SDS(Safety Data Sheet)

Product	HMC SN PLUS 0W-20		
MSDS Number	List No.	Issuing date	Last revised date
-	LB3241	2019-06-20	2026-02-24

1. IDENTIFICATION

1) Product name

HMC SN PLUS 0W-20

2) Recommended use of the chemical and restriction on use

- Recommended use: Lubricants
  Gasoline engine oil
- Restrictions on use: Do not use for any other purpose.

3) Details of the supplier of the safety data sheet

○ **Manufacturer**

- Company name: GS Caltex Corporation
- Address: GS Tower, 508, Nonhyeon-ro, Gangnam-gu, Seoul, Korea
- Emergency telephone number: +82-1899-5145

2. HAZARDS IDENTIFICATION

1) Classification of the product

- Not applicable

2) Label elements

○ **Hazard pictograms**

- Not applicable

○ **Signal word**

- Not applicable

○ **Hazard statements**

- Not applicable

○ **Precautionary statements**

1) Prevention

- Not applicable

2) Response

- Not applicable

3) Storage

- Not applicable

4) Disposal

- Not applicable

3) Other hazards

○ **Product NFPA Level**

(※ 0-Lack, 1-Low, 2-Moderate, 3-High, 4-Very High)

Product name	Health	Flammable	Reaction
HMC SN PLUS 0W-20	0	1	0

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name	Trade names and Synonyms	CAS No.	EC No.	Contain Ratio(%)
Distillates (petroleum), hydrotreated heavy paraffinic	Emulsifiable oil	64742-54-7	265-157-1	76 ~ 86
Trade secret				5 ~ 15
Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based		72623-87-1	276-738-4	3 ~ 13
ar-Nonyl-N-(nonylphenyl)benzenamine	DINONYL DIPHENYLAMINE	36878-20-3	253-249-4	0.7 ~ 4
Distillates (petroleum), hydrotreated middle	Hydrotreated middle distillates (petroleum) ; Hydrotreated middle petroleum distillates ; Hydrotreated petroleum middle distillates	64742-46-7	265-148-2	0.5 ~ 4
Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt	1-Hexanol,2-ethyl-, O,O-diester with phosphorodithioic acid, zinc salt (7CI)	4259-15-8	224-235-5	0.2 ~ 2
Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based	Factory Supply Lubricating oils (petroleum), C15-30, hydrotreated neutral oil-based	72623-86-0	276-737-9	0.1 ~ 2
Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased	Dodecylphenol, calcium salt, overbased, sulfurized, carbonated	68784-26-9	272-234-3	0.1 ~ 0.9
Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts	Dialkyl(C1-C14)dithiophosphoric acid, zinc salt ; DI-C1-14 ALKYL DITHIOPHOSPHORIC ACID, ZINC SALT ; Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts	68649-42-3	272-028-3	0.1 ~ 0.9
1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3)		799241-27-3		0.1 ~ 0.6
Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched		253873-84-6		0.1 ~ 0.6

Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched		253873-83-5		0.1 ~ 0.6
Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi-		90901-24-9		0.1 ~ 0.6

※ Except for the above components, all components are not listed as they do not meet the criteria for hazardous risk classification in Article 104 (Classification of Hazardous Factors) of Regulated Acts and Occupational Safety and Health Act.

※ This product has less than 3% DMSO extract as measured by the IP346 method.

4. FIRST AID MEASURES

1) Eye contact

- In case of contact with material, immediately flush eyes with running water for at least 15 minutes.
- If eye irritation persists: Get medical advice/attention.

2) Skin contact

- In case of contact with material, immediately flush skin with running water for at least 15 minutes.
- Remove and isolate contaminated clothing and shoes.
- Launder contaminated clothing and shoes before re-use.
- If skin irritation occurs: Get medical advice/attention.

3) Inhalation

- Move victim to fresh air.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.

4) Ingestion

- If unconscious but breathing, never give anything by mouth
- If swallowed do not induce vomiting, seek medical advice immediat.
- Get immediate medical advice/attention.
- Rinse mouth.

5) Indication of any immediate medical attention and special treatment needed

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

5. FIRE FIGHTING MEASURES

1) Suitable (and unsuitable) extinguishing media

- Small fire: Dry sand, dry chemical, alcohol-resistant foam, water spray, regular foam, CO2 (Suitable extinguishing media)
- Large fire: Water spray/fog, regular foam (Suitable extinguishing media)
- High-pressure water (Unsuitable extinguishing media)

2) Special hazards arising from the substance or mixture

- May be ignited by heat, sparks or flames.
- Fire may produce irritating and/or toxic gases.
- May cause toxic effects if inhaled.

3) Special protective equipment and precautions for firefighters	- Substance may be transported hot. - Runoff may cause pollution. - Contact may cause burns to skin and eyes. - Dike fire-control water for later disposal; do not scatter the material. - Move containers from fire area if you can do it without risk. - Fire involving Tanks: Cool containers with flooding quantities of water until well after fire is out. - Fire involving Tanks: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. - Fire involving Tanks: ALWAYS stay away from tanks engulfed in fire.

6. ACCIDENTAL RELEASE MEASURES

1) Health considerations and protective equipment	- Do not touch or walk through spilled material. - ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). - Ventilate the contaminated area. - Stop leak if you can do it without risk. - Prevent dust cloud. - Please note that materials and conditions to be avoided.
2) Environmental precautions	- Prevent entry into waterways, sewers, basements or confined areas.
3) Methods and material for containment and cleaning up	- Small Spill: Flush area with flooding quantities of water. - Large Spill: Dike far ahead of liquid spill for later disposal. - With clean shovel place material into clean, dry container and cover loosely; move containers from spill area. - Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry. - Small Spill: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal.

7. HANDLING AND STORAGE

1) Precautions for safe handling	- Wash ... thoroughly after handling. - Please note that materials and conditions to be avoided. - Handling refer to engineering control/personal protection section. - Cuation: High temperature
2) Conditions for safe storage (including any incompatibilities)	- Store in a dry place. Store in a closed container. - Please note that materials and conditions to be avoided. - Store in a closed container.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

1) Control parameters

Chemical name	Exposure limits	ACGIH TLV	OSHA PEL	Biological limit values(BLV
Distillates (petroleum), hydrotreated heavy paraffinic	TWA : 0.8 mg/m3	TWA 5 mg/m3, Inhalable particulate matter(Mineral oil, Pure, highly and severely refined)	Not available	Not available
Trade secret	Not available	Not available	Not available	Not available
Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based	TWA : 0.8 mg/m3	Not available	Not available	Not available
ar-Nonyl-N-(nonylphenyl)benzenamine	Not available	Not available	Not available	Not available
Distillates (petroleum), hydrotreated middle	TWA : 0.8 mg/m3	Not available	Not available	Not available
Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt	Not available	Not available	Not available	Not available
Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based	Not available	TWA 5 mg/m3, Inhalable particulate matter(Mineral oil, Pure, highly and severely refined)	Not available	Not available
Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased	Not available	Not available	Not available	Not available
Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts	Not available	Not available	Not available	Not available
1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3)	Not available	Not available	Not available	Not available
Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched	TWA : 0.5 mg/m3	Not available	PEL: 5 mg/m3 (Soluble compounds), 15 mg/m3 (Insoluble compounds - Total dust) mg/m3	Not available

Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched	Not available	Not available	Not available	Not available
Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi-	Not available	Not available	Not available	Not available

2) Appropriate engineering controls

- Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
- Adjust the ventilation rate to suit the condition.

3) Personal protection equipment

○ **Respiratory protection**
- Wear a adequate respiratory protection equipment with certificate by considering physicochemical properties of exposured particulate material.
- In case exposured to particulate material, the respiratory protective equipments as follow are recommended. - facepiece filtering respirator or air-putifying respirator, high-efficiency particulate air(HEPA) filter media or resporator equipped with power
- In lack of oxigan(<19.6%), wear the supplied-air respiratior or self-contained breathing apparatus.
- Consider the warning characteristics beforehand.

○ **Eye protection**
- Wear breathable safety goggles to protect from material causing eye irritation or other disord
- An eye wash unit and safety shower station should be available nearby work place.
- In case of direct exposure or potential exposure to the substance, wear safety glasses for chemicals approved in the country.

○ **Hand protection**
- Wear appropriate protective gloves by considering physical and chemical properties of chemicals.
- In case of direct exposure or potential exposure to the substance, wear safety gloves for chemicals approved in the country.

○ **Body protection**
- Wear appropriate protective clothing by considering physical and chemical properties of chemicals.
- In case of direct exposure or potential exposure to the substance, wear protective clothing fo chemicals approved in the country.

9. PHYSICAL AND CHEMICAL PROPERTIES

Item	Input Value
Apperance	Liquid
Color	Light yellow
Smell	a specific smell of hydrocarbon
Smell Threshold	No Data
pH (Numerical value)	No Data
Melting/Freezing Point	No Data
Boilling Point	No Data
Flash Point	214 °C

Evaporating Rate	No Data
Flammability(Solid, Gas)	No Data
Explosibility Range	No Data
Steam Pressure	No Data
Solubility	No Data
Vapor Density	No Data
Specific Gravity	0.844
Distribution Coefficient	No Data
SelfIgnition Temperature	No Data
Pyrolysis Temperature	No Data
Viscosity	7.7 mm2/s (at 100℃)
Molecular Weight	No Data

10. STABILITY AND REACTIVITY

1) Chemical Stability and hazardous reactivity
- Stable under normal temperatures and pressures.
- Containers may explode when heated.
- Some may burn but none ignite readily.

2) Conditions to avoid
- Ignition source(heat, spark, flame)

3) Incompatible materials
- Combustibles
- Irritating and/or toxic gas

4) Hazardous decomposition products
- Not available

11. TOXICOLOGICAL INFORMATION

1) Information on the likely routes of exposures

○ **Inhalation**

- No inhalation effects through respiratory system.

○ **Skin contact**

- No effect on skin contact.

○ **Eye contact**

- No effect on eye contact.

○ **Ingestion**

- No ingestion effect through mouth.

2) Health hazard information

○ **Acute toxicity**

*** Oral - Not classified (ATEmix > 2000 mg/kg)**

- Distillates (petroleum), hydrotreated heavy paraffinic : rat(male/female), LD50 > 5,000 mg/kg bw, no deaths (read-across: 64742-56-9) (OECD TG 401, GLP) (ECHA)

- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : rat(male/female); LD50 > 5000 ㎎/㎏ bw, no deaths (OECD TG 401, GLP) (read across: 64742-56-9) (ECHA)
- ar-Nonyl-N-(nonylphenyl)benzenamine : rat(male/female); LD50 > 5000 ㎎/㎏ bw, no deaths (OECD TG 401) (ECHA)
- Distillates (petroleum), hydrotreated middle : rat(male/female); LD50 > 5000 ㎎/㎏ bw, no deaths (OECD TG 401, GLP) (read across: (CAS# 64742-80-9) (ECHA)
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : rat(male); LD50 = 3100 ㎎/㎏ bw (OECD TG 401) (ECHA)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : rat(male/female); no deaths; LD50 > 5000 mg/kg bw; (read-across: CAS No. 64742-56-9) (OECD TG 401, GLP) (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : rat; LD50 =5000?16000 mg/kg bw no deaths (NICNAS)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : rat; LD50 = 3100 mg/kg bw (read across: zinc bis(O,O?diisooctyl) bis(dithiophosphate) (ECHA)
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

*** Dermal - Not classified (ATEmix > 2000 mg/kg)**

- Distillates (petroleum), hydrotreated heavy paraffinic : rabbit(male/female), LD50 > 5,000 mg/kg bw, no deaths (read-across: 64742-56-9) (OECD TG 402, GLP) (ECHA)
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : rabbit(male/female); LD50 > 5000 ㎎/㎏ bw, no deaths (OECD TG 402, GLP) (read across: 64742-56-9) (ECHA)
- ar-Nonyl-N-(nonylphenyl)benzenamine : rat(male/female); LD50 > 2000 ㎎/㎏ bw (OECD TG 402) (ECHA)
- Distillates (petroleum), hydrotreated middle : rabbit(male/female); LD50 > 2000 ㎎/㎏ bw, no deaths (OECD TG 402, GLP) (read across: (CAS# 64742-80-9) (ECHA)
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : rabbit(male); LD50 > 5000 ㎎/㎏ bw (OECD TG 402) (ECHA)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : rabbit; no deaths; LD50 > 2000 mg/kg bw (read-across: CAS No. 64742-53-6) (OECD TG 402, GLP) (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : rat; LD50 >2000 to >15000 mg/kg bw, no deaths (NICNAS)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : rabbit(male/female); LD50 > 3160 mg/kg bw, no deaths (ECHA)
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

*** Inhalation(Gas) - Not applicable**

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable

- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not applicable
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

*** Inhalation(Vapour) - Not classified (ATEmix > 20 mg/L)**

- Distillates (petroleum), hydrotreated heavy paraffinic : Not available
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not available
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not available
- Distillates (petroleum), hydrotreated middle : Not available
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not available
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not available
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : rat; vapour and aerosol inhalation; LC50 >1.67 mg/L, no deaths (OECD TG 403) (NICNAS)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : rat; LC50 > 5 mg/L air, no deaths (no data for exposure time)(ECHA)
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

*** Inhalation(Dust, mist) - Not classified (ATEmix > 5 mg/L)**

- Distillates (petroleum), hydrotreated heavy paraffinic : inhalation: aerosol; rat(male/female); 4h-LC50 > 5.53 mg/L. No deaths (read-across: MRD-87-102) (OECD TG 403)(ECHA)
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : rat(male/female); inhalation: aerosol; LC50 > 5.53 mg/L air /4h, no deaths (OECD TG 403) (read across: MRD-87-102) (ECHA)
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not available
- Distillates (petroleum), hydrotreated middle : rat(male/female); inhalation: aerosol/vapour mix; LC50 = 7.640 mg/L air /4h, no deaths (OECD TG 403, GLP) (read across: (CAS# 64742-80-9) (ECHA)
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not available
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : rat; inhalation: aerosol; no deaths; LC50 > 5.53 mg/L air 4hrs (read-across: CAS No. 64741-88-4) (OECD TG 403) (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not available

- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not available
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

○ **Skin corrosion/Irritation : Not classified**

- Distillates (petroleum), hydrotreated heavy paraffinic	:	Solvent dewaxed light paraffinic oil is not considered to be irritating to the skin of rabbits. (read across : 64742-56-9) (GLP) (ECHA)
- Trade secret	:	Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based	:	rabbit; not irritating (GLP) (read across: 64742-56-9) (ECHA)
- ar-Nonyl-N-(nonylphenyl)benzenamine	:	rabbit; slightly irritating (OECD TG 404, GLP) (read across: TK12340) (ECHA)
- Distillates (petroleum), hydrotreated middle	:	rabbit; Irritation studies were conducted in rabbits on commercial C14-C20 Aliphatic Hydrocarbon Solvents (≤ 2% Aromatics) (CAS RN 64742-47-8, 64742-46-7, 90622-47-2, 60908-77-2 (analogue), 90622-46-1, and 52845-07-5 (analogue)). In dermal irritation tests, the average erythema score (24, 48, 72 hours) results were 0.0 to 1.11, but generally below 1.0. The average edema score (24, 48, 72 hours) results were 0.0 to 1.0, but generally 0.0, suggesting that these solvents produce no to minimal irritation to rabbit skin. (SIDS)
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt	:	rabbit; not irritating (OECD TG 404, GLP) (ECHA)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based	:	rabbit; not irritating (read-across: CAS No. 64742-53-6) (OECD TG 404, GLP) (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased	:	rabbits; not dermal irritants(NICNAS)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts	:	rabbit; irritating (PDII = 4) (read across: Cetrimonium chloride (CAS No: 112-02-7))(ECHA)
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3)	:	Not available

- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

○ **Serious eye damage/irritation : Not classified**

- Distillates (petroleum), hydrotreated heavy paraffinic : Solvent dewaxed light paraffinic oil is not considered to be an ocular irritant. (read-aross: 64742-56-9) (equivalent or similar to guideline OECD TG 405, GLP) (ECHA)
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : rabbit; not irritating (OECD TG 405, GLP) (read across: 64742-56-9) (ECHA)
- ar-Nonyl-N-(nonylphenyl)benzenamine : rabbit; not irritating (OECD TG 405, GLP) (read across: TK12340) (ECHA)
- Distillates (petroleum), hydrotreated middle : rabbit; not irritating (OECD TG 405, GLP) (read across: (CAS# 64742-80-9) (ECHA)
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : rabbit; zinc salt causes persistent eye irritation through 21 days. (OECD TG 405, GLP) (ECHA)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : rabbit; not irritaing (read-across: CAS No. 64742-56-9) (OECD TG 405, GLP) (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : rabbit: slightly irritating to eyes (OECD TG 405) (NICNAS)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : rabbit; irritating (read across: Stearyltrimethylammonium chloride) (OECD TG 405)(ECHA)
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, : Not available

branched

- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']]dioxodi-.mu.-thioxodi- : Not available

○ **Respiratory sensitization : Not classified**

- Distillates (petroleum), hydrotreated heavy paraffinic : Not available
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not available
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not available
- Distillates (petroleum), hydrotreated middle : Not available
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not available
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not available
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not available
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not available
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']]dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']](N,N- : Not available

ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched

- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

○ **Skin sensitization : Not classified**

- Distillates (petroleum), hydrotreated heavy paraffinic : Under the conditions of the test, Solvent dewaxed light paraffinic oil is considered non-sensitizing for guinea-pigs. (read-aross: 64742-56-9) (OECD TG 406, GLP) (ECHA)
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : guinea pig; not sensitising (OECD TG 406, GLP) (read across: 64742-53-6) (ECHA)
- ar-Nonyl-N-(nonylphenyl)benzenamine : guinea pig; not sensitising (OECD TG 406, GLP) (ECHA)
- Distillates (petroleum), hydrotreated middle : guinea pig; not sensitising (OECD TG 406, GLP) (ECHA)
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : guinea pig; not sensitising (OECD TG 406, GLP) (ECHA)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : guinea pig; not sensitising (read-across: CAS No. 64742-53-6) (OECD TG 406, GLP) (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : guinea pig: not sensitising (OECD TG 406) (NICNAS)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Human(patch test); not sensitising(positive reaction index=0) (read across: Cetrimonium chloride (CAS No: 112-02-7))(ECHA)
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2- : Not available

ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi-

○ **Carcinogenicity : Not classified**

- Distillates (petroleum), hydrotreated heavy paraffinic : EU CLP 1272/2008 : Carc. 1B (Note L : The classification as a carcinogen need not apply if it can be shown that the substance contains less than 3% DMSO extract as measured by IP 346)
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : EU CLP 1272/2008 : Carc. 1B (Note L : The classification as a carcinogen need not apply if it can be shown that the substance contains less than 3% DMSO extract as measured by IP 346)
- ar-Nonyl-N-(nonylphenyl)benzenamine : IARC, EU CLP 1272/2008, OSHA, ACGIH, US EPA IRIS, NTP : not listed
- Distillates (petroleum), hydrotreated middle : EU CLP 1272/2008 : Carc. 1B (Note L : The classification as a carcinogen need not apply if the full refining history is known and it can be shown that the substance from which it is produced is not a carcinogen.)
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : IARC, EU CLP 1272/2008, OSHA, ACGIH, US EPA IRIS, NTP : not listed
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : EU CLP 1272/2008: Carc. 1B (Note L: The classification as a carcinogen need not apply if it can be shown that the substance contains less than 3% DMSO extract as measured by IP 346)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : IARC, EU CLP 1272/2008, OSHA, ACGIH, US EPA IRIS, NTP : not listed
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : IARC, EU CLP 1272/2008, OSHA, ACGIH, US EPA IRIS, NTP : not listed
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : IARC, EU CLP 1272/2008, OSHA, ACGIH, US EPA IRIS, NTP : not listed
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : IARC, EU CLP 1272/2008, OSHA, ACGIH, US EPA IRIS, NTP : not listed
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : IARC, EU CLP 1272/2008, OSHA, ACGIH, US EPA IRIS, NTP : not listed
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : IARC, EU CLP 1272/2008, OSHA, ACGIH, US EPA IRIS, NTP : not listed

○ **Germ cell mutagenicity : Not classified**

- Distillates (petroleum), hydrotreated heavy paraffinic	:	In vitro bacterial reverse mutation assay: negative (equivalent or similar to guideline OECD TG 471) (ECHA) In vitro mammalian chromosome aberration test: negative (read-aross : 64742-53-6) (equivalent or similar to guideline OECD TG 473, GLP) (ECHA) In vivo micronucleus assay : negative (read-across : 64741-62-4, 64741-53-3) (equivalent or similar to guideline OECD TG 474) (ECHA)
- Trade secret	:	Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based	:	In vitro Bacterial Reverse Mutation Assay : positive (OECD TG 471) (read across: 64741-50-0) (ECHA), In Vitro Mammalian Chromosome Aberration Test : negative (OECD TG 473) (read across: L-06 Light Hydrotreated Feedstock) (ECHA) In vivo Mammalian Erythrocyte Micronucleus Test : negative (OECD TG 474) (read across: solvent-extracted, dewaxed paraffin oil) (ECHA)
- ar-Nonyl-N-(nonylphenyl)benzenamine	:	In vitro Bacterial Reverse Mutation Assay : negative (OECD TG 471) (read across: TK12340) (ECHA), In Vitro Mammalian Cell Gene Mutation Test : negative (OECD TG 476) (read across: 4,4-dioctyldiphenylamine) (ECHA) In vivo rodent dominant lethal assay : negative (OECD TG 478) (ECHA)
- Distillates (petroleum), hydrotreated middle	:	In vitro Bacterial Reverse Mutation Assay : negative (OECD TG 471, GLP) (ECHA), In Vitro Sister Chromatid Exchange Assay in Mammalian Cells : ambiguous with metabolic activation, negative without metabolic activation (OECD TG 479, GLP) (read across: (CAS# 64742-80-9) (ECHA) In vivo Mammalian Bone Marrow Chromosome Aberration Test : negative (OECD TG 475) (ECHA)
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt	:	In vitro bacterial reverse mutation assay; negative (OECD TG 471, GLP) (ECHA) In vivo Mammalian Erythrocyte Micronucleus Test: negative (OECD TG 474, GLP) (ECHA)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based	:	in vitro mammalian chromosome aberration test: negative (read-across: CAS No. 64741-52-2) (OECD TG 473) (ECHA) in vitro bacterial reverse mutation assay: negative (read-across: CAS No. 64742-54-7 and 64742-52-5) (OECD TG 471) (ECHA) in vitro mammalian cell gene mutation assay: negative (read-across: CAS No. 64742-52-5) (OECD TG 476, GLP) (ECHA) in vivo mammalian erythrocyte micronucleus assay: negative (read-across: solvent-extracted, dewaxed paraffin oils, sufficiently refined, IP 346 < 3%) (OECD TG 474) (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased	:	in vitro Bacterial Reverse Mutation Assay; negative (OECD TG 471) (NICNAS) in vitro Mammalian Cell Gene Mutation Test; negative (OECD TG 476) (NICNAS)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts	:	In vitro - Bacterial reverse mutation test ; Negative (OECD TG 471) (read across; Cetrimonium chloride (CAS No: 112-02-7), 2',4',5',7'-tetrabromo-4,5,6,7-tetrachloro-3',6'-dihydroxy-3H-spiro[2-benzofuran-1,9'-xanthen]-3-one) (ECHA) In vivo: Not available
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-	:	Not available

(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3)

- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

○ **Reproductive toxicity : Not classified**

- Distillates (petroleum), hydrotreated heavy paraffinic : rat; screening for reproductive / developmental toxicity; Reproductive performance was not adversely affected at any dose level evaluated. There were no neonatal toxicity observed at any dose level. There were no differences in terms of systemic toxicity between either of the dose formulations. (read-aross : Chevron 100 Neutral) (OECD TG 421, GLP) (ECHA)
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : rat(male/female); 1000 mg/kg/day; Reproduction / Developmental Toxicity Screening Test; Reproductive performance was not adversely affected at any dose level evaluated. There were no neonatal toxicity observed at any dose level. There were no differences in terms of systemic toxicity between either of the dose formulations. (OECD TG 421, GLP) (read across: Chevron 100 Neutral) (ECHA)
- ar-Nonyl-N-(nonylphenyl)benzenamine : rat; 50, 150 and 500 mg/kg bw; The substance is not teratogenic and not embryotoxic in rats. It causes maternal toxicity at a dose level of 500 mg/kg bw. (OECD TG 414, GLP) (ECHA)
- Distillates (petroleum), hydrotreated middle : Based on this data, the C14-C20 Aliphatic Hydrocarbon Solvents (≤2% aromatics) Category members are not expected to be reproductive or developmental toxicants. (SIDS)
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : rat(male/female); oral; 30, 100, 200 mg/kg/day; Reproduction / Developmental Toxicity Screening Test; NOAEL(parental and neonatal toxicity)=30 mg/kg/day (OECD TG 421, GLP) (ECHA)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : rat; screening for reproductive/developmental toxicity; Reproductive performance was not adversely affected at any dose level evaluated. There were no neonatal toxicity observed at any dose level. There were no differences in terms of systemic toxicity between either of the dose formulations (read-across: CAS No. 64742-54-7) (OECD TG 421, GLP) (ECHA)

  rat; developmental toxicity; There was no evidence of teratogenicity. There were no treatment-related changes observed during the external, skeletal, or visceral evaluations (read-across: CAS No. 64741-88-4) (OECD TG 414) (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : A dose level of 50 mg/kg/day was considered to be the clear NOAEL (no observable adverse effect level) for systemic parental and neonatal toxicity and 300 mg/kg/day was considered to be the NOAEL for reproductive toxicity.

There was no evidence of cumulative toxic effect across generations in this study. (OECD TG 416, GLP)(NICNAS)

- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : In a developmental toxicity study, Sprague-Dawley female rats were treated with Quat-Silsesquioxane in the concentration of 0, 100, 300, or 1000 mg/kg/day orally by gavage in corn oil.No maternal mortality and clinical signs or behavioral changes were observed in treated female rats as compared to control. NOAEL(P)=300 mg/kg bw, NOAEL(F1)=1000 mg/kg bw (read across : Quaternary Silsesquioxane)(ECHA)
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

○ **Specific target organ toxicity (single exposure) : Not classified**

- Distillates (petroleum), hydrotreated heavy paraffinic : Hydronephrosis of the right kidney was observed in one rat but was not considered treatment-related by the study authors. No other abnormalities were observed in any male or female rats. (read-across: 64742-56-9) (OECD TG 401, GLP)(ECHA)
  Dermal administration of API 78-9 at 5000 mg/kg did not result in any dermal irritation or signs of clinical toxicity. Gross necroscopy did not reveal any signs of systemic toxicity at the 5000 mg/kg dose level. (read-across: 64742-56-9) (OECD TG 402, GLP)(ECHA)
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : oral; rat(male/female); No clinical signs of toxicity observed in either male or female rats. LD50 > 5000 ㎎/㎏ bw, no deaths (OECD TG 401, GLP) (read across: 64742-56-9) (ECHA)
  dermal; rabbit(male/female); No visible signs of clinical toxicity were observed in male and female rabbits dosed with API 78-9 at 5000 mg/kg. LD50 > 5000 ㎎/㎏ bw, no deaths (OECD TG 402, GLP) (read across: 64742-56-9) (ECHA)
  inhalation: aerosol; rat(male/female); The test material which was deposited on the animal fur during exposure diminished by observation Day 10. No mortality in either the control or exposed group was reported. There were no statistically significant differences in mean body weight between groups. LC50 > 5.53 mg/L air /4h, no deaths (OECD TG 403) (read across: MRD-87-102) (ECHA)

- ar-Nonyl-N-(nonylphenyl)benzenamine	:	oral; rat(male/female); No compound related gross organ changes were observed. LD50 > 5000 mg/kg bw, no deaths (OECD TG 401) (ECHA) dermal; rat(male/female); Piloerection, abnormal body positions, and dyspnea were seen, being common symptoms in acute toxicity testing. The animals recovered within 9 days. LD50 > 2000 mg/kg bw (OECD TG 402) (ECHA) inhalation: aerosol; rat(male/female); Necropsy and histopathological examination revealed no substance-related findings. LC50 > 5.1 mg/L air /4h, no deaths (OECD TG 403) (ECHA)
- Distillates (petroleum), hydrotreated middle	:	oral; rat(male/female); Pharmacotoxic signs observed included hypoactivity, urine stained abdomen and oily looking hair. LD50 > 5000 mg/kg bw, no deaths (OECD TG 401, GLP) (read across: (CAS# 64742-80-9) (ECHA) dermal; rabbit(male/female); No visible lesions were reported. LD50 > 2000 mg/kg bw, no deaths (OECD TG 402, GLP) (read across: (CAS# 64742-80-9) (ECHA) inhalation: aerosol/vapour mix; rat(male/female); Dyspnea, nasal discharge, excess salivation, and matted fur were some of the commonly observed signs in most animals. LC50 = 7.640 mg/L air /4h, no deaths (OECD TG 403, GLP) (read across: (CAS# 64742-80-9) (ECHA)
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt	:	oral; rat(male); Depresson, diarrhea, reduced food intake. LD50 = 3100 mg/kg bw (OECD TG 401) (ECHA)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based	:	oral; rat; No clinical signs of toxicity observed in either male or female rats. LD50 > 5000 mg/kg bw, no deaths (read-across: CAS No. 64742-56-9) (OECD TG 401, GLP) (ECHA) dermal; rat; Skin irritation and the occurrence of soft stool occurred in some animals, but this latter effect was transient. LD50 > 2000 mg/kg bw, no deaths (read-across: CAS No. 64742-53-6) (OECD TG 402, GLP) (ECHA) inhalation: aerosol; rat; After removal from the chamber all of the animals had an extreme amount of test material on their fur. Post exposure the number of animals with material on their fur diminished and was absent by Day 10. LC50 > 5.53 mg/L air 4hrs, no deaths (read-across: CAS No. 64741-88-4) (OECD TG 403) (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased	:	rat; vapour and aerosol inhalation; no mortalities or systemic toxic effects observed in rodent studies. LC50 >1.67 mg/L (OECD TG 403) (NICNAS)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts	:	Significant effects not observed. (ECHA)
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3)	:	Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched	:	Not available

- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

○ **Specific target organ toxicity (repeated exposure) : Not classified**

- Distillates (petroleum), hydrotreated heavy paraffinic : Dermal; The systemic toxicity NOAEL for this 28-day dermal toxicity study in the rabbit is 1,000 mg/kg, based on the lack of adverse systemic effects observed at this dose level. (read-aross : 64742-53-6) (OECD TG 410, GLP) (ECHA)
  Inhalation; rat; 4 weeks; 0, 50, 220 or 1000 mg/m3; No systemic effects were observed. The NOAEL for lung changes associated with oil deposition in the lungs was 220 mg/m3. As no systemic toxicity was observed, the overall NOAEL for systemic effects was > 980 mg/m3. (equivalent or similar to guideline OECD TG 412) (ECHA)
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : rabbit(male/female); dermal; The systemic toxicity NOAEL for this 28-day dermal toxicity study in the rabbit is 1,000 mg/kg, based on the lack of adverse systemic effects observed at this dose level. (OECD TG 410, GLP) (read across: 64742-53-6) (ECHA)
- ar-Nonyl-N-(nonylphenyl)benzenamine : oral; rat(male); 28 days; Based on the absence of clinical findings and effects on body weight, dose levels of 100, 300 and 1000 mg/kg bw were chosen for subchronic dosing. (ECHA)
- Distillates (petroleum), hydrotreated middle : rat(male/female); dermal; 90 days; The dermal administration of Light Catalytically Cracked Distillate at doses of 125, 500 and/or 1,250 mg/kg/day resulted in reduction in body weight, reduction in thymus weights and an increase in liver weight. Severe erythema and edema was also reported. Histopathologic evaluation was limited to control animals and those dosed at 500 mg/kg/day. A NOEL was calculated as 25 mg/kg/day for males and 125 mg/kg/day for females. (OECD TG 411) (read across: Light Catalytically Cracked Distillate) (ECHA)
  Target organ: Blood, thymus, liver
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : oral; rat(male/female); 10, 50, 125, 250, 500 mg/kg/day; 28 days; NOAEL(systemic toxicity)=125 mg/kg bw/day (OECD TG 407, GLP) (ECHA)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : oral; rat; All animals in the 125 mg/kg/day survived to date of sacrifice. No details on clinical signs were provided. A NOAEL could not be identified and is less than 125 mg/kg/day when administered orally (OECD TG 408) (ECHA)
  dermal; rabbit; The systemic toxicity NOAEL for this 28-day dermal toxicity study in the rabbit is 1,000 mg/kg, based on the lack of adverse systemic effects observed at this dose level (read-across: CAS No. 64742-53-6) (OECD TG 410, GLP) (ECHA)
  inhalation; rat; No systemic effects were observed. As no systemic toxicity was observed, the overall NOAEL for systemic effects was > 980 mg/m3 (read-across: CAS No. 64742-70-7) (OECD TG 412) (ECHA)
- Dodecyl phenol, sulfurized, : oral; rat; 90days; 125, 250, 500 or 1000 mg/kg bw/day; There was no mortality

carbonates, calcium salts, overbased		or any effect noted in clinical observations or from serum chemistry. There were no effects noted in gross pathology, organ weights or test substance related microscopic findings from histopathology. NOAEL=1000 mg/kg bw/day(OECD TG 408) (NICNAS)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts	:	Sprague-Dawley female rats were treated with Quat-Silsesquioxane in the concentration of 0, 100, 300, or 1000 mg/kg/day orally by gavage in corn oil.No maternal mortality and clinical signs or behavioral changes were observed in treated female rats as compared to control. NOAEL(P)=300 mg/kg bw, NOAEL(F1)=1000 mg/kg bw (read across : Quaternary Silsesquioxane)(ECHA)
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3)	:	Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched	:	Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched	:	Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi-	:	Not available

○ **Aspiration hazard : Not classified**

- Distillates (petroleum), hydrotreated heavy paraffinic	:	Viscosity: 73.9 mm2/s (40°C)(ECHA) & hydrocarbons
- Trade secret	:	Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based	:	> 2 mm2/s (40°C) & hydrocarbons
- ar-Nonyl-N-(nonylphenyl)benzenamine	:	585 mPa.s at 40°C (ECHA) & not hydrocarbons
- Distillates (petroleum), hydrotreated middle	:	Viscosity of a range of distillate fuels : >= 2 - 8.1 mm2/s (40°C) & hydrocarbons
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt	:	131.6 cSt at 40°C (ECHA) & not hydrocarbons
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based	:	kinematic viscosity > 2 mm2/s (40ºC) (CONCAWE, 2010a; CONCAWE, 1984; CONCAWE, 1997) (ECHA) & hydrocarbons

- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not available
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Viscosity: > 9 - < 15 mm2/s (100°C; OECD TG 114)(ECHA) & not hydrocarbons
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

12. ECOLOGICAL INFORMATION

1) Ecotoxicity

- Acute toxicity : Not classfied (ATEmix>1mg/L)
- Chronic toxicity : Not classfied

○ **Acute (short-term) aquatic hazard:**

Fish

- Distillates (petroleum), hydrotreated heavy paraffinic : 96h-LL50(Pimephales promelas) > 100 mg/L (OECD TG 203, GLP) (ECHA)
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : 96h-LL50(Pimephales promelas) > 100 mg/L (OECD TG 203, GLP) (ECHA)
- ar-Nonyl-N-(nonylphenyl)benzenamine : No toxic effects up to the limit of water solubility (< 5 μg/L)
- Distillates (petroleum), hydrotreated middle : The members of the C14-C20 Aliphatic Hydrocarbon Solvents [≤2% aromatics] Category : Water solubility values range from <0.001 to 0.13 mg/L (at 25 °C) (SIDS) 96h-LL50(Oncorhynchus mykiss) = 21 mg/L (OECD TG 203, GLP) (read across) (ECHA); No toxic effects up to the limit of water solubility
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : 96h-LL50(Oncorhynchus mykiss) = 4.4 mg/L (OECD TG 203, GLP) (ECHA)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : 96h-LL50(Pimephales promelas) > 100 mg/L (OECD TG 203, GLP) (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : 96h-LL50(Pimephales promelas) > 1000

mg/L (read across: 122384-85-4) (OECD TG 203) (OECD SIDS)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Water solubility : not soluble (0.000000000005072 mg/L at 25° C)(ECHA)
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

Invertebrates
- Distillates (petroleum), hydrotreated heavy paraffinic : 48h-EL50(Daphnia magna) > 10,000 mg/L (read across : 64742-53-6 or 64741-97-5) (equivalent or similar to guideline OECD TG 202) (ECHA)
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : 48h-EL50(Daphnia magna) > 10000 mg/L (OECD TG 202) (ECHA)
- ar-Nonyl-N-(nonylphenyl)benzenamine : No toxic effects up to the limit of water solubility (< 5 μg/L)
- Distillates (petroleum), hydrotreated middle : The members of the C14-C20 Aliphatic Hydrocarbon Solvents [≤2% aromatics] Category : Water solubility values range from <0.001 to 0.13 mg/L (at 25 °C) (SIDS) 48h-EL50(Daphnia magna) = 210 mg/L (OECD TG 202, GLP) (read across: Complex mixture of hydrocarbons) (ECHA); No toxic effects up to the limit of water solubility
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : 48h-EL50(Daphnia magna) = 75 mg/L (OECD TG 202, GLP) (ECHA)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : 48h-EL50(Daphnia magna) > 10000 mg/L (OECD TG 202) (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : 48h-LL50(Daphnia magna) > 1000 mg/L (read across: 122384-85-4) (OECD TG 202) (OECD SIDS)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Water solubility : not soluble (0.000000000005072 mg/L at 25° C)(ECHA)
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

Aquatic algae
- Distillates (petroleum), hydrotreated heavy paraffinic : Not available
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not available
- ar-Nonyl-N-(nonylphenyl)benzenamine : No toxic effects up to the limit of water solubility (< 5 μg/L)
- Distillates (petroleum), hydrotreated middle : The members of the C14-C20 Aliphatic Hydrocarbon Solvents [≤2% aromatics] Category : Water solubility values range from <0.001 to 0.13 mg/L (at 25 °C) (SIDS) 72h-ErL50(Pseudokirchneriella subcapitata) = 22 mg/L (OECD TG 201) (read across) (ECHA); No toxic effects up to the limit of water solubility
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : 72h-ErL50(Desmodesmus subspicatus) = 410 mg/L (OECD TG 201, GLP) (ECHA)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not available

- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : 96h-LL50(Pseudokirchneriella subcapitata) > 1000 mg/L (read across: 122384-85-4) (OECD TG 201) (OECD SIDS)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Water solubility : not soluble (0.000000000005072 mg/L at 25° C)(ECHA)
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

○ **Chronic (Long-term) aquatic hazard:**

Fish

- Distillates (petroleum), hydrotreated heavy paraffinic : Not available
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not available
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not available
- Distillates (petroleum), hydrotreated middle : Not available
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not available
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : 14d-NOELR(Oncorhynchus mykiss) >= 1000 mg/L (estimated) (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not available
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not available
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

Invertebrates

- Distillates (petroleum), hydrotreated heavy paraffinic : 21d-NOEL(Daphnia magna)=10 mg/L (read across: 64742-53-6) (equivalent or similar to guideline OECD TG 211, GLP) (ECHA)
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : 21d-NOEL(Daphnia magna) = 10 mg/L (OECD TG 211, GLP) (ECHA)
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not available
- Distillates (petroleum), hydrotreated middle : Not available
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : 28d-NOEC(Daphnia magna) = 0.4 mg/L (OECD TG 211, GLP) (ECHA)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : 21d-NOEL(Daphnia magna) = 10 mg/L (OECD TG 211, GLP) (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not available
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not available
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available

- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

Aquatic algae

- Distillates (petroleum), hydrotreated heavy paraffinic : 72h-NOErL(Pseudokirchnerella subcapitata) >= 100 mg/L (read across: 72623-87-1) (OECD TG 201) (ECHA)
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : 72h-NOErL(Pseudokirchneriella subcapitata) >=100 mg/L (OECD TG 201) (ECHA)
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not available
- Distillates (petroleum), hydrotreated middle : 72h-NOErL(Pseudokirchneriella subcapitata) = 1 mg/L (OECD TG 201) (read across) (ECHA); no observed acute or chronic toxicity at the limit of water solubility
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not available
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : 72h-NOEL(Pseudokirchneriella subcapitata) >= 100 mg/L (OECD TG 201) (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not available
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not available
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

2) Persistence and degradability

○ **Persistence**

- Distillates (petroleum), hydrotreated heavy paraffinic : This substance is UVCB, so it is not applicable. (ECHA)
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : log Kow = 7.87 (estimated) (EPISUITE)
- ar-Nonyl-N-(nonylphenyl)benzenamine : log Kow=12.24 (estimated) (EPISUITE); not valid (over -4<log Kow<8)
- Distillates (petroleum), hydrotreated middle : log Kow = 7.71 (estimated) (EPISUITE)
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : log Kow = 3.59 (22 °C, pH:ca. 5) (ECHA)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : log Kow = 6.43 (estimated) (EPISUITE)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : the octanol-water partition coefficient for these substances is high (log Kow > 6.6, measured). (OECD SIDS)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : log Kow=14.876 (estimated)(EPISUITE); not valid (over -4<log Kow < 8)(ECHA)
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

○ **Degradability**

- Distillates (petroleum), hydrotreated heavy paraffinic : The chemical constituents that comprise the other

lubricant base oils category consist entirely of carbon and hydrogen and do not contain hydrolyzable groups. As such, they have a very low potential to hydrolyze. Therefore, this degradative process will not contribute to their removal from the environment. (ECHA)

- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not available
- ar-Nonyl-N-(nonylphenyl)benzenamine : In contact with water no hydrolysis is expected. (ECHA)
- Distillates (petroleum), hydrotreated middle : Not available
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not available
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : They have a very low potential to hydrolyze (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : They do not undergo hydrolysis. (OECD SIDS)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not available
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

3) Bioaccumulative potential

○ **Bioaccumulation**

- Distillates (petroleum), hydrotreated heavy paraffinic : This substance is UVCB, so it is not applicable. (ECHA)
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : BCF = 4996 (estimated) (EPISUITE)
- ar-Nonyl-N-(nonylphenyl)benzenamine : BCF=35.87 (estimated) (EPISUITE)
- Distillates (petroleum), hydrotreated middle : BCF = 1516 (estimated) (EPISUITE)
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : BCF=448.2 (estimated) (EPISUITE)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : BCF = 8137 (estimated) (EPISUITE)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : BCF=3.162 (estimated)(EPISUITE)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : BCF=3.162(ECHA)
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

○ **Biodegradation**

- Distillates (petroleum), hydrotreated heavy paraffinic : Another lubricant base oil, Solvent Neutral 600 Base Oil (MRD-94 -981), was determined to be inherently biodegradable but not readily biodegradable with a mean degradation of 31.13% by day 28. (read across: Solvent Neutral 600 Base Oil (MRD-94-981)) (OECD TG 301F, GLP) (ECHA)
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : 31 % degradation after 28d; not readily biodegradable (OECD TG 301F, GLP) (ECHA)
- ar-Nonyl-N-(nonylphenyl)benzenamine : 1% degradation after 28 days; under test conditions no biodegradation observed (OECD TG 301B, GLP) (read across: TK12340) (ECHA)

- Distillates (petroleum), hydrotreated middle : 34.82 % degradation after 28d; not readily biodegradable (EPA OTS 796.3100) (ECHA)
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : < 5% degradation after 27 days; no biodegradation observed (OECD TG 301D) (ECHA)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : 31% degradation after 28 days (OECD TG 301F, GLP) (ECHA)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : It can be concluded that the substances that are members of the category(Combined Alkyl Phenol Sulfide and Alkyl Phenate Sulfide category) do not readily biodegrade. (OECD SIDS) 4.7~13.4% degradation after 28 days (read across: CAS # 122384-85-4) (OECD TG 301B) (OECD SIDS)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : 0% degradation after 28 days (Not biodegradable) (read across : Didecyl dimethyl ammonium chloride) (OECD TG 301C)(ECHA)
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

4) Mobility in soil

- Distillates (petroleum), hydrotreated heavy paraffinic : Not available
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Koc=6760000 (EPISUITE)
- ar-Nonyl-N-(nonylphenyl)benzenamine : Koc=44900000 (EPISUITE)
- Distillates (petroleum), hydrotreated middle : Koc=4910000 (EPISUITE)
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Koc=495900 (EPISUITE)
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Koc = 380400 (estimated) (EPISUITE)
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Koc=3615000000000 (EPISUITE)
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Koc=3268000000
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

5) Hazard to the ozone layer

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not applicable
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-

hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

6) Other adverse effects
- Distillates (petroleum), hydrotreated heavy paraffinic : Not available
- Trade secret : Not available
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not available
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not available
- Distillates (petroleum), hydrotreated middle : Not available
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not available
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not available
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not available
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not available
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not available
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not available
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not available
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not available

13. DISPOSAL CONSIDERATIONS

1) Disposal methods
- Not available

2) Special precaution for disposal
- The user of this product must disposal by oneself or entrust to waste disposer or person who other's waste recycle and dispose, person who establish and operate waste disposal facilities.
- Dispose of waste in accordance with all applicable laws and regulations.

14. TRANSPORT INFORMATION

1) UN No.
- Not applicable

2) Proper shipping name
- Not applicable

3) Transport hazard class(es)
- Not applicable

4) Packing group
- Not applicable

5) Marine pollutant
- Not applicable

6) Special safety response for transportation or transportation measure

- Types of Emergency Measures in Case of Fire : Not applicable
- Types of Emergency Measures in Leakage : Not applicable
- Transport regulations according to ADR/RID, AND, IMDG and ICAO/IATA : Not applicable

15. REGULATORY INFORMATION

EINECS(or ELINCS)

- Distillates (petroleum), hydrotreated heavy paraffinic : European EINECS phase-in substance
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : European EINECS phase-in substance
- ar-Nonyl-N-(nonylphenyl)benzenamine : European EINECS phase-in substance
- Distillates (petroleum), hydrotreated middle : European EINECS phase-in substance
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : European EINECS phase-in substance
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : European EINECS phase-in substance
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : European EINECS phase-in substance
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : European EINECS phase-in substance
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

EU CLP (CLASSIFICATION) - PRODUCT : Not applicable

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not applicable
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

Substances restricted under REACH

- Distillates (petroleum), hydrotreated heavy paraffinic : Substances restricted under REACH
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Substances restricted under REACH
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Substances restricted under REACH
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not applicable

- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Substances restricted under REACH
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

Substances subject to authorization under REACH

REACH SVHC List

Korea

○ **Occupational Safety and Health Act**

- Distillates (petroleum), hydrotreated heavy paraffinic : Substance subject to occupational exposure limits, Harmful agents subject to work environment monitoring, Harmful agents subject to workers requiring health examination
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Substance subject to occupational exposure limits, Harmful agents subject to work environment monitoring, Harmful agents subject to workers requiring health examination
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Substance subject to occupational exposure limits, Harmful agents subject to work environment monitoring, Harmful agents subject to workers requiring health examination
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Hazardous substance subject to control
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Hazardous substance subject to control
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Substance subject to occupational exposure limits
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

○ **K-REACH**

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not applicable
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable

- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

○ **Chemical Control Act in Korea**

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : List of substance subjected to the PRTR
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : List of substance subjected to the PRTR
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

○ **Safety Control of Dangerous Substances Act**

- Distillates (petroleum), hydrotreated heavy paraffinic : Dangerous substance
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not applicable
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

U.S.A

○ **US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)**

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable

- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not applicable
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

○ **CERCLA Designation of hazardous substances (40 CFR 302.4)**

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not applicable
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

○ **CERCLA Section 302 regulation**

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not applicable
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

○ **CERCLA Section 304 regulation**

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not applicable
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

○ **CERCLA Section 313 regulation**

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not applicable
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

Interntional Convention on Environment

○ **Rotterdam Convention list**

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not applicable
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable

- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

○ **Stockholm Convention list**

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not applicable
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

○ **Montreal Protocol list**

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not applicable
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

National Inventory

○ **Korea**

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable
- ar-Nonyl-N-(nonylphenyl)benzenamine : Not applicable
- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Not applicable
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable

- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

○ **U.S.A**

- Distillates (petroleum), hydrotreated heavy paraffinic : US TSCA phase-in substance
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : US TSCA phase-in substance
- ar-Nonyl-N-(nonylphenyl)benzenamine : US TSCA phase-in substance
- Distillates (petroleum), hydrotreated middle : US TSCA phase-in substance
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : US TSCA phase-in substance
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : US TSCA phase-in substance
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : US TSCA phase-in substance
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : US TSCA phase-in substance
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : US TSCA phase-in substance
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : US TSCA phase-in substance
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : US TSCA phase-in substance

○ **China**

- Distillates (petroleum), hydrotreated heavy paraffinic : China phase-in substance
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : China phase-in substance
- ar-Nonyl-N-(nonylphenyl)benzenamine : China phase-in substance
- Distillates (petroleum), hydrotreated middle : China phase-in substance
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : China phase-in substance
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : China phase-in substance
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : China phase-in substance
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : China phase-in substance
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Not applicable
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

○ **Japan**

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Trade secret : Not applicable
- Lubricating oils (petroleum), (C=20-50) hydrotreated neutral oil-based : Not applicable

- ar-Nonyl-N-(nonylphenyl)benzenamine : Japan ENCS phase-in substance
- Distillates (petroleum), hydrotreated middle : Not applicable
- Phosphorodithioic acid O,O-bis(2-ethylhexyl) ester, zinc salt : Japan ENCS phase-in substance
- Lubricating oils (petroleum), (C=15-30), hydrotreated neutral oil-based : Not applicable
- Dodecyl phenol, sulfurized, carbonates, calcium salts, overbased : Not applicable
- Phosphorodithioic acid O,O-dialkyl(C=1-14) esters zinc salts : Not applicable
- 1-Tridecanamine, N-tridecyl-, branched, reaction products with carbon disulfide 2-ethyl-N-(2-ethylhexyl)- 1-hexanamine and molybdenum oxide (MoO3) : Japan ENCS phase-in substance
- Bis(ditridecylcarbamodithioato-κS,κS']dioxodi-μ-thioxodimolybdenum, branched : Not applicable
- Molybdenum, [N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S'](N,N-ditridecylcarbamodithioato-.kappa.S,.kappa.S')dioxodi-.mu.-thioxodi-, branched : Not applicable
- Molybdenum, bis[N,N-bis(2-ethylhexyl)carbamodithioato-.kappa.S,.kappa.S']dioxodi-.mu.-thioxodi- : Not applicable

16. OTHER INFORMATION

1) Reference

- Sources of information used in preparing this SDS included one or more of the following: Internal technical data, data from OECD eChemPortal, ECHA, NITE, TOXNET, IPCS and KOSHA search results.

2) Issue Date

- 2019-06-20

3) Revision number and Last date revised

○ **Number of revised**

- 2

○ **Date of last revision**

- 2026-01-05

○ **Last Revision History**

- Revision of chemical composition and company information

4) Other

- The information contained in the Safety Data Sheet is at the date of its issuance to the best of our knowledge correct according to the data available to us. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.