



K05

1.

### POLYSI® G-Man® Lubricants Issued 01/16/14 Revision 1 1/15/15 **PRODUCT AND COMPANY IDENTIFICATION**

Product Name:	K05	
Recommended Use:	Lubricant (not for incidental food contact or medical purposes)	
Company:	Fuchs Lubricants Co.	
	17050 Lathrop Avenue	
	Harvey, IL 60426, USA	
Telephone:	1-708-333-8900 (Business hours)	
Emergency Telephone: 1-800-255-3924 (24 hours)		

#### HAZARDS IDENTIFICATION

**Classification:** Category 5, Acute Toxicity – No Symbol Category 3, Acute Aquatic Toxicity



Labeling:

Signal Word: Warning

Hazard statements: May be harmful if swallowed May cause eye irritation May cause skin irritation Non flammable or combustible, but may burn if involved in a fire

#### **Precautionary Statements:**

Use personal protective equipment as required. Wear safety glasses and gloves.

#### 3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Identity:	Molybdenum Disulfide, 2-4%
Common Name:	Molysulfide
CAS Number:	1317-33-5
Impurities:	Less than 0.1%, not classifiable
Chemical Identity:	Phosophorodithioic acid, O,O-di-C <sub>1</sub> -C <sub>14</sub> -alkyl esters, zinc salts, <2%
Common Name:	Zinc dialkyldithiophosphate (ZDDP)
CAS Number:	68649-42-3
Impurities:	No information provided by manufacturer
Chemical Identity:	Petroleum distillates, hydrotreated heavy paraffinic, <0.3%
Common Name:	Hydrotreated paraffinic mineral oil
CAS Number:	64742-54-7
Impurities:	No information provided by manufacturer

#### 4. FIRST AID MEASURES

**Eye Contact:** Flush eyes with large amounts of water. If signs/symptoms persist, get medical attention. Obtain medical attention. Skin Contact: Wash affected area with soap and water. If signs/symptoms persist, get medical

attention. No need for first aid is anticipated.





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Inhalation:	If signs/symptoms develop, remove person to fresh air. persist, get medical attention.	If signs/symptoms
Ingestion:	If swallowed, do not induce vomiting. If irritation or disc medical assistance.	omfort occurs, obtain

#### 5. FIRE FIGHTING MEASURES

Autoignition Temperature:	>200°C	
Flash point:	>200°C	
Flammable Limits (LEL)	Not determined	
Flammable Limits(UEL)	Not determined	
Suitable Extinguishing Media: On large fires used dry chemical, foam, or water spray. On sma		
	fires use carbon dioxide, dry chemical, or water spray. Water	
	can be used to cool fire exposed containers.	
<b>Unsuitable Extinguishing Med</b>	lia: None.	
Specific hazards in case of fire: Decomposes on heating and produces toxic fumes of sulfur		
0>	(ides, molybdenum trioxide, and incompletely burned carbon	
CC	mpounds. Molybdenum disulfide will react violently with	
hy	/drogen peroxide. Avoid reaction with hydrogen peroxide,	
pc	otassium nitrate, and oxidizers.	

#### Special protective equipment and precautions for fire fighters:

No acute hazard. Move container from fire area, if possible. Avoid breathing vapors or dusts. Keep upwind. Use full firefighting gear (bunker gear). Any supplied-air respirator with full face piece and operated in a pressure-demand or other positive pressure mode in combination with a separate escape air supply. Use any self contained breathing apparatus with a full face piece.

Alert fire brigade and indicate hazard location. Wear breathing apparatus plus protective clothing. Cool fire exposed containers with water spray from a protected location. Do not approach containers suspected to be hot. If safe to do so, remove containers from path of fire.

#### 6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Use appropriate personal protection. (See section 8.)

**Environmental precautions:** For larger spills, cover drains and build dikes to prevents entry into sewer systems or bodies of water. Collect the resulting residue containing solution. Place in a metal container approved for transportation by appropriate authorities. Dispose of collected material as soon as possible.

**Methods for material containment and cleaning up:** Observe precautions from other sections. Contain spill. Working from around the edges of the spill inward, cover with bentonite, vermiculite, or commercially available inorganic absorbent material. Mix in sufficient absorbent until it appears dry. Collect as much of the spilled material as possible. Clean up residue with an appropriate solvent. Seal the container.

#### 7. HANDLING AND STORAGE

Precautions for safe handling: Avoid contact with skin, inhalation of mist, or ingestion. See section 8 for personal protection equipment. Practice good personal hygiene to prevent accidental ingestion after handling. Properly dispose of clothing that cannot be decontaminated.

Conditions for safe storage, including any incompatibilities: Store away from oxidizing materials. Store product in a closed container located in a dry area. Do not store





POLYSI® G-Man® Lubricants K05 Issued 01/16/14 Revision 1 1/15/15 ntainers are clearly

in open, inadequate, or mislabeled packaging. Check that containers are clearly labeled. Use metal cans, metal drums, plastic, or lined fiber containers. Keep away from heat and flame.

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Control Parameters:** Under most handling conditions, this product will not generate mist or dust. US OSHA PEL control parameter for insoluble molybdenum compounds is an 8 hour TWA of 15.0 mg/m<sup>3</sup>. This is only one of many country controls that are in use worldwide for insoluble molybdenum compounds but not the most restrictive. The most restrictive known is 0.5 mg Mo/m<sup>3</sup> respirable (Belgium). It is recommended that you consider as a control measure the OEL used in your locality.

**Engineering Controls:** In most conditions, no special local ventilation is needed. General ventilation recommended. If the product is atomized ventilation should be used.

#### Personal Protective Equipment (PPE):

Eyes: Skin:	Safety glasses recommended. Impermeable gloves should be worn. elastomers.	Product is compatible with most

**Inhalation:** No respiratory protection required under most conditions. If concentrations exceed exposure limits, approved respiratory equipment must be used.

#### 9. CHEMICAL AND PHYSICAL PROPERTIES

Physical state:	Solid. Liquid may separate from product.
Color:	Gray-Black
Odor:	Mild solvent-like
Odor Threshold:	Not available
pH Value:	Not applicable
Melting Point:	1185°C (Molybdenum disulfide)
Freezing Point:	Becomes very stiff with decreasing temperature around -50°C
Initial Boiling Point:	>200°C
Flash Point:	>200°C COC (Base oil)
Evaporation rate:	Not available
Flammability (solid, gas):	Not available
Explosion limits:	Not available
Vapor pressure:	Not available
Vapor density:	Not available
Solubility:	Insoluble in water at 20°C
Partition coefficient:	Not available
Partition coefficient:	Not available
Auto-ignition temperature:	Not available
Decomposition temperature:	Begins to decompose at 150°C, MoS <sub>2</sub> begins oxidation >315°C

#### 10. STABILITY AND REACTIVITY

Chemical stability:Stable under ambient temperatures and pressuresPossibility of hazardous reactions:Molybdates react violently or explosively when reduced to<br/>molybdenum by heating with zirconium.Otherwise will not react or polymerize.

**Conditions to avoid:** No specific conditions to avoid have been identified.





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**Materials to avoid:** Oxidizers, hydrogen peroxide, and potassium nitrate. **Hazardous decomposition products:** Decomposes on heating and produces toxic fumes of sulfur oxides, molybdenum trioxide, and incompletely burned carbon compounds.

### 11. TOXICOLOGICAL INFORMATION

**Information on toxicological effects:** The information provided in this section is consistent with type of information provided in the other molybdenum compound REACH Chemical Safety Reports. For contact details, please refer to Section 16 of this data sheet.

#### Toxicity endpoints and description of effects

#### Toxicokinetics: Absorption, Distribution, Metabolism and Excretion

Molybdenum is an essential element. Up taken  $MoS_2$  is relatively inert, any dissolved  $MoS_2$  exists predominantly in the form of the molybdate ion ( $MoO_4^{2-}$ ).

**Oral absorption**: Slow absorption through GI tract.

**Inhalation absorption:** Absorption in humans dependent on particle size, deposition/clearance. **Dermal absorption:** Low to negligible.

**Metabolism:** No metabolism. Up taken  $MoS_2$  is relatively inert, any dissolved  $MoS_2$  exists predominantly in the form of the molybdate ion ( $MoO_4$ <sup>2-</sup>).

**Excretion:** Rapidly eliminated from plasma predominantly via renal excretion (>80%), and feces (<10%).

(a) acute toxicity No specific data available. Insoluble molybdenum compounds are characterized by low toxicity.  $LD_{50}$  (rat) > 5000 mg/kg.

(b) skin corrosion/irritation Not irritating / not corrosive to the skin. LD<sub>50</sub> (rat) > 16000 mg/kg (c) serious eye damage/irritation Not irritant / not corrosive to the eyes.

(d) respiratory or skin sensitization MoS<sub>2</sub> is not sensitizing to the skin.

(e) germ-cell mutagenicity Not a germ cell mutagen.

(f) carcinogenicity Not a carcinogen.

(g) reproductive toxicity There are currently no reliable scientific data available indicating adverse effects on reproduction or fertility.

(h) **STOT-single exposure** There are no specific target organ effects after single exposure to molybdenum substances.

(i) **STOT-repeated exposure** No reliable scientific data available indicating adverse systemic effects after repeated exposure to molybdenum substances.

(j) aspiration hazard Not applicable (not an aerosol/mist).

#### 12. ECOLOGICAL INFORMATION

#### Toxicity:

Phosophorodithioic acid, O,O-di-C<sub>1</sub>-C<sub>14</sub>-alkyl esters, zinc salts:

Freshwater fish: Pimephales promelas 96h-LC50 1.5-5.0 mg/L (static)

Freshwater fish: Pimephales promelas 96h-LC50 10-35.0 mg/L (semi-static)

Invertebrates: Daphnia magna 48h-LC50 10-1.5 mg/L

Petroleum distillates, hydrotreated heavy paraffinic:

Freshwater fish: Oncorhynchus mykiss 96h-LC50 >5000 mg/L

Invertebrates: Daphnia magna 48h-LC50 >1000 mg/L

Molybdenum disulfide:

Reliable acute aquatic toxicity test results: (read-across from tests with sodium molybdate) Test Organisms: End-point Range of values References

Freshwater fish: Pimephales promelas 96h-LC50 609 - 681.4 mg Mo/L

Freshwater fish: Oncorhynchus mykiss 96h-LC50 7600 mg Mo/L

Freshwater fish: Oncorhynchus mykiss 96h-LC<sub>50</sub> 781 – 1339 mg Mo/L (recalculated – logistic fit) Invertebrates: Daphnia magna 48h-LC<sub>50</sub> 1680.4 – 1776.6 mg Mo/L





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Invertebrates: Daphnia magna 48h-LC<sub>50</sub> 2729.4 mg Mo/L Invertebrates: Daphnia magna 48h-LC<sub>50</sub> 2847.5 mg Mo/L Invertebrates: Daphnia magna 48h-LC<sub>50</sub> 130.9 mg Mo/L Invertebrates: Ceriodaphnia dubia 48h-LC<sub>50</sub> 1005.5 – 1024.6 mg Mo/L Invertebrate (aq. worm): Girardia dorotocephala 96h-LC<sub>50</sub> 1226 mg Mo/L Algae: Pseudokirchneriella subcapitata 72h-ErC<sub>50</sub> (growth rate) 295.0 – 390.9 mg Mo/L 289.2 – 369.6 mg Mo/L Geom. mean: 333.1 mg Mo/L Tests were conducted according to international test guidelines (e.g., OECD) or scientifically acceptable methods.

Reliable chronic toxicity test results: (read-across from tests with sodium molybdate): Test organisms Range of values (EC10 or NOEC)

#### Aquatic freshwater toxicity data:

Oncorhynchus mykiss, Pimephales promelas, Pseudokirchneriella subcapitata, Ceriodaphnia dubia, Daphnia magna, Chironomus riparius, Brachionus calyciflorus, Lymnaea stagnalis, Xenopus laevis, Lemna minor 43.3–241.5 mg Mo/L

Most sensitive species were the fish *O. mykiss* (43.3 mg Mo/L) and *P. promelas* (60.2 mg Mo/L). Symptoms of toxicity were effects on biomass growth, reproduction, (population) growth rate and malformation during development.

#### Aquatic marine toxicity data:

Mytilus edulis, Acartia tonsa, Phaeodactylus tricornutum, Cyprinodon variegatus, Americamysis bahia, Crassostrea gigas, Dendraster excentricus, Dunaliella tertiolecta, Ceramium tenuicorne, Strongylocentrotus purpuratus, 4.4–1,174 mg Mo/L

Most sensitive species were the mussel *M. edulis* (4.4 mg Mo/L) and the copepod *A. tonsa* (7.96 mg Mo/L). Symptoms of toxicity include effects on biomass growth, growth rate, reproduction and malformation during development

#### Chronic sediment toxicity:

No reliable acute/chronic sediment data for molybdenum available. PNEC derivation was based on the equilibrium partitioning method, taking into account the PNEC<sub>freshwater</sub> and the sediment K<sub>d</sub> given in section 12.

Chronic terrestrial toxicity test results (values were determined in different top soils with contrasting properties and spiked with sodium molybdate):

Annelid worms: *Enchytraeus crypticus, Eisenia Andrei* 7.88 -1661 mg Mo/kg dw (n=11) Arthropod: *Folsomia candida* 37.9 – >3,395 mg Mo/kg dw

Plants: Hordeum vulgare, Brassica napus, Trifolium pratense, Lolium perenne, Lycopersicon esculentum 4 – 3,476 mg Mo/kg dw

Soil micro-organisms (nitrification, glucose-induced respiration, plant residue mineralisation) 10 – 3,840 mg Mo/kg dw

Plants are most sensitive, with reduced shoot yield being the most first symptoms of toxicity, followed by reduced reproduction of invertebrates. Toxicity of sodium molybdate dihydrate in soils is dependent on the soil type. Sandy soils (e.g., 5% clay) with a low organic carbon content (e.g., 1%), a low iron oxide content (e.g., 0.5 g/kg) and high pH (e.g., 7) are most sensitive, while clay soils (e.g., 30% clay) with a high organic carbon content (e.g., 12%), high iron oxide content (e.g., 10 g/kg) and low pH (e.g., 4.5) are least sensitive.

Tests were conducted according to international test guidelines (e.g., OECD, ASTM, ISO, EPA).

**Toxicity data for micro-organisms (for STP)** (values were determined using molybdenum trioxide unless indicated otherwise; UV-spectra of aqueous solutions of molybdenum trioxide demonstrated that the only dissolved molybdenum species, originating directly from molybdenum trioxide is also the molybdate anion):

#### Test Organisms, end-point, range of values

Domestic activated sludge population 3h-EC50 (respiration inhibition) 1,926 mg Mo/L





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Domestic activated sludge population 3h-EC<sub>50</sub> (respiration inhibition) 216.5 mg Mo/L Domestic activated sludge population 30 min-NOEC (O<sub>2</sub> utilization) > 950 mg Mo/L (1) (1): test conducted with sodium molybdate

Tests were conducted according to international accepted test guidelines or scientifically acceptable methods.

Conclusion on the environmental classification and labelling: MoS<sub>2</sub> is not hazardous to the aquatic environment as:

• The lowest acute reference values for fish, invertebrates and algae are > 100 mg Mo/L

• The lowest aquatic NOEC for these three trophic levels is > 1 mg Mo/L (i.e., 43.2 mg Mo/L for the rainbow trout)

• There is no evidence for bioaccumulation or bio-magnification in the environment

**Persistence and degradability:** Any dissolved  $MoS_2^{2}$  - when released into the environment - will be present as the molybdate species under normal environmental conditions.

**Bioaccumulative potential:** Available BCF/BAF data for the aquatic environment show a distinct inverse relationship with the exposure concentration. This finding demonstrates that molybdenum is homeostatically controlled by these organisms, and this is so up to the milligram range of exposure. Available information on transfer of molybdenum through the food chain indicates that molybdenum does not bio-magnify in aquatic food chains. Although not homeostatically controlled in terrestrial plants and invertebrates, molybdenum is not largely concentrated from soil into plants or soil to invertebrates. There is no significant concentration increase from diet to mammals or birds. It is concluded that bio-magnification is not significant in the terrestrial food-chain.

**Mobility in soil:** Molybdate originating from MoS<sub>2</sub> is soluble in water and with its relatively low K<sub>d</sub> value, the molybdate ions are leachable through normal soil and are mobile in sediment. Typical log K<sub>d</sub>-values of 3.25 and 2.94 have been determined for sediment and soil, respectively. **Results of PBT and vPvB assessment:** The PBT and vPvB criteria of Annex XIII to the REACH Regulation do not apply to inorganic substances, such as MoS<sub>2</sub>. Therefore a PBT and vPvB assessment is not required.

**Other adverse effects:** Molybdate originating from MoS<sub>2</sub> can contribute to the onset of molybdenosis (which is a molybdenum-induced copper deficiency) in ruminants such as cattle, deer, and sheep. The level and bio-availability of copper in the animal diet are critical factors in the onset of molybdenosis. The recommended minimum dietary Cu:Mo mass ratio threshold to prevent molybdenosis is 1.30, i.e. there should be 30% more copper than molybdenum in the diet (note: mass ratio, not molar ratio). Cu & Mo content in the diet can be monitored, and if the ratio is < 1.3 then provide Cu supplements such as copper sulphate enriched feeds or copper sulphate enriched salt blocks for ruminants to use ad libitum. If there are ruminants in the vicinity of the plant, identify direct and diffuse air emission sources at the plant and carry out and record emission minimisation measures. Have an animal health check programme in place (e.g. blood tests for copper) to verify that the measures are effective.  $MoS_2$  is not expected to contribute to ozone depletion, ozone formation, global warming or acidification.  $MoS_2$  is considered to be environmentally neutral.

Additional adverse effects: Conversely, a lack of molybdenum in the diet of the human population may increase gastrointestinal and esophageal cancer.

**Acute Aquatic Toxicity:** Tests conducted in 1990 at levels up to 750 mg/l of powdered (96 hour) MoS<sub>2</sub> resulted in zero mortality to rainbow trout (*Salmo Gairdneri*).

Other: Persistence, degradability, bioaccumulation, and mobility are unknown.

#### 13. DISPOSAL PROCEDURES





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**Waste treatment methods:** Waste (substance and container material) shall be recycled/recovered or disposed of as applicable and in accordance with community (EU) and local legislation. Recycle wherever possible. Consult state land waste management authority for disposal. Bury at an approved site. Recycle containers if possible, or dispose of in an authorized landfill.

According to the European Waste Catalogue, Waste Codes are not product specific but application specific. Waste Codes should be assigned by the user based on the application in which the product is used.

**For USA Disposal:** Waste must be disposed of in accordance with federal, state, and local environmental control regulations.

#### 14. TRANSPORT INFORMATION

Class or Type: US DOT, IMO, ADR, RID, ADN, IMDG, and IATA: Non-hazardous

#### 15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the mixture:

**Worldwide Chemical Inventories and lists**: MoS<sub>2</sub> is not a SEVESO substance, not an ozonedepleting substance and not a persistent organic pollutant.

**Other regulatory information:** Germany (base on read across) Water Hazard class, WGK = 1 (low hazard to water)

**Chemical safety assessment:** MoS<sub>2</sub> is REACH exempt as per Annex V and registration is not required.

#### Other Information:

U. S. Regulatory information	
TSCA Inventory Status:	Y
TSCA 12 (b) Export Notification:	Not listed
CERCLA Section 103 (40 CFR 302.4):	N
SARA Section 302 (40 CFR 355.30):	N
SARA Section 304 (40 CFR 355.40):	N
SARA Section 313 (40 CFR 372.65):	N
OSHA Process Safety (29 CFR 1910.119):	N
SARA Hazard Categories, SARA Sections 3	311/312 (40 CFR 370.21)
Acute Hazard:	N
Chronic Hazard:	N
Fire Hazard:	N
Reactivity Hazard:	N
Sudden Release Hazard:	N

**State Regulations:** Not on California Proposition 65 list. Does not contain any contaminants or by-products known to the State of California to cause cancer or reproductive toxicity. **Note** – There are no known safety, health or environmental restrictions or prohibitions in any country where this product is produced, imported or marketed.

#### 16. OTHER INFORMATION

NFPA Hazard Classification: Health: 1 Flammability: 1

0

None

Reactivity:

Special Hazards:

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency personnel to address the hazards that are presented by short-term, acute exposure to material





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under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

HMIS Hazard Classification:Health:1Flammability:1Reactivity:0Protection:B (See PPE section)Hazardous Material Identification System (HM)

Hazardous Material Identification System (HMIS) hazard ratings are designed to inform employees of chemical hazards in the workplace. The ratings are based on inherent properties of the material under expected conditions of normal use and are not intended for use in emergency situations.

These data are offered in good faith as typical values and not as product specifications. No warranty, either expressed or implied, is hereby made. The recommended industrial hygiene and safe handling procedures are believed to be generally applicable. However, each user should review these recommendations in the specific context of the intended use and determine whether they are appropriate.

