4902P Sn42Bi58Ag1 Low Temperature Solder Paste

MG Chemicals UK Limited

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

1.1. Product Identifier

Product name: 4902P
Synonyms: SDS Code: 4902P; 4902P-15G, 4902P-25G
Other means of identification: Sn42Bi58Ag1 Low Temperature Solder Paste

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

Relevant identified uses: solder paste
Uses advised against: Not Applicable

1.3. Details of the supplier of the safety data sheet

Registered company name: MG Chemicals UK Limited
Address: Heame House, 23 Bilston Street, Sedgeley Dudley DY3 1JA United Kingdom
Telephone: +(44) 1663 362888
Fax: Not Available
Website: Not Available
Email: sales@mgchemicals.com

1.4. Emergency telephone number

Association / Organisation: CHEMTREC
Emergency telephone numbers: +(44) 870-8200418
Other emergency telephone numbers: +(1) 703-527-3887

SECTION 2 HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification according to regulation (EC) No 1272/2008 [CLP] [1]
H411 - Chronic Aquatic Hazard Category 2, H334 - Respiratory Sensitizer Category 1B, H317 - Skin Sensitizer Category 1


2.2. Label elements

Hazard pictogram(s)

SIGNAL WORD: DANGER

Hazard statement(s)

H411: Toxic to aquatic life with long lasting effects.
H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H317: May cause an allergic skin reaction.

Supplementary statement(s)

Not Applicable

Precautionary statement(s)

P261: Avoid breathing dust/fumes.
PRECAUTIONARY STATEMENTS

P280 Wear protective gloves/protective clothing/eye protection/face protection.
P284 [In case of inadequate ventilation] wear respiratory protection.
P273 Avoid release to the environment.
P272 Contaminated work clothing should not be allowed out of the workplace.

Precautionary statement(s) Response

P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P342+P311 If experiencing respiratory symptoms: Call a POISON CENTER/doctor/physician/first aider.
P302+P352 IF ON SKIN: Wash with plenty of water and soap.
P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
P362+P364 Take off contaminated clothing and wash it before reuse.
P391 Collect spillage.

Precautionary statement(s) Storage

Not Applicable

Precautionary statement(s) Disposal

P501 Dispose of contents/container in accordance with local regulations.

2.3. Other hazards

REACH - Art.57-59: The mixture does not contain Substances of Very High Concern (SVHC) at the SDS print date.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

3.1. Substances

See 'Composition on ingredients' in Section 3.2

3.2. Mixtures

<table>
<thead>
<tr>
<th>CAS No</th>
<th>EC No</th>
<th>Index No</th>
<th>REACH No</th>
<th>%[weight]</th>
<th>Name</th>
<th>Classification according to regulation (EC) No 1272/2008 [CLP]</th>
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<tbody>
<tr>
<td>1.7440-69-9</td>
<td>2.231-177-4</td>
<td>3. Not Available</td>
<td>4.01-21956075-33-XXXX/01-21910679-50-XXXX/01-0000319807-59-XXXX</td>
<td>51</td>
<td>bismuth</td>
<td>Not Applicable</td>
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<tr>
<td>1.8050-09-7</td>
<td>2.232-475-7</td>
<td>3.650-015-09-7</td>
<td>4.01-21943041-32-XXXX</td>
<td>3</td>
<td>rosin-colophony</td>
<td>Skin Sensitizer Category 1; H317 [2]</td>
</tr>
<tr>
<td>1.110-30-5</td>
<td>2.203-755-6</td>
<td>3. Not Available</td>
<td>4.01-2120086660-54-XXXX</td>
<td>0.5</td>
<td>N,N'-ethylenebisstearamide</td>
<td>Skin Corrosion/Irritation Category 2, Specific target organ toxicity - single exposure Category 3 (respiratory tract irritation), Eye Irritation Category 2: H315, H335, H319 [1]</td>
</tr>
</tbody>
</table>

Legend:
1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 3. Classification drawn from C&L; * EU IOELVs available

SECTION 4 FIRST AID MEASURES

4.1. Description of first aid measures

Eye Contact

If this product comes in contact with the eyes:
- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Seek medical attention without delay. If pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
DO NOT attempt to remove particles attached to or embedded in eye. Lay victim down, on stretcher if available and pad BOTH eyes, make sure dressing does not press on the injured eye by placing thick pads under dressing, above and below the eye. Seek urgent medical assistance, or transport to hospital.

If skin contact occurs:
- Immediately remove all contaminated clothing, including footwear.
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

For thermal burns:
- Decontaminate area around burn.
- Consider the use of cold packs and topical antibiotics.
- For first-degree burns (affecting top layer of skin)
  - Hold burned skin under cool (not cold) running water or immerse in cool water until pain subsides.
  - Use compresses if running water is not available.
  - Cover with sterile non-adhesive bandage or clean cloth.
- Do NOT apply butter or ointments; this may cause infection.
- Give over-the-counter pain relievers if pain increases or swelling, redness, fever occur.

For second-degree burns (affecting top two layers of skin)
- Cool the burn by immerse in cold running water for 10-15 minutes.
- Use compresses if running water is not available.
- Do NOT apply ice as this may lower body temperature and cause further damage.
- Do NOT break blisters or apply butter or ointments; this may cause infection.
- Protect burn by cover loosely with sterile, nonstick bandage and secure in place with gauze or tape.

To prevent shock: (unless the person has a head, neck, or leg injury, or it would cause discomfort):
- Lay the person flat.
- Elevate feet about 12 inches.
- Elevate burn area above heart level, if possible.
- Cover the person with coat or blanket.
- Seek medical assistance.

For third-degree burns:
Seek immediate medical or emergency assistance.

In the mean time:
- Protect burn area cover loosely with sterile, nonstick bandage or, for large areas, a sheet or other material that will not leave lint in wound.
- Separate burned toes and fingers with dry, sterile dressings.
- Do NOT soak burn in water or apply ointments or butter; this may cause infection.
- To prevent shock see above.
- For an airway burn, do not place pillow under the person’s head when the person is lying down. This can close the airway.
- Have a person with a facial burn sit up.
- Check pulse and breathing to monitor for shock until emergency help arrives.
- Have a person with a facial burn sit up.

Inhalation
- If fumes, aerosols or combustion products are inhaled remove from contaminated area.
- Other measures are usually unnecessary.

Ingestion
- If swallowed, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.
- For advice, contact a Poisons Information Centre or a doctor.
- Urgent hospital treatment is likely to be needed.
- In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient’s condition.
- If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the SDS should be provided. Further action will be the responsibility of the medical specialist.
- If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the SDS.

Where medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:
- INDUCE vomiting with fingers down the back of the throat, ONLY IF CONSCIOUS. Lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

NOTE: Wear a protective glove when inducing vomiting by mechanical means.

4.2 Most important symptoms and effects, both acute and delayed
See Section 11

4.3. Indication of any immediate medical attention and special treatment needed
Treat symptomatically.
Severe bismuth intoxication may be treated with dimercaprol (BAL in oil). Induction of acidosis by administration of ammonium chloride has been claimed to promote mobilisation of bismuth from tissue depots and increase the rate of urinary excretion.

In mouse models D-penicillamine (Cuprimine M.S. & D) is a useful chelating agent. [Ellenhorn & Barceloux: Medical Toxicology]

Copper, magnesium, aluminium, antimony, iron, manganese, nickel, zinc (and their compounds) in welding, brazing, galvanising or smelting operations all give rise to thermally produced particulates of smaller dimension than may be produced if the metals are divided mechanically. Where insufficient ventilation or respiratory protection is available these particulates may produce ‘metal fume fever’ in workers from an acute or long term exposure.

- Onset occurs in 4-6 hours generally on the evening following exposure. Tolerance develops in workers but may be lost over the weekend. (Monday Morning Fever)
- Pulmonary function tests may indicate reduced lung volumes, small airway obstruction and decreased carbon monoxide diffusing capacity but these abnormalities resolve after several months.
- Although mildly elevated urinary levels of heavy metal may occur they do not correlate with clinical effects.
- The general approach to treatment is recognition of the disease, supportive care and prevention of exposure.
- Seriously symptomatic patients should receive chest x-rays, have arterial blood gases determined and be observed for the development of tracheobronchitis and pulmonary edema.

[Ellenhorn and Barceloux: Medical Toxicology]

SECTION 5 FIREFIGHTING MEASURES

5.1. Extinguishing media

Continued...
DO NOT use halogenated fire extinguishing agents. Metal dust fires need to be smothered with sand, inert dry powders.

Use dry sand, graphite powder, dry sodium chloride based extinguishers, G-1 or Met L-X to smother fire.

Confining or smothering material is preferable to applying water as chemical reaction may produce flammable and explosive hydrogen gas.

Chemical reaction with CO2 may produce flammable and explosive methane.

If impossible to extinguish, withdraw, protect surroundings and allow fire to burn itself out.

5.2. Special hazards arising from the substrate or mixture

Fire Incompatibility

Reacts with acids producing flammable / explosive hydrogen (H2) gas

5.3. Advice for firefighters

Fire Fighting

Alert Fire Brigade and tell them location and nature of hazard.

Wear breathing apparatus plus protective gloves in the event of a fire. Prevent, by any means available, spillage from entering drains or water courses.

Use fire fighting procedures suitable for surrounding area.

DO NOT approach containers suspected to be hot.

Cool fire exposed containers with water spray from a protected location.

If safe to do so, remove containers from path of fire.

Equipment should be thoroughly decontaminated after use.

Fire/Explosion Hazard

DO NOT disturb burning dust. Explosion may result if dust is stirred into a cloud, by providing oxygen to a large surface of hot metal.

DO NOT use water or foam as generation of explosive hydrogen may result.

With the exception of the metals that burn in contact with air or water (for example, sodium), masses of combustible metals do not represent unusual fire risks because they have the ability to conduct heat away from hot spots so efficiently that the heat of combustion cannot be maintained - this means that it will require a lot of heat to ignite a mass of combustible metal. Generally, metal fire risks exist when sawdust, machine shavings and other metal 'fines' are present.

Metal powders, while generally regarded as non-combustible:

May burn when metal is finely divided and energy input is high.

May react explosively with water.

May be ignited by friction, heat, sparks or flame.

May REIGNITE after fire is extinguished.

Will burn with intense heat.

Note:

Metal dust fires are slow moving but intense and difficult to extinguish.

Containers may explode on heating.

Dusts or fumes may form explosive mixtures with air.

Gases generated in fire may be poisonous, corrosive or irritating.

Hot or burning metals may react violently upon contact with other materials, such as oxidising agents and extinguishing agents used on fires involving ordinary combustibles or flammable liquids.

Temperatures produced by burning metals can be higher than temperatures generated by burning flammable liquids

Some metals can continue to burn in carbon dioxide, nitrogen, water, or steam atmospheres in which ordinary combustibles or flammable liquids would be incapable of burning.

SECTION 6 ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

See section 8

6.2. Environmental precautions

See section 12

6.3. Methods and material for containment and cleaning up

Minor Spills

Environmental hazard - contain spillage.

- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid contact with skin and eyes.
- Control personal contact with the substance, by using protective equipment.
- Use dry clean up procedures and avoid generating dust.
- Place in a suitable, labelled container for waste disposal.

Major Spills

Environmental hazard - contain spillage.

- Do not use compressed air to remove metal dusts from floors, beams or equipment
  - Vacuum cleaners, of flame-proof design, should be used to minimise dust accumulation.
  - Use non-sparking handling equipment, tools and natural bristle brushes.
  - Provide grounding and bonding where necessary to prevent accumulation of static charges during metal dust handling and transfer operations
  - Cover and reseal partially empty containers.
  - Do not allow chips, fines or dusts to contact water, particularly in enclosed areas.

If molten:

- Contain the flow using dry sand or salt flux as a dam.
- All tooling (e.g., shovels or hand tools) and containers which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use.
- Allow the spill to cool before remelting scrap.

CAUTION: Absorbent materials wetted with occluded oil must be moistened with water as they may auto-oxidize, become self heating and ignite.

Some oils slowly oxidise when spread in a film and oil on cloths, mops, absorbents may autoxidise and generate heat, smoulder, ignite and burn. In the workplace oily rags should be collected and immersed in water.

Moderate hazard.

CAUTION: Advise personnel in area.

- Alert Emergency Services and tell them location and nature of hazard.
- Control personal contact by wearing protective clothing.
- Prevent, by any means available, spillage from entering drains or water courses.
- Recover product wherever possible.
6.4. Reference to other sections

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

7.1. Precautions for safe handling

For molten metals:
- Molten metal and water can be an explosive combination. The risk is greatest when there is sufficient molten metal to entrap or seal off water. Water and other forms of contamination on or contained in scrap or remelt ingot are known to have caused explosions in melting operations. While the products may have minimal surface roughness and internal voids, there remains the possibility of moisture contamination or entrapment. If confined, even a few drops can lead to violent explosions.
  - All tooling, containers, molds and ladles, which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use.
    - Any surfaces that may contact molten metal (e.g. concrete) should be specially coated
    - Drops of molten metal in water (e.g. from plasma arc cutting), while not normally an explosion hazard, can generate enough flammable hydrogen gas to present an explosion hazard. Vigorous circulation of the water and removal of the particles minimise the hazard.
- During melting operations, the following minimum guidelines should be observed:
  - Inspect all materials prior to furnace charging and completely surface contamination such as water, ice, snow, deposits of grease and oil or other surface contamination resulting from weather exposure, shipment, or storage.
  - Store materials in dry, heated areas with any cracks or cavities pointed downwards.
  - Preheat and dry large objects adequately before charging in to a furnace containing molten metal. This is typically done by the use of a drying oven or homogenising furnace. The dry cycle should bring the metal temperature of the coldest item of the batch to 200 degree C (400 degree F) and then hold at that temperature for 6 hours.

Safe handling
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- DO NOT allow material to contact humans, exposed food or food utensils.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately. Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer’s storage and handling recommendations contained within this SDS.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Fire and explosion protection
- See section 5

Other information
- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry area protected from environmental extremes.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer’s storage and handling recommendations contained within this SDS.

For major quantities:
- Consider storage in isolated area - ensure storage areas are isolated from sources of community water (including stormwater, ground water, lakes and streams).
- Ensure that accidental discharge to air or water is the subject of a contingency disaster management plan; this may require consultation with local authorities.

7.2. Conditions for safe storage, including any incompatibilities

Suitable container
- Bulk bags: Reinforced bags required for dense materials.
- CARE: Packing of high density product in light weight metal or plastic packages may result in container collapse with product release
- Heavy gauge metal packages / Heavy gauge metal drums
- Many metals may incandesce, react violently, ignite or react explosively upon addition of concentrated nitric acid.
- HAZARD
  - Although anti-oxidants may be present, in the original formulation, these may deplete over time as they come into contact with air.
- Rags wet / soaked with unsaturated hydrocarbons / drying oils may auto-oxidise; generate heat and, in-time, smoulder and ignite. This is especially the case where oil-soaked materials are folded, bunched, compressed, or piled together - this allows the heat to accumulate or even accelerate the reaction
- Oily cleaning rags should be collected regularly and immersed in water, or spread to dry in safe-place away from direct sunlight or stored, immersed, in solvents in suitably closed containers.

Storage incompatibility
- Metals exhibit varying degrees of activity. Reaction is reduced in the massive form (sheet, rod, or drop), compared with finely divided forms. The less active metals will not burn in air but:
  - can react exothermically with oxidising acids to form noxious gases.
  - catalyse polymerisation and other reactions, particularly when finely divided.
  - react with halogenated hydrocarbons (for example, copper dissolves when heated in carbon tetrachloride), sometimes forming explosive compounds.
- Finely divided metal powders develop pyrophoricity when a critical specific surface area is exceeded; this is ascribed to high heat of oxide formation on exposure to air.
- Safe handling is possible in relatively low concentrations of oxygen in an inert gas.
- Several pyrophoric metals, stored in glass bottles have ignited when the container is broken on impact. Storage of these materials moist and in metal containers is recommended.
- The reaction residues from various metal syntheses (involving vacuum evaporation and co-deposition with a ligand) are often pyrophoric.
- Factors influencing the pyrophoricity of metals are particle size, presence of moisture, nature of the surface of the particle, heat of formation of the oxide,
nitride, mass, hydrogen content, stress, purity and presence of oxide, among others.

- Many metals in elemental form react exothermically with compounds having active hydrogen atoms (such as acids and water) to form flammable hydrogen gas and caustic products.
- Elemental metals may react with azo/diazo compounds to form explosive products.
- Some elemental metals form explosive products with halogenated hydrocarbons.

7.3. Specific end use(s)

See section 1.2

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control parameters

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<tr>
<th>DERIVED NO EFFECT LEVEL (DNEL)</th>
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<tr>
<td>PREDICTED NO EFFECT LEVEL (PNEC)</td>
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OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

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<tr>
<th>Source</th>
<th>Ingredient</th>
<th>Material name</th>
<th>TWA</th>
<th>STEL</th>
<th>Peak</th>
<th>Notes</th>
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<tbody>
<tr>
<td>EU Consolidated List of Indicative Occupational Exposure Limit Values (IOELVs)</td>
<td>tin</td>
<td>Tin and inorganic tin compounds</td>
<td>2 mg/m³</td>
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<td>UK Workplace Exposure Limits (WELs)</td>
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<td>Rosin-based solder flux fume</td>
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EMERGENCY LIMITS

<table>
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<tr>
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<th>TEEL-1</th>
<th>TEEL-2</th>
<th>TEEL-3</th>
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<tbody>
<tr>
<td>bismuth</td>
<td>Bismuth</td>
<td>15 mg/m³</td>
<td>170 mg/m³</td>
<td>990 mg/m³</td>
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<tr>
<td>tin</td>
<td>Tin</td>
<td>6 mg/m³</td>
<td>67 mg/m³</td>
<td>400 mg/m³</td>
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<tr>
<td>rosin-colophony</td>
<td>Rosin core solder decomposition products; (Colophony Gum)</td>
<td>72 mg/m³</td>
<td>790 mg/m³</td>
<td>1,500 mg/m³</td>
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<tr>
<td>silver</td>
<td>Silver</td>
<td>0.3 mg/m³</td>
<td>170 mg/m³</td>
<td>990 mg/m³</td>
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<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Original IDLH</th>
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<td>bismuth</td>
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<tr>
<td>tin</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
<tr>
<td>rosin-colophony</td>
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<td>Not Available</td>
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<td>suberic acid</td>
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<td>silver</td>
<td>10 mg/m³</td>
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<tr>
<td>N,N’-ethylenebisstearamide</td>
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MATERIAL DATA

IFRA Prohibited Fragrance Substance

The International Fragrance Association (IFRA) Standards form the basis for the globally accepted and recognized risk management system for the safe use of fragrance ingredients and are part of the IFRA Code of Practice. This is the self-regulating system of the industry, based on risk assessments carried out by an independent Expert Panel.

A TLV-TWA is recommended so as to minimise the risk of stannosis. The STEL (4.0 mg/m³) has been eliminated (since 1986) so that additional toxicological data and industrial hygiene experience may become available to provide a better base for quantifying on a toxicological basis what the STEL should in fact be.

8.2. Exposure controls

8.2.1. Appropriate engineering controls

<table>
<thead>
<tr>
<th>Care:</th>
<th>Atmospheres in bulk storages and even apparently empty tanks may be hazardous by oxygen depletion. Atmosphere must be checked before entry.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Requirements of State Authorities concerning conditions for tank entry must be met. Particularly with regard to training of crews for tank entry; work permits; sampling of atmosphere; provision of rescue harness and protective gear as needed</td>
</tr>
<tr>
<td></td>
<td>Metal dusts must be collected at the source of generation as they are potentially explosive.</td>
</tr>
<tr>
<td></td>
<td>Avoid ignition sources.</td>
</tr>
<tr>
<td></td>
<td>Good housekeeping practices must be maintained.</td>
</tr>
<tr>
<td></td>
<td>Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions.</td>
</tr>
<tr>
<td></td>
<td>Do not use compressed air to remove settled materials from floors, beams or equipment</td>
</tr>
<tr>
<td></td>
<td>Vacuum cleaners, of flame-proof design, should be used to minimise dust accumulation.</td>
</tr>
<tr>
<td></td>
<td>Use non-sparking handling equipment, tools and natural bristle brushes. Cover and resell partially empty containers. Provide grounding and bonding where necessary to prevent accumulation of static charges during metal dust handling and transfer operations.</td>
</tr>
<tr>
<td></td>
<td>Do not allow chips, fines or dusts to contact water, particularly in enclosed areas.</td>
</tr>
<tr>
<td></td>
<td>Metal spraying and blasting should, where possible, be conducted in separate rooms. This minimises the risk of supplying oxygen, in the form of metal oxides, to potentially reactive finely divided metals such as aluminium, zinc, magnesium or titanium.</td>
</tr>
<tr>
<td></td>
<td>Work-shops designed for metal spraying should possess smooth walls and a minimum of obstructions, such as ledges, on which dust accumulation is possible.</td>
</tr>
<tr>
<td></td>
<td>Wet scrubbers are preferable to dry dust collectors.</td>
</tr>
<tr>
<td></td>
<td>Bag or filter-type collectors should be sited outside the workrooms and be fitted with explosion relief doors.</td>
</tr>
<tr>
<td></td>
<td>Cyclones should be protected against entry of moisture as reactive metal dusts are capable of spontaneous combustion in humid or partially wetted...</td>
</tr>
</tbody>
</table>
Air Speed:

<table>
<thead>
<tr>
<th>Type of Contaminant:</th>
<th>Air Speed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>welding, brazing fumes (released at relatively low velocity into moderately still air)</td>
<td>0.5-1.0 m/s (100-200 f/min.)</td>
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</tbody>
</table>

Within each range the appropriate value depends on:

<table>
<thead>
<tr>
<th>Lower end of the range</th>
<th>Upper end of the range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Room air currents minimal or favourable to capture</td>
<td>1: Disturbing room air currents</td>
</tr>
<tr>
<td>2: Contaminants of low toxicity or of nuisance value only.</td>
<td>2: Contaminants of high toxicity</td>
</tr>
<tr>
<td>3: Intermittent, low production.</td>
<td>3: High production, heavy use</td>
</tr>
<tr>
<td>4: Large hood or large air mass in motion</td>
<td>4: Small hood-local control only</td>
</tr>
</tbody>
</table>

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point. Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2.5 m/s (300-500 f/min.) for extraction of gases discharged 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

### 8.2.2. Personal protection

#### Eye and face protection

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be treated for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid staff should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

#### Skin protection

See Hand protection below

---

### Hands/feet protection

#### NOTE:

- The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
- Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.

The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.

The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.

Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US FT739, AS/NZS 2161.1 or national equivalent).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
- Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long term use.

Contaminated gloves should be replaced.

As defined in ASTM F-739-96 in any application, gloves are rated as:

- Excellent when breakthrough time > 480 min
- Good when breakthrough time > 20 min
- Fair when breakthrough time < 20 min
- Poor when glove material degrades

For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended.

It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times.

Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers' technical data should always be taken into account to ensure selection of the most appropriate glove for the task.

Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example:

- Thinner gloves (down to 0.1 mm or less) may be required when a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of.
- Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

- Protective gloves eg. Leather gloves or gloves with Leather facing

Continued...
Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.

- polychloroprene.
- nitrile rubber.
- butyl rubber.
- fluorocaoutchouc.
- polyvinyl chloride.

Gloves should be examined for wear and/or degradation constantly.

Body protection
- See Other protection below

Other protection
- Overalls.
- PVC apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

Respiratory protection

Particulate. (AS/NZS 1716 & 1715, EN 143:2000 & 149:001, ANSI Z88 or national equivalent)

<table>
<thead>
<tr>
<th>Required Minimum Protection Factor</th>
<th>Half-Face Respirator</th>
<th>Full-Face Respirator</th>
<th>Powered Air Respirator</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 10 x ES</td>
<td>Air-line*</td>
<td>P1</td>
<td>PAPR-P1</td>
</tr>
<tr>
<td>up to 50 x ES</td>
<td>Air-line**</td>
<td>P2</td>
<td>PAPR-P2</td>
</tr>
<tr>
<td>up to 100 x ES</td>
<td>Air-line*</td>
<td>P3</td>
<td>PAPR-P3</td>
</tr>
<tr>
<td>100+ x ES</td>
<td>Air-line**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* - Negative pressure demand  ** - Continuous flow

- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory protection. These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

8.2.3. Environmental exposure controls

See section 12

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Metallic Grey</td>
</tr>
<tr>
<td>Physical state</td>
<td>Solid</td>
</tr>
<tr>
<td>Relative density (Water = 1)</td>
<td>8.6</td>
</tr>
<tr>
<td>Odour</td>
<td>Not Available</td>
</tr>
<tr>
<td>Partition coefficient n-octanol / water</td>
<td>Not Available</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>Not Available</td>
</tr>
<tr>
<td>Auto-ignition temperature (°C)</td>
<td>Not Available</td>
</tr>
<tr>
<td>pH (as supplied)</td>
<td>Not Available</td>
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<tr>
<td>Decomposition temperature</td>
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<tr>
<td>Melting point / freezing point (°C)</td>
<td>219</td>
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<tr>
<td>Viscosity (cSt)</td>
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<tr>
<td>Initial boiling point and boiling range (°C)</td>
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</tr>
<tr>
<td>Molecular weight (g/mol)</td>
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<tr>
<td>Flash point (°C)</td>
<td>Not Available</td>
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<tr>
<td>Taste</td>
<td>Not Available</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not Available</td>
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<tr>
<td>Explosive properties</td>
<td>Not Available</td>
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<tr>
<td>Flammability</td>
<td>Not Available</td>
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<tr>
<td>Oxidising properties</td>
<td>Not Available</td>
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<tr>
<td>Upper Explosive Limit (%)</td>
<td>Not Available</td>
</tr>
<tr>
<td>Surface Tension (dyn/cm or mN/m)</td>
<td>Not Applicable</td>
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<tr>
<td>Lower Explosive Limit (%)</td>
<td>Not Available</td>
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<tr>
<td>Volatile Component (%vol)</td>
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<tr>
<td>Vapour pressure (kPa)</td>
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</tr>
<tr>
<td>Gas group</td>
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<tr>
<td>Solubility in water</td>
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</tr>
<tr>
<td>pH as a solution (1%)</td>
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</tr>
<tr>
<td>Vapour density (Air = 1)</td>
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</tr>
<tr>
<td>VOC g/L</td>
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</tr>
</tbody>
</table>

9.2. Other information

Not Available

SECTION 10 STABILITY AND REACTIVITY
11.1. Information on toxicological effects

**Inhalation**

The material is not thought to produce either adverse health effects or irritation of the respiratory tract following inhalation (as classified by EC Directives using EC classification criteria). Nevertheless, adverse systemic effects have been produced following exposure of animals by at least one other route and good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.

Not normally a hazard due to non-volatile nature of product

Inhalation of freshly formed metal oxide particles sized below 1.5 microns and generally between 0.02 to 0.05 microns may result in "metal fume fever". Symptoms may be delayed for up to 12 hours and begin with the sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, tachyarrhythmia and a generalised feeling of malaise. Faint to severe headache, nausea, occasional vomiting, fever or chills, exaggerated mental activity, profuse sweating, diarrhoea, excessive urination and prostration may also occur. Tolerance to the fumes develops rapidly, but is quickly lost. All symptoms usually subside within 24-36 hours following removal from exposure.

**Ingestion**

Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.

As tin salts (stannous and stannic) are generally poorly absorbed from the gastrointestinal tract. Ingestion of food contaminated with tin may cause transient gastrointestinal disturbances such as nausea, vomiting, diarrhoea, fever and headache.

Parenteral administration provides a substantial description of tin toxicology. Systemic tin is highly toxic producing diarrhoea, muscle paralysis, twitching and neurological damage.

By mouth most tin salts are relatively non-toxic. A number of tin food poisonings, producing vomiting, nausea and diarrhoea, have occurred after ingestion of fruit juices etc. with tin levels above 1400 ppm. This appears to be due to gastric irritation resulting from the activity and asteryringia of tin compounds, rather than systemic toxicity. Severe growth retardation occurs in rats with dietary stannous salts at levels exceeding 0.3%

Owing to limited gastro-intestinal absorption, administration of insoluble bismuth compounds by mouth does not usually give rise to acute toxic effects. They are excreted in the faeces. Stomatitis (ulceration of mouth parts) may result following ingestion.

Absorbed bismuth salts permeate the body fluids and tissues and are excreted mainly in the urine but some bismuth is retained in tissues. It is deposited in the metaphyses of young bones and can pass the placenta into the foetus.

Effects of acute bismuth intoxication are gastro-intestinal disturbance, anorexia, headache, malaise, skin reactions, discoulouration of mucous membranes and mild jaundice. Albuminuria (albumin in the urine) is an indication of kidney damage. Bismuth may cause a reverse encephalopathy (brain disease) that takes 2 to 10 weeks to reverse spontaneously

Terpenes and their oxygen-containing counterparts, the terpenoids, produce a variety of physiological effects. Pine oil monoterpens, for example, produce a haemorrhagic gastritis characterised by stomach pain and bleeding and vomiting. Systemic effects of pine oils include weakness and central nervous depression, excitement, loss of balance, headache, with hypothermia and respiratory failure.

Central nervous system (CNS) depression may include non-specific discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal.

Not normally a hazard due to physical form of product.

Considered an unlikely route of entry in commercial/industrial environments

**Skin Contact**

Limited evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis.

It is likely that older pine oils become irritants from the build up of peroxides of delta-3-carene and limonene etc.

Open cuts, abrasions, or irritated skin should not be exposed to this material

Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

**Eye**

Evidence exists, or practical experience predicts, that the material may cause eye irritation in a substantial number of individuals and/or may produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals.

Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/laceration may occur.

Practical experience shows that skin contact with the material is capable either of inducing a sensitisation reaction in a substantial number of individuals, and/or of producing a positive response in experimental animals.

Rosin (colophony) has caused allergic contact dermatitis in soldiers using resin flux-cored solders, can be a sensitizer for strings players, and has caused dermatitis after use in adhesive tapes [NIOSHITEC]. It is found in many products that commonly come in contact with the skin, including cosmetics, sunscreens, veterinary medications, adhesives, sealants, polishes, paints and oils. Industrial use of rosins (both natural and modified) is common and they are found in such products as printing inks, cutting fluids, corrosion inhibitors and surface coatings. High-quality gloss paper may also be coated with rosin or its derivatives.

The main component of rosin is abietic acid, which by itself is non-sensitising.

Several allergens have been isolated from rosin; these include 15-hydroxyprosaebiatic acid (15-HPA) and 15-hydroxyprodoxyabietic acid (15-HPOA), a peroxide of dehydroabietic acid. In animal allergic-challenge testing, these two substances are cross-reactive despite differences in molecular weight and unsaturation. Both substances react via a radical mechanism generating structurally similar molecules which give rise to antigens producing the allergic reaction.


For a better understanding of the mechanisms of contact allergic reactions, the patterns of cross-reactivity between different resin acid oxidation products were studied.

The 13,14(a)-epoxide and the 13,14(b)-epoxide of abietic acid and 15-HPOA are contact allergens in experimental studies. The b-epoxide of abietic acid has been detected in gum rosin.

Cross reactivity has been observed between the a- and b-epoxides and also between the epoxides and 15-HPA (and also between 15-HPOA and 15-HPA).

This can be explained if 15-HPA forms an epoxide which then reacts with skin protein to generate the complete antigen. Cross-reactivity between the two...
### Toxicity and Irritation Data

**4902P Sn42Bi58Ag1 Low Temperature Solder Paste**

<table>
<thead>
<tr>
<th>Substance</th>
<th>Toxicity</th>
<th>Irritation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bismuth</strong></td>
<td>Toxicity</td>
<td>Irritation</td>
</tr>
<tr>
<td>Oral (rat) LD50: 5000 mg/kg[^2]</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
<tr>
<td><strong>Tin</strong></td>
<td>Toxicity</td>
<td>Irritation</td>
</tr>
<tr>
<td>dermal (rat) LD50: &gt;2000 mg/kg[^1]</td>
<td>Eye: no adverse effect observed (not irritating)[^1]</td>
<td></td>
</tr>
<tr>
<td>Oral (rat) LD50: &gt;2000 mg/kg[^1]</td>
<td>Skin: no adverse effect observed (not irritating)[^1]</td>
<td></td>
</tr>
<tr>
<td><strong>Rosin-colophony</strong></td>
<td>Toxicity</td>
<td>Irritation</td>
</tr>
<tr>
<td>dermal (rat) LD50: &gt;2000 mg/kg[^1]</td>
<td>Eye: no adverse effect observed (not irritating)[^1]</td>
<td></td>
</tr>
<tr>
<td>Oral (rat) LD50: &gt;1000 mg/kg[^1]</td>
<td>Skin: no adverse effect observed (not irritating)[^1]</td>
<td></td>
</tr>
<tr>
<td><strong>Suberic acid</strong></td>
<td>Toxicity</td>
<td>Irritation</td>
</tr>
<tr>
<td>Not Available</td>
<td>Not Available</td>
<td></td>
</tr>
<tr>
<td><strong>Silver</strong></td>
<td>Toxicity</td>
<td>Irritation</td>
</tr>
<tr>
<td>dermal (rat) LD50: &gt;2000 mg/kg[^1]</td>
<td>Eye: no adverse effect observed (not irritating)[^1]</td>
<td></td>
</tr>
<tr>
<td>Inhalation (rat) LC50: &gt;5.16 mg/l[^1]</td>
<td>Skin: no adverse effect observed (not irritating)[^1]</td>
<td></td>
</tr>
<tr>
<td>Oral (rat) LD50: &gt;2000 mg/kg[^2]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>N,N'-ethylenebisstearamide</strong></td>
<td>Toxicity</td>
<td>Irritation</td>
</tr>
<tr>
<td>Dermal (rabbit) LD50: &gt;2000 mg/kg[^2]</td>
<td>Non-irritant</td>
<td></td>
</tr>
</tbody>
</table>

**Legend:**
1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances

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**SUBERIC ACID**

For dibasic acids (C7-14) (as represented by Corfee M1[^1] (a mixture of dibasic acids, CAS 72162-23-3), sebacic acid (CAS 111-20-6), dodocanedioic acid (DDDA, CAS 693-23-2), undecanedioic acid (CAS 1852-04-6).
Acute toxicity: Acute toxicity data indicate that the chemicals exhibit similar acute toxicity. Acute oral toxicity LD50s of > 5000 mg/kg and > 3000 mg/kg have been measured for Corfree M1 and DDDA, respectively. These values represent the highest levels tested in their respective acute oral studies. Dermal LD50s for both chemicals were above the highest levels tested, 2000 mg/kg and 6000 mg/kg respectively for Corfree M1 and DDDA. Corfree M1 appears to be more irritating to the skin and eye than DDDA. In addition, DDDA is not a dermal sensitizer.

Repeat dose, reproductive and developmental toxicity: DDDA was tested in a combined repeat dose/developmental reproductive screening test in rats. Dose levels of 100, 500, and 1000 mg/kg were tested. No mortality was observed at any dose level. DDDA did not significantly affect overall body weight, body weight gains, food consumption, or food efficiency in male or female rats which received DDDA via gavage for approximately 50 days. Male rats in the 500 and 1000 mg/kg groups had decreased lymphocyte counts. These were not due to any toxic effects in the test substance since no morphological alterations were observed in the spleen, there were no decreases in thymus weights, and normal serum globulin concentrations were present. There were no gross or microscopic changes noted that were attributable to the test substance. Some transient cases of hyperactivity were observed shortly after dosing in the 500 and 1000 mg/kg males and the 1000 mg/kg females. There were no significant differences with respect to reproductive performance in male or female rats. The no-observed-adverse effect level (NOAEL) for the repeat dose, developmental, and reproductive toxicity sections of the study was 1000 mg/kg.

Genotoxicity: Genetic toxicity data are similar between the chemicals. Neither Corfree M1 nor DDDA were mutagenic in the bacterial reverse mutation assay using Salmonella typhimurium. No data were available on the clastogenicity of Corfree M1; however, DDDA did not induce micronuclei in an in vivo mouse micronucleus test.

For Fatty Nitrogen Derived (FND) Amides (including several high molecular weight alkyll amino acid amides)

The chemicals in the Fatty Nitrogen Derived (FND) Amides of surfactants are similar to the class in general as to physical/chemical properties, environmental fate and toxicity. Human exposure to these chemicals is substantially documented.

The Fatty nitrogen-derived amides (FND amides) comprise four categories:

Subcategory I: Substituted Amides

Subcategory II: Fatty Acid Reaction Products with Amino Compounds (Note: Subcategory II chemicals, in many cases, contain Subcategory I chemicals as major components)

Subcategory III: Imidazole Derivatives

Subcategory IV: FND Amphorotics

Acute Toxicity: The low acute oral toxicity of the FND Amides is well established across all Subcategories by the available data. The limited acute toxicity of these chemicals is also confirmed by four acute dermal and two acute inhalation studies.

Repeated Dose and Reproductive Toxicity: Two subchronic toxicity studies demonstrating low toxicity are available for Subcategory I chemicals. In addition, a 5-day repeated dose study for a third chemical confirmed the minimal toxicity of these chemicals. Since the Subcategory I chemicals are major components of many Subcategory II chemicals, and based on the low repeat-dose toxicity of the amino compounds (e.g. diethanolamine, triethanolamine) used for producing the Subcategory II derivatives, the Subcategory I repeat-dose toxicity studies adequately support Subcategory II.

Two subacute toxicology studies in Subcategory III confirmed the low order of toxicity for the FND Amides used for producing the Subcategory II derivatives. For Subcategory IV, two subchronic toxicity studies for one of the chemicals indicated a low order of repeat-dose toxicity for the FND amphorotic salts similar to that seen in the other categories.

Genotoxicity in vitro: Based on the lack of effect of one or more chemicals in each subcategory, adequate data for mutagenic activity as measured by the Salmonella reverse mutation assay exist for all of the subcategories.

Developmental Toxicity: A developmental toxicity study in Subcategory I and in Subcategory IV and a third study for a chemical in Subcategory III are available. The studies indicate these chemicals are not development toxicants, as expected based on their structures, molecular weights, physical properties, and knowledge of similar chemicals. As above for repeat-dose toxicity, the data for Subcategory I are adequate to support Subcategory II. In evaluating potential toxicity of the FND Amphorotics chemicals, it is also useful to review the available data for the related FND Cationic and FND Amines Category chemicals. Acute oral toxicity studies (approximately 60 studies for 40 chemicals in the three categories) provide LD50 values from approximately 400 to 10,000 mg/kg with no apparent organ specific toxicity. Similarly, repeated dose toxicity studies (approximately 35 studies for 15 chemicals) provide NOAELs between 10 and 100 mg/kg/day for rats and slightly lower for dogs. More than 60 genetic toxicity studies (in vitro bacterial and mammalian cells as well as in vivo studies) indicated no mutagenic activity among more than 50 chemicals tested. For reproductive evaluations, 14 studies evaluated reproductive endpoints and/or reproductive organs for 11 chemicals, and 15 studies evaluated developmental toxicity for 13 chemicals indicating no reproductive or developmental effects for the FND group as a whole.

Some typical applications of FND Amides are:

- Masonry cement additive; curing agent for epoxy resins; closed hydrocarbon systems in oil field production, refineries and chemical plants; and slip and anti-blocking additives for polymers.

The safety of the FND Amides to humans is recognised by the U.S. FDA, which has approved stearamide, stearamide and/or erucamide for adhesives; coatings for articles in food contact; cosmetics for polyethylene films; defoamers for manufacture of paper and paperboard; animal glue (defoamer in food packaging); in EVA copolymers for food packaging; lubricants for manufacture of metallic food packaging; irradiation of prepared foods; release agents in manufacture of food packaging materials, food contact material of paper and paperboard; cellophane in food packaging; closure sealing gaskets; and release agents in polymeric resins and petroleum wax. The low order of toxicity indicates that the use of FND Amides does not pose a significant hazard to human health.

The differences in chain length, degree of saturation of the carbon chains, source of the natural oils, or addition of an amino group in the chain would not be expected to have an impact on the toxicity profile. This conclusion is supported by a number of studies in the FND family of chemicals (amines, catonics, and amides as separate categories) that show no differences in the length or degree of saturation of the alkyl substituents and is also supported by the limited toxicity of these long-chain substituted chemicals.

Fatty acid amides (FAA) are ubiquitous in household and commercial environments. The most common of these are based on coconut oil fatty acids alkanoamides. These are the most widely studied in terms of human exposure.

Fatty acid diethanolamides (C8-C18) are classified by Comitée Européen des Agents de Surface et de leurs Intermédiaires Organiques (CESIO) as Irritating (X1) with the risk phrases R8 (Irritating to skin) and R41 (Risk of serious damage to eyes). Fatty acid monoethanolamides are classified as Irritant (X1) with the risk phrases R41.

Several studies of the sensitization potential of cocamide diethanolamide (DEA) indicate that this FAA induces occupational allergic contact dermatitis and a number of reports on skin allergy patch test of cocamide DEA have been published. These tests indicate that allergy to cocamide DEA is becoming more common.

Alkanolamides are manufactured by condensation of diethanolamine and the methylester of long chain fatty acids. Several alkanolamides (especially secondary alkanoamides) are susceptible to nitrosamine formation which constitutes a potential health problem. Nitrosamine contamination is possible either from pre-existing contamination of the diethanolamine used to manufacture cocamide DEA, or from nitrosamine formation by nitrosating agents in formulations containing cocamide DEA. According to the Cosmetic Directive (2006) cocamide DEA must not be used in products with nitrosating agents because of the risk of formation of N-nitrosamines. The maximum content allowed in cosmetics is 5% fatty acid diethanolamides, and the maximum content of N-nitrosodialkanolamines is 50 mg/kg. The preservatives 2-bromo-2-nitropropane-1,3-diol is a known nitrosating agent for secondary and tertiary amines or amides. Model assays have indicated that 2-bromo-2-nitropropane-1,3-diol forms the N-nitrosation of diethanolamine forming the carcinogenic compound, N-nitrosodiethanolamine which is a potent liver carcinogen in rats (IARC 1978).

Several FAA’s have been tested in short-term genotoxicity assays. No indication of any potential to cause genetic damage was seen. Lauramide DEA was tested in mutagenicity assays and did not show any mutagenic activity in Salmonella typhimurium in vivo or in hamster embryo cells. Cocamide DEA was not mutagenic in strains of Salmonella typhimurium when tested with or without metabolic activation.
The following information refers to contact allergens as a group and may not be specific to this product. Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke’s oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitisation potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitising substance which is widely distributed can be a more important allergen than one with stronger sensitising potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.

**Acute Toxicity**

- **Bismuth**
  - LC50
    - 96 hours: Fish, >100mg/L
  - EC50
    - 48 hours: Crustacea, >1.26mg/L
    - 72 hours: Algae or other aquatic plants, >1.26mg/L
  - NOEC: 72 hours, Algae or other aquatic plants, 1mg/L

- **Tin**
  - LC50
    - 96 hours: Fish, >0.0124mg/L
  - EC50
    - 48 hours: Crustacea, 0.00018mg/L
    - 72 hours: Algae or other aquatic plants, 0.009-0.846mg/L
  - NOEC: 72 hours, Algae or other aquatic plants, 0.001mg/L

- **Rosin-colophony**
  - LC50
    - 96 hours: Fish, 0.144mg/L
  - EC50
    - 48 hours: Crustacea, >2-mg/L
    - 96 hours: Algae or other aquatic plants, 0.031mg/L
  - NOEC: 72 hours, Algae or other aquatic plants, 0.013mg/L

- **Suberic acid**
  - LC50
    - 96 hours: Fish, 1116.205mg/L
  - EC50
    - 96 hours: Algae or other aquatic plants, 4327.071mg/L

- **Silver**
  - LC50
    - 96 hours: Fish, >0.001-0.93mg/L
  - EC50
    - 48 hours: Crustacea, 0.00024mg/L
    - 72 hours: Algae or other aquatic plants, 0.000016mg/L
  - BCF: 336 hours, Crustacea, 0.02mg/L
  - NOEC: 72 hours, Algae or other aquatic plants, 0.000003mg/L

**Carcinogenicity**

- **Bismuth**
  - Not available
- **Tin**
  - Not available
- **Rosin-colophony**
  - Not available
- **Suberic acid**
  - Not available
- **Silver**
  - Not available

**Mutagenicity**

- **Bismuth**
  - Not available
- **Tin**
  - Not available
- **Rosin-colophony**
  - Not available
- **Suberic acid**
  - Not available
- **Silver**
  - Not available

**STOT - Single Exposure**

- **Bismuth**
  - Not available
- **Tin**
  - Not available
- **Rosin-colophony**
  - Not available
- **Suberic acid**
  - Not available
- **Silver**
  - Not available

**STOT - Repeated Exposure**

- **Bismuth**
  - Not available
- **Tin**
  - Not available
- **Rosin-colophony**
  - Not available
- **Suberic acid**
  - Not available
- **Silver**
  - Not available

**Reproductivity**

- **Bismuth**
  - Not available
- **Tin**
  - Not available
- **Rosin-colophony**
  - Not available
- **Suberic acid**
  - Not available
- **Silver**
  - Not available

**Aspiration Hazard**

- **Bismuth**
  - Not available
- **Tin**
  - Not available
- **Rosin-colophony**
  - Not available
- **Suberic acid**
  - Not available
- **Silver**
  - Not available

**Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS, RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

**SECTION 12 ECOLOGICAL INFORMATION**

**12.1. Toxicity**

<table>
<thead>
<tr>
<th>ENDPOINT</th>
<th>TEST DURATION (HR)</th>
<th>SPECIES</th>
<th>VALUE</th>
<th>SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>bismuth</td>
<td>LC50 96</td>
<td>Fish</td>
<td>&gt;100mg/L</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>EC50 48</td>
<td>Crustacea</td>
<td>&gt;1.26mg/L</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>EC50 72</td>
<td>Algae or other aquatic plants</td>
<td>&gt;1.26mg/L</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>NOEC 72</td>
<td>Algae or other aquatic plants</td>
<td>1mg/L</td>
<td>2</td>
</tr>
<tr>
<td>tin</td>
<td>LC50 96</td>
<td>Fish</td>
<td>&gt;0.0124mg/L</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>EC50 48</td>
<td>Crustacea</td>
<td>0.00018mg/L</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>EC50 72</td>
<td>Algae or other aquatic plants</td>
<td>0.009-0.846mg/L</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>NOEC 72</td>
<td>Algae or other aquatic plants</td>
<td>0.001-mg/L</td>
<td>2</td>
</tr>
<tr>
<td>rosin-colophony</td>
<td>LC50 96</td>
<td>Fish</td>
<td>0.144mg/L</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>EC50 48</td>
<td>Crustacea</td>
<td>&gt;2-mg/L</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>EC50 96</td>
<td>Algae or other aquatic plants</td>
<td>0.031mg/L</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>NOEC 96</td>
<td>Algae or other aquatic plants</td>
<td>0.013mg/L</td>
<td>2</td>
</tr>
<tr>
<td>suberic acid</td>
<td>LC50 96</td>
<td>Fish</td>
<td>1116.205mg/L</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>EC50 96</td>
<td>Algae or other aquatic plants</td>
<td>4327.071mg/L</td>
<td>3</td>
</tr>
<tr>
<td>silver</td>
<td>LC50 96</td>
<td>Fish</td>
<td>&gt;0.001-0.93mg/L</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>EC50 48</td>
<td>Crustacea</td>
<td>0.00024mg/L</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>EC50 72</td>
<td>Algae or other aquatic plants</td>
<td>0.000016mg/L</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>BCF 336</td>
<td>Crustacea</td>
<td>0.02mg/L</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>NOEC 72</td>
<td>Algae or other aquatic plants</td>
<td>0.000003mg/L</td>
<td>2</td>
</tr>
</tbody>
</table>

Legend: × – Data either not available or does not fill the criteria for classification
       ✓ – Data available to make classification
On the basis of available evidence regarding either toxicity, persistence, potential to accumulate and/or observed environmental fate and behaviour, the material may present a danger, immediate or long-term and/or delayed, to the structure and/or of functioning of natural ecosystems.

Toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment.

Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters.

Waste resulting from the use of the product must be disposed of on site or at approved waste sites.

Metal-containing organic substances generally have negligible vapour pressure and are not expected to partition to air. Once released to surface waters and moist soils their fate depends on solubility and dissolution in water. Environmental processes (such as oxidation and the presence of acids or bases) may transform insoluble metals to more soluble ionic forms. Microbiological processes may also transform insoluble metals to more soluble forms. Such ionic species may bind to dissolved ligands or sorb to solid particles in aquatic or aqueous media. A significant proportion of dissolved/sorbed metals will end up in sediments through the settling of suspended particles. The remaining metal ions can then be taken up by aquatic organisms.

When released to dry soil most metals will exhibit limited mobility and remain in the upper layer; some will leach locally into ground water and/or surface water ecosystems when soaked by rain or melt ice. Environmental processes may also be important in changing solubilities. Even though many metals show few toxic effects at physiological pHs, transformation may introduce new or magnified effects.

MMTC is a solid at room temperature and melts at 43 deg C, boils at 171 deg C. It has a calculated vapour pressure of 1.7 hPa at 25 deg C, and is soluble in water (1038 g/L at 20 deg C). The measured log Kow is -0.9 and MMTC is not readily biodegradable. Atmospheric degradation occurs by photochemical induced hydroxyl radicals, with a half-life of 15.7 days. A Henry's Law constant of 10.98, is slightly soluble in water (1.8-6 mg/L), and is readily biodegradable. MMT(EHTG) is also degraded atmospherically, with a half-life of 6.3 hours. A Henry's Law constant of 3.18×10+4 predicts MMT(EHTG) will volatilize from surface water (t1/2 = 8 hours and 1 1 days for a model river and lake, respectively). If released to the environment, MMT(EHTG) is expected to partition primarily into water (54%) and soil (43%).

In water, MMTC undergoes rapid degradation by hydrolysis and is expected to hydrolyze within minutes. It is expected that the chlorines in MMTC will be displaced to form mono-methyltin hydroxide which eventually precipitates as the oxide. It is also possible that the labile ligands can be displaced by other anions in the medium. The displaced monoester ligands, EHTG/IOHTG, can also undergo further hydrolysis of the ester linkage to form thiyoglycolic acid and ethylkoxylic acid, respectively.

TERP is a liquid at room temperature, boils at 216 deg C, and has a calculated vapour pressure of 0.2 hPa at 25 deg C. TERP is slightly soluble in water (4.4 mg/L), highly hydrophobic (log Kow = 25.5), has low potential for bioaccumulation (log BCf = 2.0), and is readily biodegradable. It is degraded atmospherically by hydroxyl radicals and ozone, with a half-life of 0.5 hours. If released to the environment, TERP is predicted to partition primarily to sediments (99%).

MMT(EHTG) is a solid at room temperature and has a freezing point of -85 to -65 deg C, decomposes at 260 deg C and has a derived vapour pressure of 0.02 mg/L at 25 deg C. It is expected to hydrolyze within minutes by hydrolysis. The terp esters on MMT(EHTG)/IOHTG will be rapidly displaced to form mono-methyltin hydroxide which eventually precipitates as the oxide. It is also possible that the labile ligands can be displaced by other anions in the medium.

Bioavailability:

The considerable difference in the structure of the labile ligands causes differences in water solubility between the alkyltin chloride and thioesters affecting their respective bioavailabilities and distribution in the environment. Furthermore, MMT(EHTG) and MMT(IOHTG) will degrade in aqueous solution such that organisms will be exposed to the parent material and their different degradation products. MMT(EHTG) is not an appropriate surrogate for the terp esters or TERP for the ecotoxicity and environmental fate endpoints.

Ecotoxicity:

In the ecotoxicity tests the organisms were most likely exposed to parent substance as well as hydrolysis/degradation products. MMTC was not acutely toxic to zebra fish (Brachydanio rerio) (96-h LC50 > 102 mg/L) or Daphnia magna (48 h EC50 = 101 mg/L). MMTC inhibited the growth (72-h EC50 = 0.03 mg/L) and biomass (72-h EC50 = 0.02 mg/L) of the green alga Scenedesmus subspicatus (NOEC = 0.007 mg/L). MMTC was not acutely toxic to earthworms at nominal concentrations up to 1000 mg/kg. TERP was not acutely toxic to rainbow trout (Oncorhynchus mykiss) (96-h LC50 > 4.4 mg/L), inhibited D. magna survival and mobility (48-h EC50 = 0.27 mg/L), and inhibited growth of the freshwater green alga Pseudokirchneriella subcapitata (72-h EC50 = 0.64 mg/L; NOEC = 0.28 mg/L).

MMT(EHTG) was not acutely toxic to B. rerio (LC50 < 6 mg/L; NOEC = 3.6 mg/L) and did not inhibit the growth of S. subspicatus (72-h EC50 > 1.84 mg/L; NOEC = 0.6 mg/L). The 21-day EC50 for reproduction in a chronic Daphnia magna study was > 0.134 mg/L (NOEC = 0.134 mg/L).

Substances containing unsaturated carbons are ubiquitous in indoor environments. They result from many sources (see below). Most are reactive with environmental ozone and many produce stable products which are thought to adversely affect human health. The potential for surfaces in an enclosed space to facilitate reactions should be considered.

Source of unsaturated substances

Occupied spaces (exhaled breath, skin oils, personal care products)

Soft woods, wood flooring, including cypress, cedar and silver fir boards, houseplants

Carpets and carpet backing

Linoleum and paints/polishes containing linseed oil

Latex paint

Certain cleaning products, polishes, waxes, air fresheners

Natural rubber adhesive

Photocopy toner, printed paper, styrene polymers

Environmental tobacco smoke

Soiled clothing, fabrics, bedding

Major Stable Products produced following reaction with ozone.

Methacrolein, vinyl methyl ketone, nitric oxide, diacetyl, 40PA, formaldehyde, mono-nonal, decanal, 6,9-oxo-nonanoic acid, acetic acid, nonanoic acid.

Formaldehyde, 4-AMC, piaoidaldehyde, picinic acid, propanic acid, formalic acid, methacrolein, vinyl vinyl ketone, SOAs including ultratine particles

Formaldehyde, acetalddehyde, benzaldehyde, hexanal, nonanal, 2-nonalen

Propanal, hexanal, nonanal, 2-heptenal, 2-nonenal, 2-decenal, 1-pentene-3-one, propionic acid, n-butyric acid

Formaldehyde, acetaldehyde, acrylic acid, acetic acid, acetoic acid, propanoic acid, formic acid, 4-AMC, piaoidaldehyde, picinic acid, propanic acid, formalic acid, methacrolein, vinyl vinyl ketone, SOAs including ultratine particles
Soiled particle filters

Ventilation ducts and duct liners

Urban grime

Perfumes, colognes, essential oils (e.g. lavender, eucalyptus, tea tree)

Overall home emissions

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Persistence: Water/Soil</th>
<th>Persistence: Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosin-colophony</td>
<td>HIGH</td>
<td>HIGH</td>
</tr>
<tr>
<td>Suberic acid</td>
<td>LOW</td>
<td>LOW</td>
</tr>
<tr>
<td>N,N'-Ethylenebisstearamide</td>
<td>HIGH</td>
<td>HIGH</td>
</tr>
</tbody>
</table>

12.2. Persistence and degradability

12.3. Bioaccumulative potential

12.4. Mobility in soil

12.5. Results of PBT and vPvB assessment

12.6. Other adverse effects

No data available
SECTION 13 DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

<table>
<thead>
<tr>
<th>Product / Packaging disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containers may still present a chemical hazard/danger when empty.</td>
</tr>
<tr>
<td>Return to supplier for reuse/recycling if possible.</td>
</tr>
<tr>
<td>Otherwise:</td>
</tr>
<tr>
<td>If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.</td>
</tr>
<tr>
<td>Where possible retain label warnings and SDS and observe all notices pertaining to the product.</td>
</tr>
<tr>
<td>DO NOT allow wash water from cleaning or process equipment to enter drains.</td>
</tr>
<tr>
<td>It may be necessary to collect all wash water for treatment before disposal.</td>
</tr>
<tr>
<td>In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.</td>
</tr>
<tr>
<td>Where in doubt contact the responsible authority.</td>
</tr>
<tr>
<td>Recycle whenever possible or consult manufacturer for recycling options.</td>
</tr>
<tr>
<td>Consult State Land Waste Management Authority for disposal.</td>
</tr>
<tr>
<td>Bury residue in an authorised landfill.</td>
</tr>
<tr>
<td>Recycle containers if possible, or dispose of in an authorised landfill.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Waste treatment options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Available</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sewage disposal options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Available</td>
</tr>
</tbody>
</table>

SECTION 14 TRANSPORT INFORMATION

Labels Required

For 4902P-15G, 4902P-25G
NOT REGULATED by Ground ADR Special Provision 375
NOT REGULATED by Air IATA Special Provision A197
NOT REGULATED by Sea IMDG per 2.10.2.7
NOT REGULATED by ADN Special Provision 274 (The provision of 3.1.2.8 apply)

Land transport (ADR)

14.1. UN number 3077
14.2. UN proper shipping name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (contains silver)
14.3. Transport hazard class(es)
| Class | 9 |
| Subrisk | Not Applicable |
14.4. Packing group III
14.5. Environmental hazard Environmentally hazardous

14.6. Special precautions for user
| Hazard identification (Kemler) | 90 |
| Classification code | M7 |
| Hazard Label | 9 |
| Special provisions | 274 335 375 601 |
| Limited quantity | 5 kg |

Air transport (ICAO-IATA / DGR)

14.1. UN number 3077
14.2. UN proper shipping name Environmentally hazardous substance, solid, n.o.s. * (contains silver)
14.3. Transport hazard class(es)
| ICAO/IATA Class | 9 |
| ICAO / IATA Subrisk | Not Applicable |
| ERG Code | 9L |
14.4. Packing group III
14.5. Environmental hazard Environmentally hazardous

14.6. Special precautions for user
| Special provisions | A97 A158 A179 A197 |
| Cargo Only Packing Instructions | 956 |
| Cargo Only Maximum Qty / Pack | 400 kg |
| Passenger and Cargo Packing Instructions | 956 |
| Passenger and Cargo Maximum Qty / Pack | 400 kg |
| Passenger and Cargo Limited Quantity Packing Instructions | Y966 |
| Passenger and Cargo Limited Maximum Qty / Pack | 30 kg G |

Sea transport (IMDG-Code / GGVSee)

14.1. UN number 3077
14.2. UN proper shipping name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (contains silver)

Continued...
### 14.3. Transport hazard class(es)
- IMDG Class: 9
- IMDG Subrisk: Not Applicable

### 14.5. Environmental hazard
- Marine Pollutant

### 14.6. Special precautions for user
- **Environmental hazard:** Environmentally hazardous
- **Fire cones number:** 0
- **Limited quantity:** 5 kg
- **Equipment required:** PP, A***
- **Special provisions:** 274; 335; 966; 967; 969
- **UN number:** 3077
- **UN proper shipping name:** ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (contains silver)

### 15.7. Transport in bulk according to Annex II of MARPOL and the IBC code
Not Applicable

### SECTION 15 REGULATORY INFORMATION

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

**BISMUTH(7440-69-9) IS FOUND ON THE FOLLOWING REGULATORY LISTS**
- European EC Inventory
- European ECHA Registered Substances - Classification and Labelling - DSD-OPD
- European Chemical Agency (ECHA) Classification & Labelling Inventory - Chemwatch
- European Customs Inventory of Chemical Substances ECICS (English)
- European Union - European Inventory of Existing Commercial Chemical Substances (EINECS) (English)

**TIN(7440-31-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS**
- EU Consolidated List of Indicative Occupational Exposure Limit Values (IOELVs)
- European EC Inventory
- European ECHA Registered Substances - Classification and Labelling - DSD-OPD
- European Customs Inventory of Chemical Substances - ECICS (Czech)
- European Customs Inventory of Chemical Substances ECICS (Slovak)
- European Customs Inventory of Chemical Substances ECICS (Romanian)
- European Customs Inventory of Chemical Substances ECICS (English)

**ROSUB(COLLOPHONY)(8050-09-7) IS FOUND ON THE FOLLOWING REGULATORY LISTS**
- European EC Inventory
- European ECHA Registered Substances - Classification and Labelling - DSD-OPD
- European Chemical Agency (ECHA) Classification & Labelling Inventory - Chemwatch
- European Customs Inventory of Chemical Substances ECICS (English)
- European Customs Inventory of Chemical Substances ECICS (Romanian)
- European Customs Inventory of Chemical Substances ECICS (Slovak)
- European Customs Inventory of Chemical Substances ECICS (Czech)
- European Customs Inventory of Chemical Substances ECICS ( Romanian)
- European Customs Inventory of Chemical Substances ECICS (Slovak)
- European Customs Inventory of Chemical Substances ECICS (Czech)
- European Customs Inventory of Chemical Substances ECICS (Romanian)
- European Customs Inventory of Chemical Substances ECICS (English)

**SUBERIC ACID(505-48-6) IS FOUND ON THE FOLLOWING REGULATORY LISTS**
- European EC Inventory
- European ECHA Registered Substances - Classification and Labelling - DSD-OPD
- European Chemical Agency (ECHA) Classification & Labelling Inventory - Chemwatch
- European Customs Inventory of Chemical Substances ECICS (English)
- European Customs Inventory of Chemical Substances ECICS (Romanian)
- European Customs Inventory of Chemical Substances ECICS (Slovak)
- European Customs Inventory of Chemical Substances ECICS (Czech)
- European Customs Inventory of Chemical Substances ECICS (Romanian)
- European Customs Inventory of Chemical Substances ECICS (Slovak)
- European Customs Inventory of Chemical Substances ECICS (Czech)
- European Customs Inventory of Chemical Substances ECICS (Romanian)
- European Customs Inventory of Chemical Substances ECICS (English)

**SILVER(7440-22-4) IS FOUND ON THE FOLLOWING REGULATORY LISTS**
- EU European Chemicals Agency (ECHA) Community Rolling Action Plan (CoRAP) List of Substances
- European EC Inventory
- European ECHA Registered Substances - Classification and Labelling - DSD-OPD
- European Chemical Agency (ECHA) Classification & Labelling Inventory - Chemwatch
- European Customs Inventory of Chemical Substances ECICS (English)
- European Customs Inventory of Chemical Substances ECICS (Romanian)
- European Customs Inventory of Chemical Substances ECICS (Slovak)
- European Customs Inventory of Chemical Substances ECICS (Czech)
- European Customs Inventory of Chemical Substances ECICS (Romanian)
- European Customs Inventory of Chemical Substances ECICS (Slovak)
- European Customs Inventory of Chemical Substances ECICS (Czech)
- European Customs Inventory of Chemical Substances ECICS (Romanian)
- European Customs Inventory of Chemical Substances ECICS (English)

**N,N'-ETHYLENEBISSTEARAMIDE(110-30-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS**
- European EC Inventory
- European ECHA Registered Substances - Classification and Labelling - DSD-OPD
- European Chemical Agency (ECHA) Classification & Labelling Inventory - Chemwatch
- European Customs Inventory of Chemical Substances ECICS (English)
- European Customs Inventory of Chemical Substances ECICS (Romanian)
- European Customs Inventory of Chemical Substances ECICS (Slovak)
- European Customs Inventory of Chemical Substances ECICS (Czech)
- European Customs Inventory of Chemical Substances ECICS (Romanian)
- European Customs Inventory of Chemical Substances ECICS (Slovak)
- European Customs Inventory of Chemical Substances ECICS (Czech)
- European Customs Inventory of Chemical Substances ECICS (Romanian)
- European Customs Inventory of Chemical Substances ECICS (English)

**4902P Sn42Bi58Ag1 Low Temperature Solder Paste**
- Not Applicable
This safety data sheet is in compliance with the following EU legislation and its adaptations - as far as applicable - : Directives 98/24/EC, - 92/85/EEC, - 94/33/EC, - 2008/98/EC, - 2010/75/EU; Commission Regulation (EU) 2015/830; Regulation (EC) No 1272/2008 as updated through ATPs.

15.2. Chemical safety assessment

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

National Inventory Status

<table>
<thead>
<tr>
<th>National Inventory</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia - AICS</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada - DSL</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada - NDSL</td>
<td>No (bismuth; rosin-colophony; suberic acid; tin; silver; N,N'-ethylenebisstearamide)</td>
</tr>
<tr>
<td>China - IECSC</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe - EINECS / ELINCS / NLP</td>
<td>Yes</td>
</tr>
<tr>
<td>Japan - ENCS</td>
<td>No (bismuth; rosin-colophony; tin; silver)</td>
</tr>
<tr>
<td>Korea - KECI</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand - NZIoC</td>
<td>Yes</td>
</tr>
<tr>
<td>Philippines - PICCS</td>
<td>Yes</td>
</tr>
<tr>
<td>USA - TSCA</td>
<td>Yes</td>
</tr>
<tr>
<td>Taiwan - TCSI</td>
<td>Yes</td>
</tr>
<tr>
<td>Mexico - INSO</td>
<td>No (suberic acid)</td>
</tr>
<tr>
<td>Vietnam - NCI</td>
<td>Yes</td>
</tr>
<tr>
<td>Russia - ARIPS</td>
<td>No (suberic acid)</td>
</tr>
<tr>
<td>Thailand - TECI</td>
<td>No (bismuth; rosin-colophony)</td>
</tr>
</tbody>
</table>

Legend: Yes = All declared ingredients are on the inventory
No = Not determined or one or more ingredients are not on the inventory and are not exempt from listing (see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Revision Date: 24/05/2019
Initial Date: 28/11/2016

Full text Risk and Hazard codes

H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.

SDS Version Summary

<table>
<thead>
<tr>
<th>Version</th>
<th>Issue Date</th>
<th>Sections Updated</th>
</tr>
</thead>
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<tr>
<td>3.9.1.1.1</td>
<td>24/05/2019</td>
<td>Acute Health (swallowed), Appearance, Chronic Health, Engineering Control, Exposure Standard, Ingredients, Physical Properties, Spills (major), Synonyms</td>
</tr>
</tbody>
</table>

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

Definitions and abbreviations

PC – TWA: Permissible Concentration-Time Weighted Average
PC – STEL: Permissible Concentration-Short Term Exposure Limit
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists
STEL: Short Term Exposure Limit
TEEL: Temporary Emergency Exposure Limit,
IDLH: Immediately Dangerous to Life or Health Concentrations

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OSF: Odour Safety Factor
NOAEL: No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value
LOD: Limit Of Detection
OTV: Odour Threshold Value
BEI: Biological Exposure Index

Reason For Change
A-1.00 - Modifications to the safety data sheet