



SAFETY DATA SHEET

DDP SPECIALTY ELECTRONIC MATERIALS US 9, LLC

Product name: MOLYKOTE® D-7708 Anti-Friction Coating

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DDP SPECIALTY ELECTRONIC MATERIALS US 9, LLC encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. IDENTIFICATION

Product name: MOLYKOTE® D-7708 Anti-Friction Coating
Recommended use of the chemical and restrictions on use
Identified uses: Lubricants and lubricant additives

COMPANY IDENTIFICATION

DDP SPECIALTY ELECTRONIC MATERIALS
US 9, LLC
974 Centre Road
Wilmington DE 19805
UNITED STATES

Customer Information Number:

833-338-7668
SDSQuestion-NA@dupont.com

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: 1-800-424-9300
Local Emergency Contact: 800-424-9300

2. HAZARDS IDENTIFICATION

Hazard classification

GHS classification in accordance with 29 CFR 1910.1200
Flammable liquids - Category 2
Acute toxicity - Category 4 - Oral
Acute toxicity - Category 4 - Inhalation
Skin irritation - Category 2
Serious eye damage - Category 1
Skin sensitisation - Category 1
Germ cell mutagenicity - Category 2
Reproductive toxicity - Category 2
Specific target organ toxicity - single exposure - Category 3
Specific target organ toxicity - repeated exposure - Category 2

Label elements

Hazard pictograms



Signal word: **DANGER!**

Hazards

Highly flammable liquid and vapour.

Harmful if swallowed or if inhaled.

Causes skin irritation.

May cause an allergic skin reaction.

Causes serious eye damage.

May cause respiratory irritation.

May cause drowsiness or dizziness.

Suspected of causing genetic defects.

Suspected of damaging fertility or the unborn child.

May cause damage to organs (Liver, Kidney) through prolonged or repeated exposure.

Precautionary statements

Prevention

Obtain special instructions before use.

Do not handle until all safety precautions have been read and understood.

Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.

Keep container tightly closed.

Ground/bond container and receiving equipment.

Use explosion-proof electrical/ ventilating/ lighting equipment.

Use only non-sparking tools.

Take precautionary measures against static discharge.

Do not breathe mist or vapours.

Wash skin thoroughly after handling.

Do not eat, drink or smoke when using this product.

Use only outdoors or in a well-ventilated area.

Contaminated work clothing must not be allowed out of the workplace.

Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response

IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.

IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.

IF exposed or concerned: Get medical advice/ attention.

If skin irritation or rash occurs: Get medical advice/ attention.

Take off contaminated clothing and wash before reuse.

In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

Storage

Store in a well-ventilated place. Keep container tightly closed.

Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal

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

Other hazards

Static-accumulating flammable liquid.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature: Lubricants and lubricant additives

This product is a mixture.

Component	CASRN	Concentration
Methyl ethyl ketone	78-93-3	>= 30.0 - < 40.0 %
Methyl isobutyl ketone	108-10-1	>= 20.0 - < 30.0 %
Cyclohexanone	108-94-1	>= 10.0 - < 20.0 %
Reaction product: Bisphenol A-(epichlorohydrin); epoxy resin (number average molecular weight 700-1100)	25068-38-6	>= 1.0 - < 5.0 %
Carbon black	1333-86-4	>= 1.0 - < 5.0 %
Phenol	108-95-2	1.6252%
Cresol	1319-77-3	0.3375%
Toluene	108-88-3	0.27%

4. FIRST AID MEASURES

Description of first aid measures**General advice:**

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

Inhalation: Move person to fresh air. If not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

Skin contact: Wash off with plenty of water.

Eye contact: Immediately flush eyes with water; remove contact lenses, if present, after the first 5 minutes, then continue flushing eyes for at least 15 minutes. Obtain medical attention without delay, preferably from an ophthalmologist. Suitable emergency eye wash facility should be immediately available.

Ingestion: Do not induce vomiting. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Seek medical attention immediately.

Most important symptoms and effects, both acute and delayed:

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

Indication of any immediate medical attention and special treatment needed

Notes to physician: Maintain adequate ventilation and oxygenation of the patient. May cause asthma-like (reactive airways) symptoms. Bronchodilators, expectorants, antitussives and corticosteroids may be of help. Chemical eye burns may require extended irrigation. Obtain prompt consultation, preferably from an ophthalmologist.

5. FIREFIGHTING MEASURES

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

Unsuitable extinguishing media: High volume water jet Do not use direct water stream.

Special hazards arising from the substance or mixture

Hazardous combustion products: Carbon oxides Fluorine compounds Chlorine compounds

Unusual Fire and Explosion Hazards: Flash back possible over considerable distance. Exposure to combustion products may be a hazard to health. Vapours may form explosive mixtures with air.

Advice for firefighters

Fire Fighting Procedures: Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Do not use a solid water stream as it may scatter and spread fire.

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

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

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Remove all sources of ignition. Ventilate the area. Use personal protective equipment. Follow safe handling advice and personal protective equipment recommendations.

Environmental precautions: Discharge into the environment must be avoided. Prevent further leakage or spillage if safe to do so. Prevent spreading over a wide area (e.g. by containment or oil barriers). Retain and dispose of contaminated wash water. Local authorities should be advised if significant spillages cannot be contained.

Methods and materials for containment and cleaning up: Non-sparking tools should be used. Soak up with inert absorbent material. Suppress (knock down) gases/vapours/mists with a water spray jet. Clean up remaining materials from spill with suitable absorbant. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable. For large spills, provide dyking or other appropriate containment to keep material from spreading. If dyked material can be pumped, Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

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

7. HANDLING AND STORAGE

Precautions for safe handling: Do not get on skin or clothing. Do not breathe vapours or spray mist. Do not swallow. Do not get in eyes. Keep container tightly closed. Keep away from heat and sources of ignition. Take precautionary measures against static discharges. Take care to prevent spills, waste and minimize release to the environment. Non-sparking tools should be used. Handle in accordance with good industrial hygiene and safety practice.

Use with local exhaust ventilation. Use only in an area equipped with explosion proof exhaust ventilation. Ensure all equipment is electrically grounded before beginning transfer operations. This material can accumulate static charge due to its inherent physical properties and can therefore cause an electrical ignition source to vapors. In order to prevent a fire hazard, as bonding and grounding may be insufficient to remove static electricity, it is necessary to provide an inert gas purge before beginning transfer operations. Restrict flow velocity in order to reduce the accumulation of static electricity. Ground and bond container and receiving equipment.

Conditions for safe storage: Keep in properly labelled containers. Store locked up. Keep tightly closed. Keep in a cool, well-ventilated place. Store in accordance with the particular national regulations. Keep away from heat and sources of ignition.

Do not store with the following product types: Strong oxidizing agents. Organic peroxides. Flammable solids. Pyrophoric liquids. Pyrophoric solids. Self-heating substances and mixtures. Substances and mixtures, which in contact with water, emit flammable gases. Explosives. Gases. Unsuitable materials for containers: None known.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

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

Component	Regulation	Type of listing	Value
Methyl ethyl ketone	Dow IHG	TWA	50 ppm
	Dow IHG	STEL	100 ppm
	ACGIH	TWA	200 ppm
Further information: CNS impair: Central Nervous System impairment; URT irr: Upper Respiratory Tract irritation; PNS impair: Peripheral Nervous System impairment; BEI: Substances for which there is a Biological Exposure Index or Indices (see BEI®)			

	section)			
	ACGIH	STEL		300 ppm
	Further information: CNS impair: Central Nervous System impairment; URT irr: Upper Respiratory Tract irritation; PNS impair: Peripheral Nervous System impairment; BEI: Substances for which there is a Biological Exposure Index or Indices (see BEI® section)			
	OSHA Z-1	TWA		590 mg/m3 200 ppm
	Further information: (b): The value in mg/m3 is approximate.			
	CAL PEL	PEL		590 mg/m3 200 ppm
	CAL PEL	STEL		885 mg/m3 300 ppm
Methyl isobutyl ketone	ACGIH	TWA		20 ppm
	Further information: A3: Confirmed animal carcinogen with unknown relevance to humans			
	ACGIH	STEL		75 ppm
	Further information: A3: Confirmed animal carcinogen with unknown relevance to humans			
	OSHA Z-1	TWA		410 mg/m3 100 ppm
	CAL PEL	PEL		205 mg/m3 50 ppm
	CAL PEL	STEL		300 mg/m3 75 ppm
	OSHA P0	TWA		205 mg/m3 50 ppm
	OSHA P0	STEL		300 mg/m3 75 ppm
Cyclohexanone	Dow IHG	TWA		7.5 ppm
	Further information: SKIN: Absorbed via skin			
	Dow IHG	STEL		15 ppm
	Further information: SKIN: Absorbed via skin			
	ACGIH	TWA		20 ppm
	Further information: URT irr: Upper Respiratory Tract irritation; eye irr: Eye irritation; A3: Confirmed animal carcinogen with unknown relevance to humans; Skin: Danger of cutaneous absorption			
	ACGIH	STEL		50 ppm
	Further information: URT irr: Upper Respiratory Tract irritation; eye irr: Eye irritation; A3: Confirmed animal carcinogen with unknown relevance to humans; Skin: Danger of cutaneous absorption			
	OSHA Z-1	TWA		200 mg/m3 50 ppm
	Further information: (b): The value in mg/m3 is approximate.			
	NIOSH REL	TWA		100 mg/m3 25 ppm
	Further information: skin: Potential for dermal absorption			
Carbon black	ACGIH	TWA Inhalable particulate matter		3 mg/m3
	Further information: A3: Confirmed animal carcinogen with unknown relevance to humans			
	OSHA Z-1	TWA		3.5 mg/m3
	OSHA P0	TWA		3.5 mg/m3
Phenol	Dow IHG	TWA		5 ppm
	Further information: SKIN: Absorbed via skin			
	Dow IHG	STEL		10 ppm
	Further information: SKIN: Absorbed via skin			
	ACGIH	TWA		5 ppm
	Further information: CNS impair: Central Nervous System impairment; URT irr: Upper Respiratory Tract irritation; lung dam: Lung damage; BEI: Substances for which there is a Biological Exposure Index or Indices (see BEI® section); A4: Not classifiable as a human carcinogen; Skin: Danger of cutaneous absorption			
	OSHA Z-1	TWA		19 mg/m3 5 ppm
	Further information: X: Skin designation; (b): The value in mg/m3 is approximate.			
Cresol	ACGIH	TWA Inhalable fraction and vapor		20 mg/m3
	Further information: URT irr: Upper Respiratory Tract irritation; A4: Not classifiable as			

	a human carcinogen; Skin: Danger of cutaneous absorption		
	OSHA Z-1	TWA	22 mg/m3 5 ppm
	Further information: X: Skin designation; (b): The value in mg/m3 is approximate.		
Toluene	ACGIH	TWA	20 ppm
	Further information: OTO: Ototoxicant; A4: Not classifiable as a human carcinogen		
	OSHA Z-1		See Further information
	Further information: (2): See Table Z-2		
	OSHA Z-2	TWA	200 ppm
	Further information: Z37.12-1967		
	OSHA Z-2	CEIL	300 ppm
	Further information: Z37.12-1967		
	OSHA Z-2	Peak	500 ppm
	Further information: Z37.12-1967		
	CAL PEL	PEL	37 mg/m3 10 ppm
	Further information: S: Skin		
	CAL PEL	C	500 ppm
	Further information: S: Skin		
	CAL PEL	STEL	560 mg/m3 150 ppm
	Further information: S: Skin		

Biological occupational exposure limits

Components	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
Methyl ethyl ketone	78-93-3	methyl ethyl ketone	Urine	End of shift (As soon as possible after exposure ceases)	2 mg/l	ACGIH BEI
Methyl isobutyl ketone	108-10-1	methyl isobutyl ketone	Urine	End of shift (As soon as possible after exposure ceases)	1 mg/l	ACGIH BEI
Cyclohexanone	108-94-1	1,2-Cyclohexanediol	Urine	End of shift at end of workweek	80 mg/l	ACGIH BEI
Phenol	108-95-2	Phenol	Urine	End of shift (As soon as possible after exposure ceases)	250 mg/g Creatinine	ACGIH BEI
Toluene	108-88-3	Toluene	In blood	Prior to last shift of workweek	0.02 mg/l 0.3 mg/g Creatinine	ACGIH BEI

Exposure controls

Engineering controls: Use engineering controls to maintain airborne level below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use only in enclosed systems or with local exhaust ventilation. Exhaust systems should be designed to move the air away from the source of vapor/aerosol generation and people working at this point. Lethal concentrations may exist in areas with poor ventilation.

Individual protection measures

Eye/face protection: Use safety glasses (with side shields).

Skin protection

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

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

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state	liquid
Color	black
Odor	Solvent odor
Odor Threshold	No data available
pH	No data available
Melting point/range	No data available
Freezing point	No data available
Boiling point (760 mmHg)	> 35 °C (> 95 °F)
Flash point	closed cup 0.01 °C (32.02 °F)
Evaporation Rate (Butyl Acetate = 1)	No data available
Flammability (solid, gas)	Not Applicable
Lower explosion limit	No data available
Upper explosion limit	No data available
Vapor Pressure	No data available
Relative Vapor Density (air = 1)	No data available
Relative Density (water = 1)	0.95
Water solubility	No data available
Partition coefficient: n-octanol/water	No data available

Auto-ignition temperature	No data available
Decomposition temperature	No data available
Kinematic Viscosity	28 mm ² /s
Explosive properties	No data available
Oxidizing properties	The substance or mixture is not classified as oxidizing.
Molecular weight	No data available

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

10. STABILITY AND REACTIVITY

Reactivity: Not classified as a reactivity hazard.

Chemical stability: Stable under normal conditions.

Possibility of hazardous reactions: Can react with strong oxidizing agents. Vapours may form explosive mixture with air. Highly flammable liquid and vapour.

Conditions to avoid: Heat, flames and sparks.

Incompatible materials: Oxidizing agents

Hazardous decomposition products: Phenol. Hexafluoroethane. Hydrogen Fluoride. 1,1,1,3,3,3-Hexafluoro-2-propanone. Carbonic difluoride. Carbon monoxide. Fluorinated hydrocarbons. Bisphenol A.

11. TOXICOLOGICAL INFORMATION

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

Acute toxicity

Acute oral toxicity

Product test data not available. Refer to component data.

Acute dermal toxicity

Product test data not available. Refer to component data.

Acute inhalation toxicity

Product test data not available. Refer to component data.

Skin corrosion/irritation

Product test data not available. Refer to component data.

Serious eye damage/eye irritation

Product test data not available. Refer to component data.

Sensitization

Product test data not available. Refer to component data.

Specific Target Organ Systemic Toxicity (Single Exposure)

Product test data not available. Refer to component data.

Specific Target Organ Systemic Toxicity (Repeated Exposure)

Product test data not available. Refer to component data.

Carcinogenicity

Product test data not available. Refer to component data.

Teratogenicity

Product test data not available. Refer to component data.

Reproductive toxicity

Product test data not available. Refer to component data.

Mutagenicity

Product test data not available. Refer to component data.

Aspiration Hazard

Product test data not available. Refer to component data.

COMPONENTS INFLUENCING TOXICOLOGY:

Methyl ethyl ketone

Acute oral toxicity

LD50, Rat, 2,193 mg/kg

Acute dermal toxicity

LD50, Rabbit, > 8,049 mg/kg

Acute inhalation toxicity

LC50, Mouse, 4 Hour, vapour, 32 mg/l

Skin corrosion/irritation

Brief contact is essentially nonirritating to skin.

Prolonged contact may cause moderate skin irritation with local redness.

Repeated contact may cause moderate skin irritation with local redness.

May cause drying and flaking of the skin.

Serious eye damage/eye irritation

May cause pain disproportionate to the level of irritation to eye tissues.

May cause moderate eye irritation which may be slow to heal.

May cause moderate corneal injury.

Vapor may cause eye irritation experienced as mild discomfort and redness.

Sensitization

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

For respiratory sensitization:

No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)

May cause drowsiness or dizziness.

Route of Exposure: Inhalation

Target Organs: Nervous system

Specific Target Organ Systemic Toxicity (Repeated Exposure)

Methyl ethyl ketone has caused liver effects in laboratory animals exposed by inhalation to high concentrations.

Methyl ethyl ketone is probably not neurotoxic in itself but it potentiates the neurotoxicity of methyl-n-butyl ketone and n-hexane.

Carcinogenicity

Available data are inadequate to evaluate carcinogenicity.

Teratogenicity

Has been toxic to the fetus in laboratory animals at doses toxic to the mother. Did not cause birth defects in laboratory animals.

Reproductive toxicity

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

Mutagenicity

In vitro genetic toxicity studies were predominantly negative. Animal genetic toxicity studies were negative.

Aspiration Hazard

May be harmful if swallowed and enters airways.

Methyl isobutyl ketone

Acute oral toxicity

LD50, Rat, 2,080 mg/kg OECD Test Guideline 401

Acute dermal toxicity

LD50, Rat, > 2,000 mg/kg OECD Test Guideline 402

Acute inhalation toxicity

LC50, Rat, 4 Hour, vapour, 11.6 mg/l OECD Test Guideline 403

Skin corrosion/irritation

Brief contact is essentially nonirritating to skin.

Serious eye damage/eye irritation

May cause slight temporary eye irritation.

Sensitization

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

Specific Target Organ Systemic Toxicity (Single Exposure)

The substance or mixture is classified as specific target organ toxicant, single exposure, category 3 with narcotic effects.

Target Organs: Central nervous system

Specific Target Organ Systemic Toxicity (Repeated Exposure)

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

Carcinogenicity

Animal experiments showed a statistically significant number of tumours. However, the relevance of this to humans is unknown.

Teratogenicity

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

Reproductive toxicity

In animal studies, did not interfere with reproduction. In animal studies, did not interfere with fertility.

Mutagenicity

In vitro genetic toxicity studies were negative.

Aspiration Hazard

The substance or mixture causes concern owing to the assumption that it causes a human aspiration toxicity hazard.

Cyclohexanone

Acute oral toxicity

LD50, Rat, 1,890 mg/kg

Acute dermal toxicity

LD50, Rabbit, 950 mg/kg

Acute inhalation toxicity

Vapor concentrations are attainable which could be hazardous on single exposure. May cause central nervous system effects. Excessive exposure may cause severe irritation to upper respiratory tract (nose and throat) and lungs.

LC50, Rat, 4 Hour, vapour, > 6.2 mg/l No deaths occurred at this concentration.

Skin corrosion/irritation

Brief contact may cause severe skin irritation with pain and local redness. Prolonged contact may cause skin burns. Symptoms may include pain, severe local redness, swelling, and tissue damage.

Serious eye damage/eye irritation

May cause severe eye irritation.

May cause severe corneal injury.

Vapor may cause severe eye irritation and corneal injury.

Vapor may cause lacrimation (tears).

In humans, eye irritation resulted from brief (minutes) exposure to cyclohexanone vapor concentration of 50 ppm and above.

Sensitization

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

For respiratory sensitization:

No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)

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

Specific Target Organ Systemic Toxicity (Repeated Exposure)

In animals, effects have been reported on the following organs:

Central nervous system.

Kidney.

Liver.

Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed.

Carcinogenicity

Available data are inadequate to evaluate carcinogenicity.

Teratogenicity

Has been toxic to the fetus in laboratory animals at doses toxic to the mother. Did not cause birth defects in laboratory animals.

Reproductive toxicity

Cyclohexanone caused reduced growth and survival of offspring in an animal reproduction study. Dose levels producing this effect also caused central nervous system effects in parental animals. In animal studies, has been shown to interfere with reproduction in males. Effects have been seen only at doses that produced significant toxicity to the parent animals.

Mutagenicity

In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.

Aspiration Hazard

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

Reaction product: Bisphenol A-(epichlorohydrin); epoxy resin (number average molecular weight 700-1100)

Acute oral toxicity

Single dose oral LD50 has not been determined. Typical for this family of materials. LD50, Rat, > 2,000 mg/kg Estimated.

Acute dermal toxicity

The dermal LD50 has not been determined.

Typical for this family of materials. LD50, Rabbit, > 2,000 mg/kg

Acute inhalation toxicity

The LC50 has not been determined.

Skin corrosion/irritation

Brief contact may cause slight skin irritation with local redness.

Prolonged contact may cause skin irritation with local redness.

Repeated contact may cause skin irritation with local redness.

Serious eye damage/eye irritation

May cause slight eye irritation.

Corneal injury is unlikely.

Solid or dust may cause irritation or corneal injury due to mechanical action.

Sensitization

Has caused allergic skin reactions when tested in guinea pigs.

For respiratory sensitization:

No relevant data found.

Specific Target Organ Systemic Toxicity (Repeated Exposure)

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

Carcinogenicity

Similar epoxy resin did not cause cancer in long-term animal studies.

Teratogenicity

No relevant data found.

Reproductive toxicity

No relevant data found.

Mutagenicity

Some similar resins have shown genetic toxicity in in vitro tests, while others have not.

Aspiration Hazard

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

Carbon black

Acute oral toxicity

LD50, Rat, > 8,000 mg/kg

Acute dermal toxicity

LD50, Rabbit, > 3,000 mg/kg No deaths occurred at this concentration.

Acute inhalation toxicity

LC50, Rat, 1 Hour, dust/mist, 27 mg/l No deaths occurred at this concentration.

Skin corrosion/irritation

Prolonged exposure not likely to cause significant skin irritation.

Serious eye damage/eye irritation

Solid or dust may cause irritation or corneal injury due to mechanical action.

Sensitization

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

For respiratory sensitization:

No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)

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

Specific Target Organ Systemic Toxicity (Repeated Exposure)

Dust may cause irritation of the upper respiratory tract (nose and throat) and lungs. Repeated exposures to very fine dusts may cause lung injury.

Carcinogenicity

Lung fibrosis and tumors have been observed in rats exposed to high concentrations of very fine carbon black particles for their lifetime. Effects are believed to be due to overloading of the normal respiratory clearance mechanisms caused by the extreme study conditions. Rats may be particularly susceptible to particle clearance overload, resulting in lung injury and tumors. No increases in tumors were observed in male or female mice exposed under the same conditions.

Teratogenicity

No relevant data found.

Reproductive toxicity

No relevant data found.

Mutagenicity

Animal genetic toxicity studies were negative in some cases and positive in other cases. Positive findings were observed only at doses which produced significant inflammation.

Aspiration Hazard

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

Phenol

Acute oral toxicity

Lethal Dose, human, 140 mg/kg

LD50, Rat, male and female, 340 mg/kg

Acute dermal toxicity

LD50, Rat, female, 660 mg/kg OECD Test Guideline 402

Acute inhalation toxicity

Excessive exposure may cause severe irritation to upper respiratory tract (nose and throat) and lungs. Prolonged excessive exposure may cause adverse effects. May cause pulmonary edema (fluid in the lungs.) May cause central nervous system effects. Effects may be delayed.

The LC50 has not been determined.

Skin corrosion/irritation

Brief contact may cause severe skin burns. Symptoms may include pain, severe local redness and tissue damage.

Serious eye damage/eye irritation

May cause severe irritation with corneal injury which may result in permanent impairment of vision, even blindness. Chemical burns may occur.

Material may be handled at elevated temperatures; contact with heated material may cause thermal burns.

Sensitization

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

For respiratory sensitization:

No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)

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

Specific Target Organ Systemic Toxicity (Repeated Exposure)

Repeated excessive exposure to phenol may cause central nervous system effects (including respiratory, motor difficulties, and paralysis), digestive disturbances, liver and kidney effects.

Carcinogenicity

Did not cause cancer in laboratory animals.

Teratogenicity

Phenol has been toxic to the fetus in laboratory animals at doses toxic to the mother. Birth defects (cleft palate) were seen in mice at maternally lethal doses. This is a common developmental abnormality in mice and is associated with stress to the maternal animals.

Reproductive toxicity

In animal studies, phenol did not interfere with reproduction. Toxicity to the newborn animals was observed at doses that were toxic to the maternal animals.

Mutagenicity

In vitro genetic toxicity studies were negative in some cases and positive in other cases.

Aspiration Hazard

Aspiration into the lungs may occur during ingestion or vomiting, causing tissue damage or lung injury.

Cresol

Acute oral toxicity

Typical for this family of materials. LD50, Rat, 100 - 300 mg/kg

Acute dermal toxicity

Typical for this family of materials. LD50, Rabbit, 300 - 1,000 mg/kg

Acute inhalation toxicity

Typical for this family of materials. LC50, Rat, 8 Hour, vapour, 35.38 mg/l

Skin corrosion/irritation

Brief contact may cause skin burns. Symptoms may include pain, severe local redness and tissue damage.

Serious eye damage/eye irritation

May cause severe irritation with corneal injury which may result in permanent impairment of vision, even blindness. Chemical burns may occur.

Sensitization

For skin sensitization:

No relevant data found.

For respiratory sensitization:

No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)

Material is corrosive. Material is not classified as a respiratory irritant; however, upper respiratory tract irritation or corrosivity may be expected.

Specific Target Organ Systemic Toxicity (Repeated Exposure)

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

Teratogenicity

Did not cause birth defects in laboratory animals. Has been toxic to the fetus in laboratory animals at doses toxic to the mother.

Reproductive toxicity

In animal studies, did not interfere with reproduction.

Mutagenicity

In vitro genetic toxicity studies were negative in some cases and positive in other cases. Animal genetic toxicity studies were negative.

Aspiration Hazard

Aspiration into the lungs may occur during ingestion or vomiting, resulting in rapid absorption and injury to other body systems.

Toluene

Acute oral toxicity

LD50, Rat, 5,580 mg/kg

Acute dermal toxicity

LD50, Rabbit, 12,267 mg/kg

Acute inhalation toxicity

Symptoms may include headache, dizziness and drowsiness, progressing to incoordination and unconsciousness. Alcohol consumption and exertion may increase the adverse effects of toluene. LC50, Rat, male, 4 Hour, vapour, 25.7 mg/l

LC50, Rat, female, 4 Hour, vapour, 30 mg/l

Skin corrosion/irritation

Brief contact may cause slight skin irritation with local redness.

Prolonged contact may cause moderate skin irritation with local redness.

May cause drying and flaking of the skin.

Serious eye damage/eye irritation

May cause slight eye irritation.

May cause slight temporary corneal injury.

Vapor may cause eye irritation experienced as mild discomfort and redness.

Vapor may cause lacrimation (tears).

Sensitization

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

For respiratory sensitization:

No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)

May cause drowsiness or dizziness.
 Route of Exposure: Inhalation
 Target Organs: Central nervous system

Specific Target Organ Systemic Toxicity (Repeated Exposure)

In animals, effects have been reported on the following organs:
 central nervous system (CNS) effects
 Excessive exposure may cause neurologic signs and symptoms.
 Toluene has caused hearing loss in laboratory animals upon exposure to high concentrations.
 Intentional misuse by deliberately inhaling toluene may cause nervous system damage, hearing loss, liver and kidney effects and death.

Carcinogenicity

Did not cause cancer in laboratory animals.

Teratogenicity

In laboratory animals, toluene has been toxic to the fetus at doses toxic to the mother; it has caused birth defects in mice when administered orally, but not by inhalation.

Reproductive toxicity

In animal studies, did not interfere with reproduction.

Mutagenicity

The majority and most reliable of the many genetic toxicity studies on toluene, both in vitro and in animals, indicate that it is not genetically toxic.

Aspiration Hazard

May be fatal if swallowed and enters airways.

Carcinogenicity

Component

Methyl isobutyl ketone

List

IARC

ACGIH

Classification

Group 2B: Possibly carcinogenic to humans

A3: Confirmed animal carcinogen with unknown relevance to humans.

Cyclohexanone

ACGIH

A3: Confirmed animal carcinogen with unknown relevance to humans.

Carbon black

IARC

Group 2B: Possibly carcinogenic to humans

ACGIH

A3: Confirmed animal carcinogen with unknown relevance to humans.

12. ECOLOGICAL INFORMATION

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

Toxicity

Methyl ethyl ketone

Acute toxicity to fish

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Pimephales promelas (fathead minnow), static test, 96 Hour, 2,993 mg/l, OECD Test Guideline 203

Acute toxicity to aquatic invertebrates

EC50, Daphnia magna (Water flea), static test, 48 Hour, 308 mg/l, OECD Test Guideline 202

Acute toxicity to algae/aquatic plants

ErC50, Pseudokirchneriella subcapitata (microalgae), static test, 96 Hour, Growth rate inhibition, 2,029 mg/l, OECD Test Guideline 201
NOEC, Pseudokirchneriella subcapitata (green algae), 96 Hour, 1,240 mg/l, OECD Test Guideline 201

Toxicity to bacteria

EC50, Bacteria, 96 Hour, > 1,000 mg/l, hUCC

Methyl isobutyl ketone

Acute toxicity to fish

LC50, Danio rerio (zebra fish), 96 Hour, > 179 mg/l, OECD Test Guideline 203

Acute toxicity to aquatic invertebrates

EC50, Daphnia magna (Water flea), 48 Hour, > 200 mg/l, OECD Test Guideline 202

Toxicity to bacteria

EC10, Pseudomonas putida, 16 Hour, 275 mg/l

Chronic toxicity to aquatic invertebrates

NOEC, Daphnia magna (Water flea), 21 d, 78 mg/l

Cyclohexanone

Acute toxicity to fish

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Leuciscus idus (Golden orfe), static test, 48 Hour, 630 mg/l
LC50, Pimephales promelas (fathead minnow), static test, 96 Hour, 527 - 732 mg/l

Acute toxicity to aquatic invertebrates

EC50, Daphnia magna (Water flea), 24 Hour, 820 mg/l

Acute toxicity to algae/aquatic plants

LOEC, Scenedesmus quadricauda (Green algae), 192 Hour, 370 mg/l, Method Not Specified.
EC50, Desmodesmus subspicatus (green algae), Static, 72 Hour, > 100 mg/l, OECD Test Guideline 201

Toxicity to bacteria

EC50, activated sludge, > 1,000 mg/l, OECD 209 Test

Reaction product: Bisphenol A-(epichlorohydrin): epoxy resin (number average molecular weight 700-1100)

Acute toxicity to fish

Based on information for a similar material:
Not expected to be acutely toxic, but may cause adverse effects by physical/mechanical means.

Carbon black

Acute toxicity to fish

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Leuciscus idus (Golden orfe), static test, 96 Hour, > 1,000 mg/l

Acute toxicity to aquatic invertebrates

EC50, Daphnia magna (Water flea), 24 Hour, > 5,600 mg/l

Acute toxicity to algae/aquatic plants

NOEC, Desmodesmus subspicatus (green algae), 72 Hour, 10,000 mg/l

Phenol

Acute toxicity to fish

Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).
LC50, Oncorhynchus mykiss (rainbow trout), flow-through test, 96 Hour, 8.9 mg/l

Acute toxicity to aquatic invertebrates

LC50, Ceriodaphnia dubia (water flea), 48 Hour, 4.3 - 20 mg/l

Acute toxicity to algae/aquatic plants

EC50, Pseudokirchneriella subcapitata (microalgae), static test, 96 Hour, Growth inhibition (cell density reduction), 61.1 mg/l, Other guidelines

Toxicity to bacteria

EC50, activated sludge, 110 - 800 mg/l

Chronic toxicity to fish

NOEC, Fish, semi-static test, 60 d, 0.077 mg/l

Chronic toxicity to aquatic invertebrates

NOEC, Daphnia magna (Water flea), 16 d, 10 mg/l

Cresol

Acute toxicity to fish

Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).
LC50, Oncorhynchus mykiss (rainbow trout), flow-through test, 96 Hour, 7.5 mg/l

Acute toxicity to aquatic invertebrates

LC50, Daphnia magna (Water flea), 48 Hour, 4.9 mg/l

Acute toxicity to algae/aquatic plants

Based on data from similar materials

EC50, Desmodesmus subspicatus (green algae), 48 Hour, 21 mg/l

Based on data from similar materials

EC10, Desmodesmus subspicatus (green algae), 48 Hour, 21 mg/l

Toxicity to bacteria

EC50, activated sludge, 458 mg/l

Chronic toxicity to fish

For similar material(s):

NOEC, Pimephales promelas (fathead minnow), 32 d, 1.35 mg/l

Chronic toxicity to aquatic invertebrates

NOEC, Daphnia magna (Water flea), 21 d, number of offspring, > 1 mg/l

Toluene

Acute toxicity to fish

Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

LC50, Oncorhynchus mykiss (rainbow trout), semi-static test, 96 Hour, 5.8 mg/l

Acute toxicity to aquatic invertebrates

LC50, water flea Ceriodaphnia dubia, semi-static test, 48 Hour, 3.78 mg/l

Acute toxicity to algae/aquatic plants

EbC50, Pseudokirchneriella subcapitata (green algae), 72 Hour, Biomass, 12.5 mg/l, OECD Test Guideline 201

Toxicity to bacteria

IC50, Bacteria, 16 Hour, 29 mg/l

Chronic toxicity to fish

NOEC, Fish, flow-through test, 40 d, growth, 1.4 mg/l

Chronic toxicity to aquatic invertebrates

NOEC, Ceriodaphnia dubia (water flea), 7 d, number of offspring, 0.74 mg/l

Toxicity to soil-dwelling organisms

LC50, Eisenia fetida (earthworms), 150 - 280 mg/kg

Persistence and degradability

Methyl ethyl ketone

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

10-day Window: Not applicable

Biodegradation: 98 %

Exposure time: 28 d

Method: OECD Test Guideline 301D or Equivalent

Theoretical Oxygen Demand: 2.44 mg/mg

Biological oxygen demand (BOD)

Incubation Time	BOD
5 d	71 - 76 %
10 d	71 - 82 %
20 d	71 - 89 %

Photodegradation

Test Type: Half-life (indirect photolysis)
Sensitization: OH radicals
Atmospheric half-life: 8 d
Method: Estimated.

Methyl isobutyl ketone

Biodegradability: Readily biodegradable.
Method: OECD Test Guideline 301

Biodegradation: 83 %
Exposure time: 28 d

Theoretical Oxygen Demand: 2.72 mg/mg

Photodegradation

Test Type: Half-life (indirect photolysis)
Sensitization: OH radicals
Atmospheric half-life: 14.5 Hour
Method: Estimated.

Cyclohexanone

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

10-day Window: Not applicable

Biodegradation: 87 %

Exposure time: 14 d

Method: OECD Test Guideline 301C or Equivalent

10-day Window: Pass

Biodegradation: 90 - 100 %

Exposure time: 28 d

Method: OECD Test Guideline 301F

Theoretical Oxygen Demand: 2.61 mg/mg

Photodegradation

Test Type: Half-life (indirect photolysis)
Sensitization: OH radicals
Atmospheric half-life: 10.6 Hour
Method: Estimated.

Reaction product: Bisphenol A-(epichlorohydrin); epoxy resin (number average molecular weight 700-1100)

Biodegradability: This water-insoluble polymeric solid is expected to be inert in the environment. Surface photodegradation is expected with exposure to sunlight. No appreciable biodegradation is expected.

Carbon black

Biodegradability: Biodegradation is not applicable.

Phenol

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

10-day Window: Not applicable

Biodegradation: 62 %
Exposure time: 100 Hour
Method: OECD Test Guideline 301C or Equivalent
10-day Window: Not applicable
Biodegradation: 85 %
Exposure time: 14 d
Method: OECD Test Guideline 301C or Equivalent

Theoretical Oxygen Demand: 2.38 mg/mg

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitization: OH radicals
Atmospheric half-life: 3.8 Hour
Method: Estimated.

Cresol

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

Theoretical Oxygen Demand: 2.52 mg/mg

Biological oxygen demand (BOD)

Incubation Time	BOD
5 d	1.40 mg/mg
10 d	2.02 mg/mg
20 d	2.06 mg/mg

Toluene

Biodegradability: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.
10-day Window: Not applicable
Biodegradation: 100 %
Exposure time: 14 d
Method: OECD Test Guideline 301C or Equivalent

Theoretical Oxygen Demand: 3.13 mg/mg Calculated.

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitization: OH radicals
Atmospheric half-life: 2 d
Method: Estimated.

Bioaccumulative potential

Methyl ethyl ketone

Bioaccumulation: Bioaccumulation is unlikely. Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 0.3 at 40 °C Measured

Methyl isobutyl ketone

Bioaccumulation: Bioaccumulation is unlikely.

Partition coefficient: n-octanol/water(log Pow): 1.9 at 20 °C

Cyclohexanone

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

Partition coefficient: n-octanol/water(log Pow): 0.81 Measured

Bioconcentration factor (BCF): 3.16 Fish

Reaction product: Bisphenol A-(epichlorohydrin); epoxy resin (number average molecular weight 700-1100)

Bioaccumulation: No relevant data found.

Carbon black

Bioaccumulation: No relevant data found.

Phenol

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

Partition coefficient: n-octanol/water(log Pow): 1.47 at 30 °C Measured

Bioconcentration factor (BCF): 10 - 39 Carassius auratus (goldfish) Measured

Cresol

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

Partition coefficient: n-octanol/water(log Pow): 1.95 Calculated.

Bioconcentration factor (BCF): < 100 Fish Measured

Toluene

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

Partition coefficient: n-octanol/water(log Pow): 2.73 Measured

Bioconcentration factor (BCF): 13.2 - 90 Fish Measured

Mobility in soil

Methyl ethyl ketone

Potential for mobility in soil is very high (Koc between 0 and 50).

Partition coefficient (Koc): 3.8 Estimated.

Methyl isobutyl ketone

Potential for mobility in soil is high (Koc between 50 and 150).

Partition coefficient (Koc): 101 Estimated.

Cyclohexanone

Potential for mobility in soil is very high (Koc between 0 and 50).

Partition coefficient (Koc): 15 Estimated.

Reaction product: Bisphenol A-(epichlorohydrin); epoxy resin (number average molecular weight 700-1100)

In the terrestrial environment, material is expected to remain in the soil.

In the aquatic environment, material will sink and remain in the sediment.

Carbon black

No relevant data found.

Phenol

Potential for mobility in soil is high (Koc between 50 and 150).

Partition coefficient (Koc): 27 - 91 Estimated.

Cresol

No relevant data found.

Toluene

Potential for mobility in soil is very high (Koc between 0 and 50).

Partition coefficient (Koc): 37 - 178 Estimated.

13. DISPOSAL CONSIDERATIONS

Disposal methods: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Incinerator or other thermal destruction device. For additional information, refer to: Handling & Storage Information, MSDS Section 7 Stability & Reactivity Information, MSDS Section 10 Regulatory Information, MSDS Section 15

Treatment and disposal methods of used packaging: Empty containers should be recycled or otherwise disposed of by an approved waste management facility. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. Do not re-use containers for any purpose.

14. TRANSPORT INFORMATION

DOT

Proper shipping name	Coating solution
UN number	UN 1139
Class	3
Packing group	II
Reportable Quantity	Methyl ethyl ketone, Methyl isobutyl ketone

Classification for SEA transport (IMO-IMDG):

Proper shipping name	COATING SOLUTION
UN number	UN 1139
Class	3
Packing group	II
Marine pollutant	No
Transport in bulk according to Annex I or II	Consult IMO regulations before transporting ocean bulk

**of MARPOL 73/78 and the
IBC or IGC Code****Classification for AIR transport (IATA/ICAO):**

Proper shipping name	Coating solution
UN number	UN 1139
Class	3
Packing group	II

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

15. REGULATORY INFORMATION

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Flammable (gases, aerosols, liquids, or solids)
Hazard not otherwise classified (physical hazards)
Acute toxicity (any route of exposure)
Skin corrosion or irritation
Serious eye damage or eye irritation
Respiratory or skin sensitisation
Germ cell mutagenicity
Reproductive toxicity
Specific target organ toxicity (single or repeated exposure)

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

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

Components	CASRN
Methyl isobutyl ketone	108-10-1
Phenol	108-95-2

California Prop. 65

WARNING: This product can expose you to chemicals including Methyl isobutyl ketone, Carbon black, Formaldehyde, Ethylbenzene, Benzene, Cumene, which is/are known to the State of California to cause cancer, and Toluene, 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.

United States TSCA Inventory (TSCA)

All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

16. OTHER INFORMATION

Hazard Rating System

NFPA

Health	Flammability	Instability
3	3	0

HMIS

Health	Flammability	Physical Hazard
3*	4	0

* = Chronic Effects (See Hazards Identification)

Revision

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

Legend

ACGIH	USA. ACGIH Threshold Limit Values (TLV)
ACGIH BEI	ACGIH - Biological Exposure Indices (BEI)
C	Ceiling
CAL PEL	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
CEIL	Acceptable ceiling concentration
Dow IHG	Dow Industrial Hygiene Guideline
NIOSH REL	USA. NIOSH Recommended Exposure Limits
OSHA P0	USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)
OSHA Z-1	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
OSHA Z-2	USA. Occupational Exposure Limits (OSHA) - Table Z-2
Peak	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift
PEL	Permissible exposure limit
STEL	Short-term exposure limit
TWA	8-hour time weighted average

Full text of other abbreviations

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; TECl - 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

Information Source and References

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

DDP SPECIALTY ELECTRONIC MATERIALS US 9, LLC urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

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