on data obtained from similar substances.

**Ruthenium (IV) oxide:**

Acute oral toxicity : LD50 (Rat): 4,580 mg/kg

**Skin corrosion/irritation**

Causes skin irritation.



**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

---

**Components:****Terpineol:**

Species	:	Rabbit
Assessment	:	Irritating to skin.
Method	:	OECD Test Guideline 404
Result	:	Skin irritation

**Bisphenol A-epichlorohydrin resin:**

Species	:	Rabbit
Assessment	:	Irritating to skin.
Result	:	Severe skin irritation

**Silver powder (particle diameter >100 nm <1mm):**

Species	:	Rabbit
Assessment	:	No skin irritation
Method	:	OECD Test Guideline 404
Result	:	Slight or no skin irritation
Remarks	:	Minimal effects that do not meet the threshold for classification.

**Polyethylene oxide, mono(nonylphenyl) ether, branched, phosphate:**

Species	:	Rabbit
Assessment	:	Irritating to skin.
Result	:	Severe skin irritation
Remarks	:	Information given is based on data obtained from similar substances.

**Lead:**

Species	:	Rabbit
Assessment	:	Not classified as irritant
Method	:	OECD Test Guideline 404
Result	:	No skin irritation
Remarks	:	Information given is based on data obtained from similar substances.

**Serious eye damage/eye irritation**

Causes serious eye irritation.

**Components:****Terpineol:**

Species	:	animals (unspecified species)
Result	:	Eye irritation
Assessment	:	Irritating to eyes.
Method	:	OECD Test Guideline 405

**Bisphenol A-epichlorohydrin resin:**

Species	:	Rabbit
Result	:	Irritation to eyes, reversing within 7 days
Assessment	:	Mild eye irritation
Method	:	OECD Test Guideline 405

**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

---

**Silver powder (particle diameter >100 nm <1mm):**

Species	: Rabbit
Result	: No eye irritation
Assessment	: No eye irritation
Method	: OECD Test Guideline 405

**Polyethylene oxide, mono(nonylphenyl) ether, branched, phosphate:**

Species	: Rabbit
Result	: Risk of serious damage to eyes.
Assessment	: Risk of serious damage to eyes.
Remarks	: Information given is based on data obtained from similar substances.

**Lead:**

Species	: Rabbit
Result	: No eye irritation
Assessment	: Not classified as irritant
Method	: OECD Test Guideline 405
Remarks	: Information given is based on data obtained from similar substances.

**Ruthenium (IV) oxide:**

Species	: Rabbit
Result	: Slight or no eye irritation
Assessment	: No eye irritation
Method	: OECD Test Guideline 405
Remarks	: Minimal effects that do not meet the threshold for classification.

**Respiratory or skin sensitisation****Skin sensitisation**

May cause an allergic skin reaction.

**Respiratory sensitisation**

Not classified due to lack of data.

**Components:****Terpineol:**

Test Type	: Maximisation Test
Species	: Guinea pig
Assessment	: Not a skin sensitizer.
Method	: OECD Test Guideline 406
Result	: Did not cause sensitisation on laboratory animals.

**Bisphenol A-epichlorohydrin resin:**

Species	: Mouse
Assessment	: May cause sensitisation by skin contact.
Method	: OECD Test Guideline 429
Result	: May cause sensitisation by skin contact.

**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

---

**Silver powder (particle diameter >100 nm <1mm):**

Species	:	Guinea pig
Assessment	:	Does not cause skin sensitisation.
Method	:	US EPA Test Guideline OPPTS 870.2600
Result	:	Does not cause skin sensitisation.
Remarks	:	Information given is based on data obtained from similar substances.

**Polyethylene oxide, mono(nonylphenyl) ether, branched, phosphate:**

Species	:	Human
Assessment	:	Does not cause skin sensitisation.
Result	:	Does not cause skin sensitisation.
Remarks	:	Information given is based on data obtained from similar substances.

**Lead:**

Species	:	Guinea pig
Assessment	:	Does not cause skin sensitisation.
Method	:	OECD Test Guideline 406
Result	:	Does not cause skin sensitisation.
Remarks	:	Information given is based on data obtained from similar substances.

**Germ cell mutagenicity**

Suspected of causing genetic defects.

**Components:****Terpineol:**

Germ cell mutagenicity - Assessment	:	Tests on bacterial or mammalian cell cultures did not show mutagenic effects., Evidence suggests this substance does not cause genetic damage in animals.
-------------------------------------	---	---

**Bisphenol A-epichlorohydrin resin:**

Germ cell mutagenicity - Assessment	:	Animal testing did not show any mutagenic effects., Did not cause genetic damage in cultured bacterial cells., Genetic damage in cultured mammalian cells was observed in some laboratory tests but not in others.
-------------------------------------	---	--

**Lead:**

Germ cell mutagenicity - Assessment	:	In vitro tests showed mutagenic effects, Genetic damage in cultured mammalian cells was observed in some laboratory tests but not in others.
-------------------------------------	---	--

**Carcinogenicity**

Suspected of causing cancer.

**Components:****Terpineol:**

Carcinogenicity - Assess-	:	Not classifiable as a human carcinogen., Overall weight of
---------------------------	---	--

**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

---

ment evidence indicates that the substance is not carcinogenic.

**Bisphenol A-epichlorohydrin resin:**

Carcinogenicity - Assessment : Animal testing did not show any carcinogenic effects.

**Lead:**

Carcinogenicity - Assessment : Suspected human carcinogens, An increased incidence of tumours was observed in laboratory animals., Information given is based on data obtained from similar substances.

<b>IARC</b>	Group 2B: Possibly carcinogenic to humans	
	Lead	7439-92-1

<b>OSHA</b>	OSHA specifically regulated carcinogen	
	Lead	7439-92-1
	(Lead and inorganic lead compounds)	

<b>NTP</b>	Reasonably anticipated to be a human carcinogen	
	Lead	7439-92-1

**Reproductive toxicity**

May damage fertility or the unborn child.

**Components:****Terpineol:**

Reproductive toxicity - Assessment : Animal testing showed effects on reproduction at levels equal to or above those causing parental toxicity.

**Bisphenol A-epichlorohydrin resin:**

Reproductive toxicity - Assessment : No toxicity to reproduction, Animal testing showed no reproductive toxicity., No effects on or via lactation  
Animal testing showed no developmental toxicity.

**Lead:**

Reproductive toxicity - Assessment : Known human reproductive toxicant, Reduced fertility, Information given is based on data obtained from similar substances.  
Delayed foetal development (variations), Information given is based on data obtained from similar substances.

**STOT - single exposure**

Not classified due to lack of data.

**Components:****Terpineol:**

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

**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

---

**Bisphenol A-epichlorohydrin resin:**

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

**Lead:**

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

**STOT - repeated exposure**

Causes damage to organs (Blood) through prolonged or repeated exposure if swallowed.

**Components:****Terpineol:**

Assessment : The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

**Bisphenol A-epichlorohydrin resin:**

Assessment : The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

**Repeated dose toxicity****Components:****Terpineol:**

Species : Rat  
Application Route : Oral  
Remarks : No toxicologically significant effects were found.

**Bisphenol A-epichlorohydrin resin:**

Species : Rat  
NOAEL : > 1,000 mg/kg  
Application Route : Ingestion  
Exposure time : 90 d  
Method : OECD Test Guideline 408  
Remarks : No toxicologically significant effects were found.

Species : Mouse  
NOAEL : 100 mg/kg  
Application Route : Skin contact  
Exposure time : 90 d  
Method : OECD Test Guideline 411  
Remarks : No toxicologically significant effects were found.

**Lead:**

Species : Rat  
LOAEL : 200  
Application Route : Oral  
Target Organs : Blood  
Assessment : The substance or mixture is classified as specific target organ toxicant, repeated exposure, category 1.

## 0021Z MICROMAX™ RESISTOR PASTE

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

Remarks : altered blood chemistry  
Information given is based on data obtained from similar substances.

**Aspiration toxicity**

Not classified due to lack of data.

**Components:****Bisphenol A-epichlorohydrin resin:**

No aspiration toxicity classification

**Silver powder (particle diameter >100 nm <1mm):**

No aspiration toxicity classification

**Polyethylene oxide, mono(nonylphenyl) ether, branched, phosphate:**

No aspiration toxicity classification

**Lead:**

No aspiration toxicity classification

---

**SECTION 12. ECOLOGICAL INFORMATION****Ecotoxicity****Components:****Terpineol:**

Toxicity to fish : LC50 (Danio rerio (zebra fish)): 62 - 80 mg/l  
Exposure time: 96 h  
Method: OECD Test Guideline 203

Toxicity to daphnia and other : LC50 (Daphnia magna (Water flea)): 73 mg/l  
aquatic invertebrates Exposure time: 48 h  
Method: OECD Test Guideline 202

Toxicity to algae/aquatic : ErC50 (Pseudokirchneriella subcapitata (green algae)): 68  
plants mg/l  
Exposure time: 72 h  
Method: OECD Test Guideline 201

EbC50 (Pseudokirchneriella subcapitata (green algae)): 17  
mg/l  
Exposure time: 72 h  
Method: OECD Test Guideline 201

**Bisphenol A-epichlorohydrin resin:**

Toxicity to fish : LC50 (Oncorhynchus mykiss (rainbow trout)): 1.2 mg/l  
Exposure time: 96 h

Toxicity to daphnia and other : EC50 (Daphnia magna (Water flea)): 1.1 mg/l

**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

---

aquatic invertebrates	Exposure time: 48 h Method: OECD Test Guideline 202
Toxicity to algae/aquatic plants	: ErC50 (Scenedesmus capricornutum (fresh water algae)): > 11 mg/l Exposure time: 72 h  NOEC (Scenedesmus capricornutum (fresh water algae)): 4.2 mg/l Exposure time: 72 h
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	: NOEC (Daphnia magna (Water flea)): 0.3 mg/l Exposure time: 21 d Method: OECD Test Guideline 211

**Ecotoxicology Assessment**

Acute aquatic toxicity	: Toxic to aquatic life.
Chronic aquatic toxicity	: Toxic to aquatic life with long lasting effects.

**Silver powder (particle diameter >100 nm <1mm):**

Toxicity to fish	: LC50 (Pimephales promelas (fathead minnow)): 0.016 mg/l Exposure time: 96 h Remarks: Information given is based on data obtained from similar substances.
Toxicity to daphnia and other aquatic invertebrates	: EC50 (Daphnia magna (Water flea)): 0.0125 mg/l Exposure time: 48 h Remarks: Information given is based on data obtained from similar substances.
Toxicity to algae/aquatic plants	: EC50 (Pseudokirchneriella subcapitata (green algae)): 0.19 mg/l Exposure time: 96 h Remarks: Information given is based on data obtained from similar substances.  EC10 (Pseudokirchneriella subcapitata (green algae)): 0.03462 mg/l Exposure time: 72 h Remarks: Information given is based on data obtained from similar substances.
Toxicity to fish (Chronic toxicity)	: NOEC (Oncorhynchus mykiss (rainbow trout)): 0.0012 mg/l Exposure time: 32 d Remarks: Information given is based on data obtained from similar substances.
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	: NOEC (Daphnia magna (Water flea)): 0.00327 mg/l Exposure time: 21 d Remarks: Information given is based on data obtained from similar substances.

**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

---

**Ecotoxicology Assessment**

Acute aquatic toxicity : Very toxic to aquatic life.

Chronic aquatic toxicity : Very toxic to aquatic life with long lasting effects.

**Polyethylene oxide, mono(nonylphenyl) ether, branched, phosphate:**

Toxicity to fish : LC50 (Danio rerio (zebra fish)): 81 mg/l  
Exposure time: 96 h

**Ecotoxicology Assessment**

Acute aquatic toxicity : Harmful to aquatic life.

Chronic aquatic toxicity : Harmful to aquatic life with long lasting effects.

**Lead:**

Toxicity to fish : LC50 (Oncorhynchus mykiss (rainbow trout)): 0.107 mg/l  
Exposure time: 96 h  
Remarks: Information given is based on data obtained from similar substances.

Toxicity to daphnia and other aquatic invertebrates : EC50 (Ceriodaphnia dubia (water flea)): 0.597 mg/l  
Exposure time: 48 h  
Remarks: Information given is based on data obtained from similar substances.

Toxicity to algae/aquatic plants : NOEC (algae): 0.0227 mg/l  
Exposure time: 96 h  
Remarks: Information given is based on data obtained from similar substances.

Toxicity to fish (Chronic toxicity) : NOEC (Pimephales promelas (fathead minnow)): 0.02 mg/l  
Exposure time: 30 d  
Remarks: Information given is based on data obtained from similar substances.

**Ecotoxicology Assessment**

Acute aquatic toxicity : Very toxic to aquatic life.

Chronic aquatic toxicity : Very toxic to aquatic life with long lasting effects.

**Ruthenium (IV) oxide:****Ecotoxicology Assessment**

Acute aquatic toxicity : Toxic effects cannot be excluded

**Persistence and degradability****Components:****Terpineol:**

Biodegradability : Biodegradation: 80 %  
Exposure time: 28 d



**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue:
8.0	04-17-2025	300000003402	04-12-2024
			Date of first issue: 01-29-2024

---

Method: OECD Test Guideline 301  
Remarks: Readily biodegradable.

**Bisphenol A-epichlorohydrin resin:**

Biodegradability : Result: Not biodegradable  
Method: OECD Test Guideline 301

**Bioaccumulative potential****Components:****Terpineol:**

Bioaccumulation : Bioconcentration factor (BCF): 24.13  
Remarks: Bioaccumulation is unlikely.

**Bisphenol A-epichlorohydrin resin:**

Bioaccumulation : Remarks: The substance has the potential to bioaccumulate.

**Silver powder (particle diameter >100 nm <1mm):**

Bioaccumulation : Remarks: Bioaccumulation is unlikely.  
Information given is based on data obtained from similar substances.

Partition coefficient: n-octanol/water : Remarks: Not applicable

**Mobility in soil**

No data available

**Other adverse effects****Product:**

Additional ecological information : No data is available on the product itself.

---

**SECTION 13. DISPOSAL CONSIDERATIONS****Disposal methods**

Waste from residues : If recycling is not practicable, dispose of in compliance with local regulations.  
Do not reuse empty container. Never place unused product down any indoor or out door drain.  
Contaminated/not cleaned containers should be treated/handled like product waste. Dispose of container properly. Refer to applicable Local, State/Provincial, and Federal Regulations, as well as industry Standards.

---

**SECTION 14. TRANSPORT INFORMATION****International Regulations****UNRTDG**

UN number : UN 3082

**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.  
Class : 9  
Packing group : III  
Labels : 9  
Environmentally hazardous : no

**IATA-DGR**

UN/ID No. : UN 3082  
Proper shipping name : Environmentally hazardous substance, liquid, n.o.s.  
(Silver oxide, Glass frits)  
Class : 9  
Packing group : III  
Labels : Miscellaneous  
Packing instruction (cargo aircraft) : 964  
Packing instruction (passenger aircraft) : 964

**IMDG-Code**

UN number : UN 3082  
Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.  
(Silver oxide, Glass frits)  
Class : 9  
Packing group : III  
Labels : 9  
EmS Code : F-A, S-F  
Marine pollutant : no

**Transport in bulk according to IMO instruments**

Not applicable for product as supplied.

**National Regulations****49 CFR**

Not regulated as a dangerous good

**Special precautions for user**

Remarks : Regulated by DOT/49CFR as Combustible Liquid when transported in a bulk package ( $\geq 119$  gallons(450 litres))., Not regulated by DOT in non-bulk package., Marine Pollutants assigned UN number 3077 and 3082 in single or combination packaging containing a net quantity per single or inner packaging of 5 L or less for liquids or having a net mass per single or inner packaging of 5 KG or less for solids may be transported as non-dangerous goods as provided in section 2.10.2.7 of IMDG code, IATA special provision A197, and ADR/RID special provision 375.

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

**SECTION 15. REGULATORY INFORMATION**

**SARA 311/312 Hazards** : Flammable (gases, aerosols, liquids, or solids)

**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

---

Respiratory or skin sensitisation  
Germ cell mutagenicity  
Carcinogenicity  
Reproductive toxicity  
Specific target organ toxicity (single or repeated exposure)  
Skin corrosion or irritation  
Serious eye damage or eye irritation

**SARA 313** : The following components are subject to reporting levels established by SARA Title III, Section 313:

Lead	7439-92-1	$\geq 10 - < 20 \%$
Silver powder (particle diameter >100 nm <1mm)	7440-22-4	$\geq 1 - < 5 \%$

**California Prop. 65**

WARNING: This product can expose you to chemicals including Lead, 1,4-Dioxane, Acetaldehyde, which is/are known to the State of California to cause cancer, and Lead, which is/are known to the State of California to cause birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

**California Regulated Carcinogens**

Lead	7439-92-1
------	-----------

**TSCA list**

In compliance with TSCA-active Inventory requirements for commercial purposes.

The following substance(s) is/are subject to a Significant New Use Rule:

Bis(2-butoxyethyl) ether	112-73-2	See 40 CFR § 721.10229; Final Rule
		See 40 CFR § 721.10229; Proposed Rule

The following substance(s) is/are subject to TSCA 12(b) export notification requirements:

Bis(2-butoxyethyl) ether	112-73-2
Lead	7439-92-1

---

**SECTION 16. OTHER INFORMATION****Full text of other abbreviations**

ACGIH	: USA. ACGIH Threshold Limit Values (TLV)
ACGIH BEI	: ACGIH - Biological Exposure Indices (BEI)
NIOSH REL	: USA. NIOSH Recommended Exposure Limits
OSHA CARC	: OSHA Specifically Regulated Chemicals/Carcinogens
OSHA P0	: USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)
ACGIH / TWA	: 8-hour, time-weighted average
NIOSH REL / TWA	: Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek
OSHA CARC / PEL	: Permissible exposure limit (PEL)

**0021Z MICROMAX™ RESISTOR PASTE**

Version	Revision Date:	SDS Number:	Date of last issue: 04-12-2024
8.0	04-17-2025	300000003402	Date of first issue: 01-29-2024

---

OSHA P0 / TWA : 8-hour time weighted average

AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; 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; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; 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; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; 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; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Revision Date : 04-17-2025

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

US / EN

