



# SAFETY DATA SHEET

## DDP SPECIALTY ELECTRONIC MATERIALS US 9, LLC

**Product name:** MOLYKOTE® BR-2 Plus High Performance Grease

**Issue Date:** 05/23/2022

**Print Date:** 01/06/2024

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® BR-2 Plus High Performance Grease

**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

Serious eye damage - Category 1

### Label elements

**Hazard pictograms**



**Signal word:** DANGER!

**Hazards**

Causes serious eye damage.

**Precautionary statements****Prevention**

Wear eye protection/ face protection.

**Response**

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.

**Other hazards**

No data available

---

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

---

**Chemical nature:** Molybdenum disulfide grease

This product is a mixture.

| Component   | CASRN      | Concentration       |
|---|------------|---------------------|
| Distillates (petroleum), hydrotreated heavy naphthenic                      | 64742-52-5 | >= 38.0 - <= 46.0 % |
| Solvent dewaxed heavy paraffinic distillates                                | 64742-65-0 | >= 34.0 - <= 41.0 % |
| Lithium 12-hydroxyoctadecanoate   | 7620-77-1  | >= 7.0 - <= 8.0 %   |
| Solvent dewaxed residual oil (petroleum)                                    | 64742-62-7 | >= 3.0 - <= 5.0 %   |
| Phosphorodithioic acid, mixed O,O-bis(iso-Bu and pentyl) esters, zinc salts | 68457-79-4 | >= 3.0 - <= 4.0 %   |
| Graphite  | 7782-42-5  | >= 0.5 - <= 2.5 %   |
| Molybdenum disulfide  | 1317-33-5  | >= 0.5 - <= 2.5 %   |

---

**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:** No emergency medical treatment necessary.

**Skin contact:** Wash off with plenty of water. Suitable emergency safety shower facility should be available in work area.

**Eye contact:** Wash immediately and continuously with flowing water for at least 30 minutes. Remove contact lenses after the first 5 minutes and continue washing. Obtain prompt medical consultation, preferably from an ophthalmologist. Suitable emergency eye wash facility should be immediately available. Get medical attention immediately.

**Ingestion:** No emergency medical treatment necessary.

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

---

## **5. FIREFIGHTING MEASURES**

---

**Suitable extinguishing media:** Water spray Alcohol-resistant foam Carbon dioxide (CO<sub>2</sub>) Dry chemical

**Unsuitable extinguishing media:** None known.

**Special hazards arising from the substance or mixture**

**Hazardous combustion products:** Metal oxides Oxides of phosphorus Sulphur oxides Carbon oxides

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

**Advice for firefighters**

**Fire Fighting Procedures:** Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage.

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

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

---

## **6. ACCIDENTAL RELEASE MEASURES**

---

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

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

**Methods and materials for containment and cleaning up:** Wipe up or scrape up and contain for salvage or disposal. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable. For large spills, provide dyking or other appropriate containment to keep material from spreading. If dyked material can be pumped, Sections 13 and 15 of this SDS provide information regarding certain local or national requirements. 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 swallow. Do not get in eyes. Keep container tightly closed. Take care to prevent spills, waste and minimize release to the environment. Handle in accordance with good industrial hygiene and safety practice. Use only with adequate ventilation. See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.

**Conditions for safe storage:** Keep in properly labelled containers. Keep tightly closed. Store in accordance with the particular national regulations.

Do not store with the following product types: Strong oxidizing agents.  
Unsuitable materials for containers: None known.

---

## 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   |
|--|--|----------------------------------|---------|
| Distillates (petroleum), hydrotreated heavy naphthenic | OSHA Z-1   | TWA Mist                         | 5 mg/m3 |
|  | ACGIH  | TWA Inhalable particulate matter | 5 mg/m3 |
|  | Further information: URT irr: Upper Respiratory Tract irritation; A4: Not classifiable as a human carcinogen |                                  |         |
|  | CAL PEL  | PEL particulate                  | 5 mg/m3 |
|  | Further information: (I): As sampled by method that does not collect vapor.                                  |                                  |         |
| Solvent dewaxed heavy paraffinic distillates           | OSHA Z-1   | TWA Mist                         | 5 mg/m3 |
|  | ACGIH  | TWA Inhalable particulate matter | 5 mg/m3 |
|  | Further information: URT irr: Upper Respiratory Tract irritation; A4: Not classifiable as a human carcinogen |                                  |         |
|  | CAL PEL  | PEL particulate                  | 5 mg/m3 |
|  | Further information: (I): As sampled by method that does not collect vapor.                                  |                                  |         |

|  |   |                                   |                                     |
|--|---|-----------------------------------|-------------------------------------|
|  | NIOSH REL   | TWA Mist                          | 5 mg/m3                             |
|  | NIOSH REL   | ST Mist                           | 10 mg/m3                            |
|  | OSHA P0   | TWA Mist                          | 5 mg/m3                             |
| Lithium 12-hydroxyoctadecanoate          | ACGIH   | TWA Inhalable particulate matter  | 10 mg/m3                            |
|  | Further information: LRT irr: Lower Respiratory Tract irritation; J: Does not include stearates of toxic metals.; A4: Not classifiable as a human carcinogen; varies: varies  |                                   |                                     |
|  | ACGIH   | TWA Respirable particulate matter | 3 mg/m3                             |
|  | Further information: LRT irr: Lower Respiratory Tract irritation; J: Does not include stearates of toxic metals.; A4: Not classifiable as a human carcinogen; varies: varies  |                                   |                                     |
| Solvent dewaxed residual oil (petroleum) | OSHA Z-1  | TWA Mist                          | 5 mg/m3                             |
|  | ACGIH   | TWA Inhalable particulate matter  | 5 mg/m3                             |
|  | Further information: URT irr: Upper Respiratory Tract irritation; A4: Not classifiable as a human carcinogen  |                                   |                                     |
|  | NIOSH REL   | TWA Mist                          | 5 mg/m3                             |
|  | NIOSH REL   | ST Mist                           | 10 mg/m3                            |
|  | OSHA P0   | TWA Mist                          | 5 mg/m3                             |
| Graphite                                 | OSHA Z-1  |                                   | See Further information             |
|  | Further information: (3): See table Z-3   |                                   |                                     |
|  | OSHA Z-3  | TWA Dust                          | 15 Million particles per cubic foot |
|  | Further information: a: Based on impinger samples counted by light-field techniques.; mppcf X 35.3 = million particles per cubic meter = particles per c.c  |                                   |                                     |
|  | OSHA Z-1  | TWA total dust                    | 15 mg/m3                            |
|  | OSHA Z-1  | TWA respirable fraction           | 5 mg/m3                             |
|  | ACGIH   | TWA Respirable particulate matter | 2 mg/m3                             |
|  | Further information: pneumoconiosis: Pneumoconiosis   |                                   |                                     |
|  | CAL PEL   | PEL Total dust                    | 10 mg/m3                            |
|  | CAL PEL   | PEL respirable dust fraction      | 5 mg/m3                             |
|  | Further information: (n): The concentration and percentage of the particulate used for this limit are determined from the fraction passing a size selector with the following characteristics: Aerodynamic Diameter in Micrometers (unit density sphere).....<br>Percent Passing Selector 0 ..... 100<br>1 ..... 97 2 ..... 91<br>3 ..... 74 4 ..... 50<br>5 ..... 30 6 ..... 17<br>7 ..... 9 8 ..... 5<br>10 ..... 1 |                                   |                                     |
|  | CAL PEL   | PEL Respirable dust               | 2.5 mg/m3                           |
|  | NIOSH REL   | TWA Respirable                    | 2.5 mg/m3                           |
|  | Further information: Also see specific listing for Graphite (synthetic).  |                                   |                                     |
|  | OSHA P0   | TWA Total dust                    | 10 mg/m3                            |
|  | OSHA P0   | TWA respirable dust fraction      | 5 mg/m3                             |
|  | OSHA P0   | TWA respirable dust fraction      | 2.5 mg/m3                           |
| Molybdenum disulfide                     | OSHA Z-1  | TWA total dust                    | 15 mg/m3 , Molybdenum               |

|  |   |                                   |                          |
|--|---|-----------------------------------|--------------------------|
|  | ACGIH   | TWA Inhalable particulate matter  | 10 mg/m3 ,<br>Molybdenum |
|  | ACGIH   | TWA Respirable particulate matter | 3 mg/m3 ,<br>Molybdenum  |
|  | CAL PEL   | PEL Total dust                    | 10 mg/m3 ,<br>Molybdenum |
|  | CAL PEL   | PEL respirable dust fraction      | 3 mg/m3 ,<br>Molybdenum  |
|  | Further information: (n): The concentration and percentage of the particulate used for this limit are determined from the fraction passing a size selector with the following characteristics: Aerodynamic Diameter in Micrometers (unit density sphere).....<br>Percent Passing Selector 0 ..... 100<br>1 ..... 97 2 ..... 91<br>3 ..... 74 4 ..... 50<br>5 ..... 30 6 ..... 17<br>7 ..... 9 8 ..... 5<br>10 ..... 1 |                                   |                          |

**Exposure controls**

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

**Individual protection measures**

**Eye/face protection:** Use chemical goggles.

**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. If there are no applicable exposure limit requirements or guidelines, use an approved respirator.

---

**9. PHYSICAL AND CHEMICAL PROPERTIES**


---

**Appearance****Physical state**

Grease

**Color**

black

**Odor**

slight

**Odor Threshold**

No data available

**pH**

Not applicable

**Melting point/range**

No data available

**Freezing point**

No data available

**Boiling point (760 mmHg)**

Not applicable

|  |  |
|--|--|
| Flash point                            | closed cup >200 °C ( 392 °F)                             |
| Evaporation Rate (Butyl Acetate = 1)   | Not applicable   |
| Flammability (solid, gas)              | Not classified as a flammability hazard                  |
| Lower explosion limit                  | No data available  |
| Upper explosion limit                  | No data available  |
| Vapor Pressure                         | Not applicable   |
| Relative Vapor Density (air = 1)       | No data available  |
| Relative Density (water = 1)           | 0.89   |
| Water solubility                       | No data available  |
| Partition coefficient: n-octanol/water | No data available  |
| Auto-ignition temperature              | No data available  |
| Decomposition temperature              | No data available  |
| Dynamic Viscosity                      | Not applicable   |
| Kinematic Viscosity                    | Not applicable   |
| Explosive properties                   | Not explosive  |
|  |  |
| Oxidizing properties                   | The substance or mixture is not classified as oxidizing. |
| Molecular weight                       | No data available  |
| Particle size                          | 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.

**Conditions to avoid:** None known.

**Incompatible materials:** Oxidizing agents

**Hazardous decomposition products**

No hazardous decomposition products are known.

---

## 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:**

**Distillates (petroleum), hydrotreated heavy naphthenic**

**Acute oral toxicity**

LD50, Rat, > 5,000 mg/kg

**Acute dermal toxicity**

LD50, Rabbit, > 2,000 mg/kg

**Acute inhalation toxicity**



Excessive exposure may cause irritation to upper respiratory tract (nose and throat) and lungs.

LC50, Rat, 3 Hour, dust/mist, > 3.11 mg/l No deaths occurred at this concentration.

**Skin corrosion/irritation**

Prolonged contact is essentially nonirritating to skin.

Repeated contact may cause moderate skin irritation with local redness.

**Serious eye damage/eye irritation**

Essentially nonirritating to eyes.

**Sensitization**

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

For respiratory sensitization:

No relevant information 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 after dermal exposure:  
Skin.

**Carcinogenicity**

Has caused tumors in skin painting tests in animals. Not classifiable as a human carcinogen.

**Teratogenicity**

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

**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**

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

**Solvent dewaxed heavy paraffinic distillates****Acute oral toxicity**

Typical for this family of materials. LD50, Rat, > 5,000 mg/kg

**Acute dermal toxicity**

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

**Acute inhalation toxicity**

LC50, Rat, male and female, 4 Hour, dust/mist, > 5 mg/l No deaths occurred at this concentration.

**Skin corrosion/irritation**

Brief contact may cause slight skin irritation with local redness.

Prolonged contact may cause moderate skin irritation with local redness.

**Serious eye damage/eye irritation**

May cause slight eye irritation.  
Corneal injury is unlikely.

**Sensitization**

For skin sensitization:  
No relevant data found.

For respiratory sensitization:  
No relevant data found.

**Specific Target Organ Systemic Toxicity (Single Exposure)**

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

**Specific Target Organ Systemic Toxicity (Repeated Exposure)**

For this family of materials:  
In animals, effects have been reported on the following organs:  
Liver.

**Carcinogenicity**

For this family of materials: Did not cause cancer in animal skin painting studies.

**Teratogenicity**

Typical for this family of materials. Has been toxic to the fetus in laboratory animals at doses toxic to the mother.

**Reproductive toxicity**

Typical for this family of materials. Limited data in laboratory animals suggest that the material does not affect reproduction.

**Mutagenicity**

Typical for this family of materials. In vitro genetic toxicity studies were predominantly negative.

**Aspiration Hazard**

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

**Lithium 12-hydroxyoctadecanoate****Acute oral toxicity**

LD50, Rat, female, > 2,000 mg/kg OECD Test Guideline 420 No deaths occurred at this concentration.

**Acute dermal toxicity**

LD50, Rat, male and female, > 2,000 mg/kg OECD Test Guideline 402 No deaths occurred at this concentration.

**Acute inhalation toxicity**

The LC50 has not been determined.

**Skin corrosion/irritation**

Brief contact is essentially nonirritating to skin.

**Serious eye damage/eye irritation**

May cause slight eye irritation.

**Sensitization**

Did not demonstrate the potential for contact allergy in mice.

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)**

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

**Carcinogenicity**

No relevant data found.

**Teratogenicity**

Did not cause birth defects in laboratory animals.

**Reproductive toxicity**

In animal studies, did not interfere with reproduction.

**Mutagenicity**

In vitro genetic toxicity studies were negative.

**Aspiration Hazard**

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

**Solvent dewaxed residual oil (petroleum)**

**Acute oral toxicity**

LD50, Rat, male and female, > 5,000 mg/kg

**Acute dermal toxicity**

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

**Acute inhalation toxicity**

LC50, Rat, male and female, 4 Hour, dust/mist, > 5.53 mg/l No deaths occurred at this concentration.

**Skin corrosion/irritation**

Prolonged contact may cause moderate skin irritation with local redness.

**Serious eye damage/eye irritation**

May cause slight temporary eye irritation.

Corneal injury is unlikely.

**Sensitization**

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

Did not cause allergic skin reactions when tested in humans.

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:

Liver.

**Carcinogenicity**

No relevant information found.

**Teratogenicity**

Did not cause birth defects or other effects in the fetus even at doses which caused toxic effects in 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**

Based on available information, aspiration hazard could not be determined.

**Phosphorodithioic acid, mixed O,O-bis(iso-Bu and pentyl) esters, zinc salts****Acute oral toxicity**

LD50, Rat, male, 3,600 mg/kg

**Acute dermal toxicity**

LD50, Rabbit, male and female, > 20,000 mg/kg

**Acute inhalation toxicity**

The LC50 has not been determined.

**Skin corrosion/irritation**

Brief contact may cause slight skin irritation with local redness.

**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:

Based on data from similar materials

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)**

Observations in animals include:  
Gastrointestinal irritation.

**Carcinogenicity**

No relevant data found.

**Teratogenicity**

No relevant data found.

**Reproductive toxicity**

No relevant data found.

**Mutagenicity**

For similar material(s): 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.

**Graphite****Acute oral toxicity**

LD50, Rat, > 2,000 mg/kg OECD Test Guideline 401 No deaths occurred at this concentration.

**Acute dermal toxicity**

The dermal LD50 has not been determined.

**Acute inhalation toxicity**

LC50, Rat, 4 Hour, dust/mist, > 2 mg/l OECD Test Guideline 403 No deaths occurred at this concentration.

**Skin corrosion/irritation**

Essentially nonirritating to skin.

**Serious eye damage/eye irritation**

May cause slight temporary eye irritation.  
May cause slight temporary corneal injury.

**Sensitization**

Did not demonstrate the potential for contact allergy in mice.

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)**

Excessive exposure may cause irritation to upper respiratory tract (nose and throat) and lungs.

**Carcinogenicity**

No relevant data found.

**Teratogenicity**

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

**Reproductive toxicity**

In animal studies, did not interfere with reproduction.

**Mutagenicity**

In vitro genetic toxicity studies were negative.

**Aspiration Hazard**

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

**Molybdenum disulfide**

**Acute oral toxicity**

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

**Acute dermal toxicity**

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

**Acute inhalation toxicity**

LC50, Rat, 4 Hour, dust/mist, > 2.82 mg/l No deaths occurred at this concentration.

**Skin corrosion/irritation**

Brief contact is essentially nonirritating to skin.

Prolonged contact may cause slight skin irritation with local redness.

**Serious eye damage/eye irritation**

May cause slight temporary eye irritation.

Corneal injury is unlikely.

**Sensitization**

For skin 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)**

No relevant data found.

**Carcinogenicity**

No relevant data found.

**Teratogenicity**

No relevant data found.

**Reproductive toxicity**

No relevant data found.

**Mutagenicity**

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

**Aspiration Hazard**

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

---

**12. ECOLOGICAL INFORMATION**

---

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

**Toxicity****Distillates (petroleum), hydrotreated heavy naphthenic****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, Oncorhynchus mykiss (rainbow trout), static test, 96 Hour, > 1,000 mg/l, OECD Test Guideline 203 or Equivalent  
LC50, Oncorhynchus mykiss (rainbow trout), 96 Hour, > 5,000 mg/l, OECD Test Guideline 203 or Equivalent

**Acute toxicity to aquatic invertebrates**

EC50, Daphnia magna (Water flea), static test, 48 Hour, > 1,000 mg/l, OECD Test Guideline 202 or Equivalent  
EC50, scud Gammarus sp., 96 Hour, > 10,000 mg/l, Method Not Specified.

**Acute toxicity to algae/aquatic plants**

EcC50, alga Scenedesmus sp., static test, 96 Hour, Biomass, > 1,000 mg/l, OECD Test Guideline 201 or Equivalent

**Chronic toxicity to fish**

NOEC, Pimephales promelas (fathead minnow), 7 d, growth, > 5,000 mg/l

**Chronic toxicity to aquatic invertebrates**

NOEC, Daphnia magna (Water flea), 21 d, number of offspring, > 1,000 mg/l

**Solvent dewaxed heavy paraffinic distillates****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).  
LL50, Pimephales promelas (fathead minnow), static test, 96 Hour, > 100 mg/l

**Acute toxicity to aquatic invertebrates**

EL50, Daphnia magna (Water flea), static test, 48 Hour, > 10,000 mg/l

**Acute toxicity to algae/aquatic plants**

NOEC, Pseudokirchneriella subcapitata (green algae), static test, 72 Hour, Growth rate, > 100 mg/l

**Toxicity to bacteria**

Based on data from similar materials  
NOEC, 10 min, > 1.93 mg/l, DIN 38 412 Part 8

**Chronic toxicity to aquatic invertebrates**

Based on data from similar materials

NOEC, *Daphnia magna* (Water flea), 21 d, 10 mg/l

**Lithium 12-hydroxyoctadecanoate****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, *Oncorhynchus mykiss* (rainbow trout), semi-static test, 96 Hour, > 100 mg/l, OECD Test Guideline 203

**Acute toxicity to aquatic invertebrates**

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

**Acute toxicity to algae/aquatic plants**

EC50, *Pseudokirchneriella subcapitata* (green algae), static test, 72 Hour, Growth rate, > 160 mg/l, OECD Test Guideline 201

**Solvent dewaxed residual oil (petroleum)****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).

LL50, *Pimephales promelas* (fathead minnow), Static, 96 Hour, > 100 mg/l, OECD Test Guideline 203 or Equivalent

**Acute toxicity to aquatic invertebrates**

LL50, scud *Gammarus* sp., semi-static test, 48 Hour, > 10,000 mg/l, OECD Test Guideline 202 or Equivalent

EL50, water flea *Daphnia magna*, Static, 48 Hour, > 10,000 mg/l, OECD Test Guideline 202 or Equivalent

**Acute toxicity to algae/aquatic plants**

NOEC, green alga *Pseudokirchneriella subcapitata* (formerly known as *Selenastrum capricornutum*), Static, 72 Hour, Growth rate inhibition, > 100 mg/l, OECD Test Guideline 201 or Equivalent

**Toxicity to bacteria**

Based on data from similar materials

NOEC, 10 min, > 1.93 mg/l

**Chronic toxicity to aquatic invertebrates**

NOEC, *Daphnia magna*, semi-static test, 21 d, number of offspring, 10 mg/l

**Phosphorodithioic acid, mixed O,O-bis(iso-Bu and pentyl) esters, zinc salts****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).

Based on data from similar materials

LL50, *Cyprinodon variegatus* (sheepshead minnow), semi-static test, 96 Hour, 4.5 mg/l, OECD Test Guideline 203

**Acute toxicity to aquatic invertebrates**



Based on data from similar materials  
EL50, Daphnia magna (Water flea), static test, 48 Hour, 23 mg/l, OECD Test Guideline 202

**Acute toxicity to algae/aquatic plants**

Based on data from similar materials  
EL50, Desmodesmus subspicatus (green algae), 72 Hour, 24 mg/l, OECD Test Guideline 201

**Toxicity to bacteria**

Based on data from similar materials  
EC50, 3 Hour, > 1,000 mg/l, OECD Test Guideline 209

**Chronic toxicity to aquatic invertebrates**

Based on data from similar materials  
NOEC, Daphnia magna (Water flea), 21 d, 0.4 mg/l

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

**Acute toxicity to aquatic invertebrates**

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

**Acute toxicity to algae/aquatic plants**

EC50, Pseudokirchneriella subcapitata (green algae), 72 Hour, > 100 mg/l, OECD Test Guideline 201

**Toxicity to bacteria**

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

**Molybdenum disulfide****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).  
For similar material(s):  
LC50, Fish, 96 Hour, > 100 mg/l

**Acute toxicity to aquatic invertebrates**

Based on data from similar materials  
EC50, Daphnia magna (Water flea), 48 Hour, > 100 mg/l

**Acute toxicity to algae/aquatic plants**

Based on data from similar materials  
ErC50, algae, 72 Hour, Growth rate, > 100 mg/l

**Toxicity to bacteria**

EC50, 30 Hour, Respiration rates., > 100 mg/l

**Chronic toxicity to fish**

Based on data from similar materials  
NOEC, Fish, 34 d, > 10 mg/l

**Chronic toxicity to aquatic invertebrates**

Based on data from similar materials  
NOEC, Daphnia magna, 21 d, > 10 mg/l

**Persistence and degradability****Distillates (petroleum), hydrotreated heavy naphthenic**

**Biodegradability:** Material is expected to biodegrade very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability. Material is inherently biodegradable (reaches > 20% biodegradation in OECD test(s) for inherent biodegradability).

10-day Window: Fail

**Biodegradation:** 6 %

**Exposure time:** 28 d

**Method:** OECD Test Guideline 301B or Equivalent

10-day Window: Fail

**Biodegradation:** 22 - 51 %

**Exposure time:** 21 - 28 d

**Photodegradation**

**Test Type:** Half-life (indirect photolysis)

**Sensitization:** OH radicals

**Solvent dewaxed heavy paraffinic distillates**

**Biodegradability:** Material is expected to biodegrade very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.

10-day Window: Fail

**Biodegradation:** 2 %

**Exposure time:** 28 d

**Method:** OECD Test Guideline 301B

**Lithium 12-hydroxyoctadecanoate**

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

10-day Window: Pass

**Biodegradation:** 78 %

**Exposure time:** 28 d

**Method:** OECD Test Guideline 301C

**Solvent dewaxed residual oil (petroleum)**

**Biodegradability:** Based on information for a similar material: Material is expected to biodegrade very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.

**Phosphorodithioic acid, mixed O,O-bis(iso-Bu and pentyl) esters, zinc salts**

**Biodegradability:** Material is expected to biodegrade very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.

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

**Biodegradation:** 1.5 %

**Exposure time:** 28 d

**Method:** OECD Test Guideline 301B

**Graphite**

**Biodegradability:** Biodegradation is not applicable.

**Molybdenum disulfide**

**Biodegradability:** Biodegradability is not applicable to inorganic substances.

**Bioaccumulative potential**

**Distillates (petroleum), hydrotreated heavy naphthenic**

**Bioaccumulation:** Bioconcentration potential is high (BCF > 3000 or Log Pow between 5 and 7).

**Partition coefficient: n-octanol/water(log Pow):** 3.9 - 6 Estimated.

**Solvent dewaxed heavy paraffinic distillates**

**Bioaccumulation:** Bioconcentration potential is high (BCF > 3000 or Log Pow between 5 and 7).

**Partition coefficient: n-octanol/water(log Pow):** 3.9 - 6 Estimated.

**Lithium 12-hydroxyoctadecanoate**

**Bioaccumulation:** No relevant data found.

**Solvent dewaxed residual oil (petroleum)**

**Bioaccumulation:** No relevant data found.

**Phosphorodithioic acid, mixed O,O-bis(iso-Bu and pentyl) esters, zinc salts**

**Bioaccumulation:** For similar material(s): Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

**Partition coefficient: n-octanol/water(log Pow):** 0.69 OECD Test Guideline 107

**Graphite**

**Bioaccumulation:** No relevant data found.

**Molybdenum disulfide**

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

**Mobility in soil**

**Distillates (petroleum), hydrotreated heavy naphthenic**

No data available.

**Solvent dewaxed heavy paraffinic distillates**

No relevant data found.

**Lithium 12-hydroxyoctadecanoate**

No relevant data found.

**Solvent dewaxed residual oil (petroleum)**

No relevant data found.

**Phosphorodithioic acid, mixed O,O-bis(iso-Bu and pentyl) esters, zinc salts**

No specific, relevant data available for assessment.

**Graphite**

No relevant data found.

**Molybdenum disulfide**

No relevant data found.

---

### 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**

Not regulated for transport

**Classification for SEA transport (IMO-IMDG):**

**Transport in bulk  
according to Annex I or II  
of MARPOL 73/78 and the  
IBC or IGC Code**

Not regulated for transport  
Consult IMO regulations before transporting ocean bulk

**Classification for AIR transport (IATA/ICAO):**

Not regulated for transport

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

Serious eye damage or eye irritation

### 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

|   |                            |
|---|----------------------------|
| Phosphorodithioic acid, mixed O,O-bis(iso-Bu and pentyl) esters, zinc salts | <b>CASRN</b><br>68457-79-4 |
| Zinc sulfide  | 1314-98-3                  |
| Zinc oxide  | 1314-13-2                  |

### 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      | 1            | 0           |

#### HMIS

| Health | Flammability | Physical Hazard |
|--------|--------------|-----------------|
| 3/     | 1            | 0               |

### Revision

Identification Number: 4112547 / A776 / Issue Date: 05/23/2022 / Version: 10.0

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)   |
| CAL PEL   | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
| 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-3  | USA. Occupational Exposure Limits (OSHA) - Table Z-3 Mineral Dusts                      |
| PEL       | Permissible exposure limit  |
| ST        | STEL - 15-minute TWA exposure that should not be exceeded at any time during a workday  |
| 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; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

**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.

US

