Material Safety Data Sheet

Product	VOLVO GREASE 3		
List No.	Issuing date	Last revised date	Department
LB3002	2012-11-30	2018-01-01	Finished Lubricants R&D Team

1. Identification of the substance/mixture and of the company/undertaking

1) Product identifier

- VOLVO GREASE 3

2) Relevant identified uses of the substance or mixture and uses advised against

- Relevant identified uses : (Lubricants and additives)
- Uses advised against : Do not use for any other purpose.

3) Supplier information

○ **Manufacturer information**

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

2. HAZARD IDENTIFICATION

1) Hazard classification

- Not applicable

2) Allocation 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 : Health , Flammability , Reactivity**

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

※ Chemical NFPA Level.

- Distillates (petroleum), hydrotreated heavy paraffinic : Health=1, Flammable=1, Reaction=0
- Distillates, petroleum, solvent-refined heavy naphthenic : Health=1, Flammable=1, Reaction=0
- 12-Hydroxystearic acid : Health=1, Flammable=1, Reaction=0
- Hydrogenated castor oil : Health=1, Flammable=1, Reaction=0
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Health=0, Flammable=1, Reaction=0
- Boric acid, crude natural : Health=2, Flammable=0, Reaction=0
- Business Secret1 : Health=0, Flammable=0, Reaction=0

3. Composition/Information on ingredients

Chemical name	Trade names and Synonyms	CAS No.	EC No.	Contain Ratio(%)
Distillates (petroleum), hydrotreated heavy paraffinic		64742-54-7	265-157-1	70 ~ 80
Distillates, petroleum, solvent-refined heavy naphthenic		64741-96-4	265-097-6	10 ~ 20
12-Hydroxystearic acid		106-14-9	203-366-1	5 ~ 15
Hydrogenated castor oil		8001-78-3	232-292-2	3 ~ 5
N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene		68411-46-1	270-128-1	0 ~ 1
Boric acid, crude natural		10043-35-3	233-139-2	0 ~ 0.29
Business Secret1				1 ~ 3

4. FIRST AID MEASURES

1) Following eye contact

- In case of contact with material, immediately flush eyes with running water for at least 15 minutes.
- Get medical aid immediately.

2) Following 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.
- Get medical aid immediately.

3) Following inhalation

- Move to fresh air.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Seek immediate medial assistance.

4) Following ingestion

- If unconscious but breathing, never give anything by mouth.
- Get medical aid immediately.

5) Advice to physician

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
- Do not apply drugs of the adrenaline ephedrine group.

5. FIRE FIGHTING MEASURES

1) Suitable (and unsuitable) extinguishing media

○ **Suitable 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).

○ **Unsuitable extinguishing media**

- High-pressure water (Unsuitable extinguishing media).

2) Special hazards arising from the substance or mixture

- May ignited from heat, friction or contamination.
- Containers may explode when heated.
- Some may burn but none ignite readily.
- Fire may produce irritating and/or toxic gases.
- May cause toxic effects if inhaled.
- Some liquids produce vapors that may cause dizziness or suffocation.

3) Special protective equipment for firefighters

- Move containers from fire area if you can do it without risk.
- 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

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- Stop leak if you can do it without risk.
- Please note that materials and conditions to be avoided.
- Ventilate the contaminated area.
- Do not touch or walk through spilled material.
- Prevent dust cloud.
- Do not enter areas which have more than 23.5% oxygen in the atmosphere, without respirator or air supplied mask.

2) Environmental precautions

- Prevent entry into waterways, sewers, basements or confined areas.

3) For cleaning up

- Small Spill: Flush area with flooding quantities of water.
- Small Spill: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal.
- 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.

7. HANDLING AND STORAGE

1) Precautions for safe handling

- Please note that materials and conditions to be avoided.
- Wash ... thoroughly after handling.
- Handling refer to engineering control/personal protection section.
- CAUTION: High temperature.
- CAUTION: This material does not contain oxygen and may cause asphyxia if released in a confined area.
- High concentration of this gas will create an oxygen-deficient atmosphere, creating the risk of asphyxiation. Check oxygen content before entering area.
- CAUTION: Vapors displace air and can cause asphyxiation in confined spaces if released material.
- CAUTION: Can be reach toxic concentration quickly in air if released.
- Do not spray. Can be reach toxic concentration quickly in air if sprayed.
- Keep under 20℃. This material evaporate slowly at 20℃ and reach toxic concentration.
- Do not spray. This material does not easily evaporated. But can be reach toxic concentration quickly in air if sprayed.
- Check oxygen content before entering area.
- Do not spray. Can be evaporate quickly if sprayed.
- Use adequate machine for prevention when package handling.
- Avoid any skin and eye contact when insert undiluted solution. Wash ... thoroughly after handling.
- Caution: Dangerous fire hazard when exposed to heat, or flame, sparks.
- Wear an appropriate Personal protection. (See Exposure Controls/Personal Protection section.)

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 containers: AVOID the place where can be damage and contamination.
- Store in a cool/low-temperature, well-ventilated {dry} place {away from heat and ignition sources}
- Choose a place that can be protected from strong oxidizers and acid.
- Drum Handling: Must work at safe place., Loading more than 3 stack is prohibited.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

1) Chemical exposure limits, Biological exposure standard

○ Occupational exposure limits (Domestic)

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

- Distillates, petroleum, solvent-refined heavy naphthenic : TWA Not applicable, STEL Not applicable
- 12-Hydroxystearic acid : TWA Not applicable, STEL Not applicable
- Hydrogenated castor oil : TWA Not applicable, STEL Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : TWA Not applicable, STEL Not applicable
- Boric acid, crude natural : TWA Not applicable, STEL Not applicable
- Business Secret1 : TWA Not applicable, STEL Not applicable

○ Occupational exposure limits (ACGIH)

- Distillates (petroleum), hydrotreated heavy paraffinic : TWA 5mg/m3, STEL Not applicable
- Distillates, petroleum, solvent-refined heavy naphthenic : TWA Not applicable, STEL Not applicable
- 12-Hydroxystearic acid : TWA Not applicable, STEL Not applicable
- Hydrogenated castor oil : TWA Not applicable, STEL Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : TWA Not applicable, STEL Not applicable
- Boric acid, crude natural : TWA Not applicable, STEL Not applicable
- Business Secret2 : TWA Not applicable, STEL Not applicable

○ Biological limit values

- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Distillates, petroleum, solvent-refined heavy naphthenic : Not applicable
- 12-Hydroxystearic acid : Not applicable
- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Boric acid, crude natural : Not applicable
- Business Secret3 : Not applicable

2) Appropriate engineering controls

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

3) Personal protection equipment

○ Respiratory protection

- If high frequency of use or exposure, wear air respirator.
- Wear breathing protection, which needs a confirmation from the Korea Occupational Safety and Health Agency.

○ Eye protection

- Wear suitable protective goggles and face shields.
- Wear face shield to protect eyes from scattering dust or hazardous liquid.
- Wear Non-moisture permeable goggle for dust protection.
- Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

○ Hand protection

- Wear insulated gloves.
- Wear Non-moisture permeable chemical resistance protective gloves(latex, nitrile rubber, PVC) for prevent skin contact.

○ Body protection

- When contact is likely wear chemical resistant, oil and grease resistant, non-moisture permeable shoes and clothes.

9. PHYSICAL AND CHEMICAL PROPERTIES

Item	Input Value
Apperance	Clear, light yellow semi-solid
Smell	a specific smell of Hydrocarbon
Smell Threshold	No Data
pH	No Data
Melting/Freezing Poing	No Data
Boilling Point	No Data
Flash Point	No Data
Evaporating Rate	No Data
Flammability	No Data
Explosibility Range	No Data
Steam Pressure	<0.1
Solubility	No Data
Vapor Density	No Data
Specific Gravity	0.901
Distribution Coefficient	No Data
SelfIgnition Temperature	No Data
Pyrolysis Temperature	No Data
Viscosity	No Data
Molecular Weight	No Data

10. STABILITY AND REACTIVITY

1) Stability and hazardous reactivity

- Stable under normal temperatures and pressures.
- Containers may explode when heated.
- Some may burn but none ignite readily.
- Fire may produce irritating and/or toxic gases.
- May cause toxic effects if inhaled.
- Some liquids produce vapors that may cause dizziness or suffocation.

2) Conditions to avoid

- Ignition source(heat, spark, flame, etc.).

3) Incompatible materials

- Combustibles.
- Irritating and/or toxic gas.

4) Hazardous decomposition products

- Not available

11. TOXICOLOGICAL INFORMATION

1) Exposure route information

○ Inhalation

- After inhalation: No data

○ Skin Contact

- Following skin contact: No data

○ Eye Contact

- After eye contact: No data

○ Ingestion

- After ingestion: No data

2) Health hazard information

○ Acute toxicity

*** Oral - PRODUCT : Not applicable (ATEMix > 2,000 mg/kg)**

- Distillates (petroleum), hydrotreated heavy paraffinic : LD50 >15000 ㎎/kg Species : Rat
- Distillates, petroleum, solvent-refined heavy naphthenic : LD50 >5000 ㎎/kg (Rat)
- 12-Hydroxystearic acid : LD50 > 10000 mg/L (Rat)
- Hydrogenated castor oil : LD50 >20000 ㎎/kg (Rat, no deatsh; OECD TG 401)
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : LD50 >5000 ㎎/kg Species : Rat (bw OECD401)
- Boric acid, crude natural : LD50 2660 ㎎/kg (Rat)

*** Dermal - PRODUCT : Not applicable (ATEMix > 2,000 mg/kg)**

- Distillates (petroleum), hydrotreated heavy paraffinic : LD50 >5000 ㎎/kg Species : Rabbit
- Distillates, petroleum, solvent-refined heavy naphthenic : LD50 >2000 ㎎/kg (Rabbit)
- 12-Hydroxystearic acid : No data
- Hydrogenated castor oil : LD50 >2000 ㎎/kg (Rat, no deaths; 79/831/EWG, Annex V, Part B, GLP) (read across: CAS No.91845-19-1)
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : LD50 >2000 ㎎/kg
- Boric acid, crude natural : LD50 >2000 ㎎/kg (Rabbit)

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

- Distillates (petroleum), hydrotreated heavy paraffinic : No data
- Distillates, petroleum, solvent-refined heavy naphthenic : No data
- 12-Hydroxystearic acid : No data
- Hydrogenated castor oil : No data
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : No data
- Boric acid, crude natural : No data

*** Inhalation(Vapour) - PRODUCT : Not applicable (ATEMix > 20 mg/L)**

- Distillates (petroleum), hydrotreated heavy paraffinic : No data
- Distillates, petroleum, solvent-refined heavy naphthenic : LC50> 5.53 mg/l air/4h (rat; female/male; aerosol inlahation; no deaths; OECD Guideline 403; 1988)
- 12-Hydroxystearic acid : No data
- Hydrogenated castor oil : No data
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : No data

- Boric acid, crude natural : No data

*** Inhalation(Dust, mist) - PRODUCT : Not applicable (ATEMix > 5 mg/L)**

- Distillates (petroleum), hydrotreated heavy paraffinic : LC50 > 5.53 mg/L 4h Rat
- Distillates, petroleum, solvent-refined heavy naphthenic : LC50 > 5.53 mg/L 4h Rat
- 12-Hydroxystearic acid : No data
- Hydrogenated castor oil : LC50 >1.86 ㎎/ℓ 6 hr (Rat) (showed not signs of toxicity.) (OECD TG 403)
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : No data
- Boric acid, crude natural : LC50 > 2.538 mg/l Rat

○ Skin corrosion/Irritation

- Distillates (petroleum), hydrotreated heavy paraffinic : Rabbit - slightly irritating
- Distillates, petroleum, solvent-refined heavy naphthenic : Slightly irritating(rabbit)
- 12-Hydroxystearic acid : Rabbit, non-irritating
- Hydrogenated castor oil : rabbit; non-irritating (EPA OPP 81-5, GLP) (read-across: C10-18 TRIGLYCERIDE)
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : No data
- Boric acid, crude natural : Guinea pig; moderately irritant

○ Serious eye damage/irritation

- Distillates (petroleum), hydrotreated heavy paraffinic : Rabbit, not irritating, OECD TG 405 GLP (Read-across CAS No. 64742-53-6)
- Distillates, petroleum, solvent-refined heavy naphthenic : Rabbit, non-irritating
- 12-Hydroxystearic acid : Rabbit, non-irritating
- Hydrogenated castor oil : rabbit; non-irritating (OECD TG 405, read-across: CAS no.8001-78-3)
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : No data
- Boric acid, crude natural : Human; irritating

○ Respiratory sensitization

- Distillates (petroleum), hydrotreated heavy paraffinic : No data
- Distillates, petroleum, solvent-refined heavy naphthenic : No data
- 12-Hydroxystearic acid : No data
- Hydrogenated castor oil : No data
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : No data
- Boric acid, crude natural : No data

○ Skin sensitization

- Distillates (petroleum), hydrotreated heavy paraffinic : Not sensitising (Guinea Pig)
- Distillates, petroleum, solvent-refined heavy naphthenic : Not sensitising (Guinea Pig)
- 12-Hydroxystearic acid : Not sensitising (Guinea Pig)
- Hydrogenated castor oil : Not sensitising (Guinea Pig) (OECD TG406, GLP)
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not sensitising (Guinea pig, maximization test; OECD 406 GLP)
- Boric acid, crude natural : Not sensitising (Guinea Pig)

○ Carcinogenicity

- Distillates (petroleum), hydrotreated heavy paraffinic : EU CLP:1B The classification as a carcinogen need not apply if it can be shown that the sybstance contains less than 3% DMSO extract as measure by IP 346

- Distillates, petroleum, solvent-refined heavy naphthenic : EU CLP:1B The classification as a carcinogen need not apply if it can be shown that the sybstance contains less than 3% DMSO extract as measure by IP 346

- 12-Hydroxystearic acid : No data

- Hydrogenated castor oil : No data

- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : No data

- Boric acid, crude natural : ACGIH:A4

○ Germ cell mutagenicity

- Distillates (petroleum), hydrotreated heavy paraffinic : CHO cell - Negative

- Distillates, petroleum, solvent-refined heavy naphthenic : In vitro- Negative (Bacterial Reverse Mutation Assay; OECD TG 471)

- 12-Hydroxystearic acid : In vittro chinese hamster Ovary : negative

- Hydrogenated castor oil : In vitro- Negative (Bacterial Reverse Mutation Assay; OECD TG 471, GLP), In vitro chromosome aberration study in mammalian cells: negative (OECD TG 473, GLP, read-across CAS no.91052-13-0), In vivo mi

- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : In Vitro - Bacterial reverse mutation test : negative (HPVIS), In vivo - Chromosome aberration test (Mouse Bone marrow cell) : negative

- Boric acid, crude natural : in vivo bacterial reverse mutation assay; negative, in vivo micronucleus assay; negative

○ Reproductive toxicity

- Distillates (petroleum), hydrotreated heavy paraffinic : Reproductive performance was not adversely affected at any dose level evaluated. (Rat)

- Distillates, petroleum, solvent-refined heavy naphthenic : Rat; Reproductive performance was not adversely affected at any dose level evaluated. There were no neonatal toxicity observed at any dose level. NOAEL(F1, P)>=1000mg/kg bw/day(OECD Guideline 421; rea

- 12-Hydroxystearic acid : No data

- Hydrogenated castor oil : Rat; Reproduction / Developmental Toxicity Screening Test - no effects observed (NOAEL=1000mg/kg bw/day,OECD TG 422, GLP, read-across CAS no.91052-13-0)

- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Treatment-related effects on reproduction were observed at 600 mg/kg/day. These were confined to an increase in pre-implantation losses, resulting in lower offspring numbers at this dose level. The NO

- Boric acid, crude natural : Reported no adverse effects on fertility, lactation, litter size, progeny weight or appearance in rats exposed to either 5.9 or 17.5 mg B/kg bw. The teratogenicity of the test substance was assessed a

○ Specific target organ toxicity (single exposure)

- Distillates (petroleum), hydrotreated heavy paraffinic : No systemic effects were observed

- Distillates, petroleum, solvent-refined heavy naphthenic : No data

- 12-Hydroxystearic acid : Rat; significant effects not observed

- Hydrogenated castor oil : Rat; acute oral toxicity study - significant effects not observed (OECD TG 401, read-across)

- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : No data

- Boric acid, crude natural : Rat; acute toxicity study; No clinical signs were observed.

○ Specific target organ toxicity (repeated exposure)

- Distillates (petroleum), hydrotreated heavy paraffinic : No systemic effects were observed

- Distillates, petroleum, solvent-refined heavy naphthenic : In a 90-day dermal toxicity study, mineral oil basestock was applied to the intact, shaved skin of Sprague-Dawley rats (10/sex/dose) for 13 weeks. No systemic or local effects were considered signific

- 12-Hydroxystearic acid : Rat; Treatment-related effects were not observed.

- Hydrogenated castor oil : Rat; 28d; Critical effects observed:not specified (NOAEL=1000mg/kg bw/day,OECD TG 422, GLP, read-across CAS no.91052-13-0)

- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : The hepatic changes observed were regarded as adaptive in nature. The NOEL for systemic toxicity was therfore considered to be 5 mg/kg/day. (Rat both M/F; Oral Gavage 43-54d; OECD 422 GLP read across

- Boric acid, crude natural : Testicular atrophy and seminiferous tubule degeneration was observed at 6, 12 and 24 months at the highest dose level only. No treatment related effects were observed in the mid and low dose groups. N

○ Aspiration hazard

- Distillates (petroleum), hydrotreated heavy paraffinic : No data

- Distillates, petroleum, solvent-refined heavy naphthenic : 1.99 mm2/s ~ 847 mm2/s (40°C)(EN ISO 3104/ASTM D 445; 2010)

- 12-Hydroxystearic acid : No data

- Hydrogenated castor oil : No data

- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : No data

- Boric acid, crude natural : No data

12. ECOLOGICAL INFORMATION

1) Aquatic toxicity

○ Fish

- Distillates (petroleum), hydrotreated heavy paraffinic : LC50 > 100 mg/L Fish(Pimephales promelas)

- Distillates, petroleum, solvent-refined heavy naphthenic : LC50 >5000 ㎎/ℓ 96 hr Oncorhynchus mykiss

- 12-Hydroxystearic acid : LC50 > 1000 mg/L Fish(Danio rerio)

- Hydrogenated castor oil : ECHA LC50 >10000 ㎎/ℓ 96 hr (Danio rerio (ISO 7346-1))

- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : No data

- Boric acid, crude natural : LC50 74 mg/L Fish(Limanda limanda)

○ Crustacean

- Distillates (petroleum), hydrotreated heavy paraffinic : LC50 > 10000 mg/L Aquatic invertebrates(Gammarus pulex)

- Distillates, petroleum, solvent-refined heavy naphthenic : EC50 >1000 ㎎/ℓ 48 hr Daphnia magna

- 12-Hydroxystearic acid : EC50 > 100 mg/L Aquatic invertebrates(Daphnia magna)

- Hydrogenated castor oil : ECHA EC50 >100 ㎎/ℓ 48 hr Daphnia magna((EU Method C.2, GLP, read-across CAS no.97722-02-6))

- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : EC50 0.82 ㎎/ℓ 24 hr Daphnia magna(OECD 202)

- Boric acid, crude natural : EC50 >= 658 mg/L Aquatic invertebrates(Daphnia magna)

○ Acuatic algae

- Distillates (petroleum), hydrotreated heavy paraffinic : NOEC >= 100 mg/L Aquatic algae(Pseudokirchnerella subcapitata)

- Distillates, petroleum, solvent-refined heavy naphthenic : No data

- 12-Hydroxystearic acid : EC50 > 100 mg/L Aquatic algae (Pseudokirchnerella subcapitata)

- Hydrogenated castor oil : ECHA ErC50 >0.01 ㎎/ℓ 72 hr (Desmodesmus subspicatus (EU Method C.3, GLP, read-across CAS no.67701-30

- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : EC50 ≥100 ㎎/ℓ 96 hr Selenastrum capricornutum(no effect growth rate, read across 101-67-7)

- Boric acid, crude natural : EC50 66 mg/L Aquatic algae(Phaeodactylum tricornutum)

2) Persistence and degradation

○ Persistence

- Distillates (petroleum), hydrotreated heavy paraffinic : log Kow 6
- Distillates, petroleum, solvent-refined heavy naphthenic : 6 log Kow ~ 3.9 log Kow (estimated)
- 12-Hydroxystearic acid : log Pow 5.7
- Hydrogenated castor oil : QSAR 18.75 log Kow
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : 7.05 log Kow (>6 (HPVIS))
- Boric acid, crude natural : log Kow -1.09

○ Degradation

- Distillates (petroleum), hydrotreated heavy paraffinic : No data
- Distillates, petroleum, solvent-refined heavy naphthenic : No data
- 12-Hydroxystearic acid : BOD 83 %
- Hydrogenated castor oil : No data
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : No data
- Boric acid, crude natural : No data

○ biodegradation

- Distillates (petroleum), hydrotreated heavy paraffinic : BOD 77 %
- Distillates, petroleum, solvent-refined heavy naphthenic : 6% degradation after 28 day (aerobic, not readily biodegradable)
- 12-Hydroxystearic acid : No data
- Hydrogenated castor oil : ECHA 64 % degradation after 28 day (readily biodegradable)
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : 9 (%) 28 day (read across 68442-68-2)
- Boric acid, crude natural : No data

3) Bioaccumulative potential

- Distillates (petroleum), hydrotreated heavy paraffinic : No data
- Distillates, petroleum, solvent-refined heavy naphthenic : BCF=5147
- 12-Hydroxystearic acid : No data
- Hydrogenated castor oil : No data
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : 12520 (estimated)
- Boric acid, crude natural : BCF 0 Fish(Oncorhynchus tschawytscha)

4) Mobility in soil

- Distillates (petroleum), hydrotreated heavy paraffinic : No data
- Distillates, petroleum, solvent-refined heavy naphthenic : Koc=208800
- 12-Hydroxystearic acid : Koc 902.5 L/kg
- Hydrogenated castor oil : ECHA 21990000000 Koc
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : 60460 (estimated)
- Boric acid, crude natural : Koc >= 62

5) Hazard to the ozone laye

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

- Distillates, petroleum, solvent-refined heavy naphthenic : Not applicable

- 12-Hydroxystearic acid : Not applicable

- Hydrogenated castor oil : Not applicable

- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable

- Boric acid, crude natural : Not applicable

6) Other adverse effects

- Distillates (petroleum), hydrotreated heavy paraffinic : Fish: NOEC(Pimephales promelas) >5000 mg/L/7d

- Distillates, petroleum, solvent-refined heavy naphthenic : Fish: NOEC(Pimephales promelas) >5000 mg/L/7d

- 12-Hydroxystearic acid : No data

- Hydrogenated castor oil : Crustacea(Daphnia magna) NOEC(21d) ≥0.01mg/L (OECD guideline 211, GLP, read-across CAS no.65381-09-1

- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : No data

- Boric acid, crude natural : No data

13. DISPOSAL CONSIDERATIONS

1) Disposal methods

- Every commercial waste producer shall either treat wastes generated from his/her place of business by him/herself or commission the treatment of such wastes to a person who has license for a waste treatment business under Article 26(3), a person who recycles of such wastes under Article 44(2), a person who has installed and operates a waste disposal facility under Article 4 or 5, a person who has completed the registration of a business of discharging wastes into the sea under Article 18 of the Marine Environment Management Act.

2) Precautions (including disposal of contaminated container of package)

- Wear an appropriate Personal protection. (See Exposure Controls/Personal Protection section.)

- Do not allow spill material to enter sewers, storn water drains, soil, etc.

- Empty containers recycled under environmental laws.

- Empty containers may rupture when pressured.

- Empty containers may explode and residues can be ignited when pressured, cut, weld, heated.

14. TRANSPORT INFORMATION

1) UN No.

- Not applicable

2) Proper shipping name

- Not applicable

3) Class or division

- 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
- This product is not regulated for carriage according to ADR/RID, ADN, IMDG, ICAO/IATA.

15. REGULATORY INFORMATION

1) Occupational Safety and Health Act in Korea - PRODUCT :

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Distillates, petroleum, solvent-refined heavy naphthenic : Not applicable
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : Not applicable
- Business Secret : No data

2) Toxic Chemical Control Act in Korea - PRODUCT :

- Hydrogenated castor oil : Existing Commercial Chemical Substances
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Existing Commercial Chemical Substances
- Distillates (petroleum), hydrotreated heavy paraffinic : Existing Commercial Chemical Substances
- Distillates, petroleum, solvent-refined heavy naphthenic : Existing Commercial Chemical Substances
- 12-Hydroxystearic acid : Existing Commercial Chemical Substances
- Boric acid, crude natural : Pollutant release and transfer register substances,Existing Commercial Chemical Substances
- Business Secret : No data

3) Safety Control of Dangerous Substances Act in Korea - PRODUCT :

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Distillates, petroleum, solvent-refined heavy naphthenic : Not applicable
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : Not applicable
- Business Secret : No data

4) Wastes Control Act in Korea - PRODUCT : 지정 폐기물

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5) Other regulations in KOREA and Abroad regulations

○ Clean Air Conservation Act

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Distillates, petroleum, solvent-refined heavy naphthenic : Not applicable
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : Air pollutants
- Business Secret : No data

○ Persistent Organic Pollutants (POPs) Control Act

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Distillates, petroleum, solvent-refined heavy naphthenic : Not applicable
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : Not applicable
- Business Secret : No data

○ Act on the registration and evaluation of chemicals

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Distillates, petroleum, solvent-refined heavy naphthenic : Not applicable
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : Existing chemicals subject to registration
- Business Secret : No data

○ U.S.A. management information(OSHA regulation)

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Distillates, petroleum, solvent-refined heavy naphthenic : Not applicable
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : Not applicable
- Business Secret : No data

○ U.S.A. management information(CERCLA regulation)

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Distillates, petroleum, solvent-refined heavy naphthenic : Not applicable
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : Not applicable
- Business Secret : No data

○ U.S.A. management information(EPCRA 302 regulation)

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Distillates, petroleum, solvent-refined heavy naphthenic : Not applicable
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : Not applicable
- Business Secret : No data

○ U.S.A. management information(EPCRA 304 regulation)

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Distillates, petroleum, solvent-refined heavy naphthenic : Not applicable
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : Not applicable
- Business Secret : No data

○ U.S.A. management information(EPCRA 313 regulation)

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Distillates, petroleum, solvent-refined heavy naphthenic : Not applicable
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : Not applicable
- Business Secret : Not applicable

○ U.S.A. management information(Rotterdam Convention on Substances)

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Distillates, petroleum, solvent-refined heavy naphthenic : Not applicable
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : Not applicable
- Business Secret : Not applicable

○ U.S.A. management information(Stockholm Convention on Substances)

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Distillates, petroleum, solvent-refined heavy naphthenic : Not applicable
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : Not applicable
- Business Secret : Not applicable

○ U.S.A. management information(Mont- real Protocol on Substances)

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : Not applicable
- Distillates, petroleum, solvent-refined heavy naphthenic : Not applicable
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : Not applicable
- Business Secret : Not applicable

○ EU Classification (CLASSIFICATION)

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : Carc. 1B
- Distillates, petroleum, solvent-refined heavy naphthenic : Carc. 1B
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : Repr. 1B
- Business Secret : No data

○ EU Classification (Risk Phrases)

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : H350
- Distillates, petroleum, solvent-refined heavy naphthenic : H350
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : H360FD
- Business Secret : No data

○ EU Classification (Safety Phrases)

- Hydrogenated castor oil : Not applicable
- N-Phenylbenzenamine reaction products with 2,4,4-trimethylpentene : Not applicable
- Distillates (petroleum), hydrotreated heavy paraffinic : S:53-45
- Distillates, petroleum, solvent-refined heavy naphthenic : S:53-45
- 12-Hydroxystearic acid : Not applicable
- Boric acid, crude natural : S:53-45
- Business Secret : No data

16. OTHER INFORMATION

1) Reference

- The information contained herein is believed to be accurate. It is provided independently of any sale of the product for purpose of hazard communication. It is not intended to constitute performance information concerning the product. No express warranty, or implied warranty of merchantability or fitness for a particular purpose is made with respect to the product or the information contained herein.

- This Safety Data Sheet was compiled with data and information from the following sources: KOSHA, NITE, ESIS, NLM, SIDS, IPCS

2) Print date

- 2012-11-30

3) Revision date

○ Number of revised

- 4

○ Date of last revision

- 2018-01-01

○ Last Revision History

- No revision information

4) Other

- 이 정보는 근로자 건강, 환경, 안전을 보호하고자, 현재 가용할 수 있는 DB를 근거로 하여 작성하였음.