

# Material Safety Data Sheet



## MoS2 Antifricition for Gears

### 1. Product and company identification

<b>Product name</b>	: MoS2 Antifricition for Gears
<b>Material uses</b>	: Additive .
<b>Code</b>	: 2019
<b>Supplier/Manufacturer</b>	: LIQUI MOLY GmbH Jerg-Wieland-Strasse 4 D-89081 Ulm-Lehr, Germany Tel.: +49(0)731 / 1420-0 Fax: +49(0)731 / 1420-88
<b>Validation date</b>	: 4/19/2011.
<b>Prepared by</b>	: Chemical Check GmbH
<b>In case of emergency</b>	: +49(0)731 / 1420-0

### 2. Hazards identification

<b>Physical state</b>	: Liquid.
<b>Color</b>	: Black.
<b>Odor</b>	: Characteristic.
<b>Emergency overview</b>	
<b>Hazard statements</b>	: INHALATION CAUSES HEADACHES, DIZZINESS, DROWSINESS AND NAUSEA AND MAY LEAD TO UNCONSCIOUSNESS. MAY CAUSE RESPIRATORY TRACT, EYE AND SKIN IRRITATION. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
<b>Precautions</b>	: Do not breathe vapor or mist. Avoid contact with eyes. Avoid prolonged or repeated contact with skin. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.
<b>Routes of entry</b>	: Dermal contact. Eye contact. Inhalation. Ingestion.
<b>Potential acute health effects</b>	
<b>Inhalation</b>	: Can cause central nervous system (CNS) depression. Slightly irritating to the respiratory system. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
<b>Ingestion</b>	: Can cause central nervous system (CNS) depression.
<b>Skin</b>	: Slightly irritating to the skin.
<b>Eyes</b>	: Slightly irritating to the eyes.
<b>Potential chronic health effects</b>	
<b>Chronic effects</b>	: Contains material that may cause target organ damage, based on animal data.
<b>Carcinogenicity</b>	: No known significant effects or critical hazards.
<b>Mutagenicity</b>	: No known significant effects or critical hazards.
<b>Teratogenicity</b>	: No known significant effects or critical hazards.
<b>Developmental effects</b>	: No known significant effects or critical hazards.
<b>Fertility effects</b>	: No known significant effects or critical hazards.
<b>Target organs</b>	: Contains material which may cause damage to the following organs: upper respiratory tract, skin, eyes.
<b>Over-exposure signs/symptoms</b>	
<b>Inhalation</b>	:

## 2. Hazards identification

Adverse symptoms may include the following:

nausea or vomiting  
respiratory tract irritation  
coughing  
headache  
drowsiness/fatigue  
dizziness/vertigo  
unconsciousness

- Ingestion** : No specific data.
- Skin** : Adverse symptoms may include the following:  
irritation  
redness
- Eyes** : Adverse symptoms may include the following:  
irritation  
watering  
redness
- Medical conditions aggravated by over-exposure** : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

## 3. Composition/information on ingredients

Name	CAS number	%
Paraffin oils	8012-95-1	60-100
molybdenum disulphide	1317-33-5	10-30
Amines, C12-14-alkyl, reaction products with hexanol, phosphorus oxide (P2O5), phosphorus sulfide (P2S5) and propylene oxide	91745-46-9	1-5
bis[O,O-bis(2-ethylhexyl) dithiophosphorato-S,S']dioxodi- $\mu$ -thioxodimolybdenum	68958-92-9	1-5

**There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.**

## 4. First aid measures

- Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Inhalation** : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

### Antidote information

## 4. First aid measures

Product/ingredient name	Antidote information
No antidote information known	

**Notes to physician** : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

## 5. Fire-fighting measures

**Flammability of the product** : In a fire or if heated, a pressure increase will occur and the container may burst.

### Extinguishing media

**Suitable** : Use dry chemical, CO<sub>2</sub> or foam. Cool closed containers exposed to fire with water.

**Not suitable** : Do not use water jet.

**Special exposure hazards** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

**Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide  
nitrogen oxides  
sulfur oxides  
phosphorus oxides  
metal oxide/oxides  
Aldehydes  
Toxic pyrolysis products

**Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## 6. Accidental release measures

**Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

**Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

### Methods for cleaning up

**Small spill** : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

**Large spill** : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

## 7. Handling and storage

- Handling** : Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not breathe vapor or mist. Do not ingest. Avoid contact with eyes, skin and clothing. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Storage** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## 8. Exposure controls/personal protection

<u>Occupational exposure limits</u>		TWA (8 hours)			STEL (15 mins)			Ceiling			
<u>Ingredient</u>	<u>List name</u>	ppm	mg/m <sup>3</sup>	Other	ppm	mg/m <sup>3</sup>	Other	ppm	mg/m <sup>3</sup>	Other	<u>Notations</u>
Paraffin oils	US ACGIH 2/2010	-	5	-	-	-	-	-	-	-	[a]
	AB 4/2009	-	5	-	-	10	-	-	-	-	[b]
	ON 7/2010	-	5	-	-	10	-	-	-	-	[c]
	QC 6/2008	-	5	-	-	10	-	-	-	-	[c]
molybdenum disulphide, as Mo	US ACGIH 2/2010	-	10	-	-	-	-	-	-	-	[a]
	-	-	3	-	-	-	-	-	-	-	[d]
	AB 4/2009	-	3	-	-	-	-	-	-	-	[e]
molybdenum disulphide	-	-	10	-	-	-	-	-	-	-	[f]
	BC 9/2010	-	10	-	-	-	-	-	-	-	[f]
molybdenum disulphide, as Mo	-	-	3	-	-	-	-	-	-	-	[e]
	ON 7/2010	-	10	-	-	-	-	-	-	-	[a]
	-	-	3	-	-	-	-	-	-	-	[d]
bis[O,O-bis(2-ethylhexyl) dithiophosphorato-S,S']dioxodi-μ-thioxodimolybdenum, Respirable fraction as Mo	QC 6/2008	-	10	-	-	-	-	-	-	-	[a]
	US ACGIH	-	3	-	-	-	-	-	-	-	[d]

**Form:** [a]Inhalable fraction. See Appendix C, paragraph A. Inhalable Particulate Mass TLVs (IPM–TLVs) for those materials that are hazardous when deposited anywhere in the respiratory tract. [b]Mist [c]mist [d]Respirable fraction; see Appendix C [e]Respirable [f]Inhalable

### Consult local authorities for acceptable exposure limits.

- Recommended monitoring procedures** : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.
- Engineering measures** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

### Personal protection

## 8. Exposure controls/personal protection

- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: Use appropriate respiratory protection if there is a risk of exceeding any exposure limits. (Filter A2 P2. )
- Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.  
Recommended: Oil resistant gloves. If applicable : Nitrile gloves. Neoprene gloves. Protective hand cream.
- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. Recommended: Tight fitting protective goggles with side shields.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.  
Recommended: Long-sleeved protective clothing. Safety shoes.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

## 9. Physical and chemical properties

- Physical state** : Liquid.
- Flash point** : >200°C (392°F)
- Auto-ignition temperature** : Not available.
- Flammable limits** : Not available.
- Color** : Black.
- Odor** : Characteristic.
- pH** : Not available.
- Boiling/condensation point** : Not available.
- Melting/freezing point** : Not available.
- Density** : 1 g/cm<sup>3</sup> [20°C (68°F)]
- Vapor pressure** : Not available.
- Vapor density** : Not available.
- Odor threshold** : Not available.
- Evaporation rate** : Not available.
- Viscosity** : Dynamic: ~380 mPa·s (380 cP)
- Solubility** : Insoluble in the following materials: cold water.
- LogK<sub>ow</sub>** : Not available.

## 10. Stability and reactivity

- Chemical stability** : The product is stable.
- Conditions to avoid** : No specific data.
- Incompatible materials** : Strong oxidizing materials .
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

## 10. Stability and reactivity

**Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.

Under normal conditions of storage and use, hazardous polymerization will not occur.

## 11. Toxicological information

### Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Molybdenum sulfide (MoS2)	LC50 Inhalation Vapor	Rat	>2820 mg/m3	4 hours
Mineral oil	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-

### Chronic toxicity

Not available.

### Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Paraffin oils	Eyes - Mild irritant	Rabbit	-	-	-
	Skin - Mild irritant	Guinea pig	-	-	-
	Skin - Mild irritant	Rabbit	-	-	-

### Sensitizer

Not available.

### Conclusion/Summary

**Skin** : May cause an allergic skin reaction.

### Carcinogenicity

#### Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Paraffin oils	A4	-	-	-	-	-

### Mutagenicity

Not available.

### Teratogenicity

Not available.

### Reproductive toxicity

Not available.

## 12. Ecological information

**Ecotoxicity** : This material is harmful to aquatic life with long lasting effects.

### Aquatic ecotoxicity

Product/ingredient name	Result	Species	Exposure
Paraffin oils	Acute EC50 >100 mg/l	Daphnia	48 hours
	Acute IC50 >100 mg/l	Algae	96 hours
	Acute LC50 >100 ppm Fresh water	Fish - Oncorhynchus mykiss	96 hours

**Conclusion/Summary** : Product can form a film on the water surface, which can prevent oxygen exchange.

### Persistence/degradability

## 12. Ecological information

Not available.

- Partition coefficient: n-octanol/water** : Not available.
- Bioconcentration factor** : Not available.
- Mobility** : Not available.
- Toxicity of the products of biodegradation** : Not available.
- Other adverse effects** : No known significant effects or critical hazards.

## 13. Disposal considerations

- Waste disposal** : The generation of waste should be avoided or minimized wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

## 14. Transport information

- TDG/IMDG/IATA** : Not regulated.

## 15. Regulatory information

- United States inventory (TSCA 8b)** : Not determined.
- WHMIS (Canada)** : Not controlled under WHMIS (Canada).
- Canadian lists**
- Canadian NPRI** : None of the components are listed.
- CEPA Toxic substances** : None of the components are listed.
- Canada inventory** : Not determined.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

### International regulations

- International lists** :
- Australia inventory (AICS)**: Not determined.
  - China inventory (IECSC)**: Not determined.
  - Japan inventory**: Not determined.
  - Korea inventory**: Not determined.
  - New Zealand Inventory of Chemicals (NZIoC)**: Not determined.
  - Philippines inventory (PICCS)**: Not determined.

## 15. Regulatory information

- Chemical Weapons Convention List Schedule I Chemicals** : Not listed
- Chemical Weapons Convention List Schedule II Chemicals** : Not listed
- Chemical Weapons Convention List Schedule III Chemicals** : Not listed

## 16. Other information

**Label requirements** : INHALATION CAUSES HEADACHES, DIZZINESS, DROWSINESS AND NAUSEA AND MAY LEAD TO UNCONSCIOUSNESS. MAY CAUSE RESPIRATORY TRACT, EYE AND SKIN IRRITATION. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

**Hazardous Material Information System (U.S.A.)** :

Health	*	1
Flammability		1
Physical hazards		0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

**References** : - Adopted National Exposure Standards For Atmospheric Contaminants In The Occupational Environment [NOHSC: 1003 (1995)]. - American Conference of Governmental Industrial Hygienists (ACGIH), Documentation of the Threshold Limit Values and Biological Exposure Indices, ACGIH, Cincinnati, Ohio, 2009.  
 - National Occupational Health and Safety Commission, 'Oil Mist, Refined Mineral' Documentation of the Exposure Standards [NOHSC:10003 (1995)]. - NOHSC 3008 (1995): National Occupational Health and Safety Commission, 'Guidance Note on the Interpretation of Exposure Standards for Atmospheric Contaminants in the Occupational Environment'.

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☑ Indicates information that has changed from previously issued version.

### Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.