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1. IDENTIFICATION

A. Product Name : **n-hexane 63%**

B. Recommended use of the chemical and restrictions on use :

- o Recommended use : Solvents
- o Restrictions on use : Used for only recommended uses.

C. Manufacturer/Supplier :

1) Manufacturer :

HanwhaTotal Petrochemicals Co.,Ltd			
103, Dokgot2-Ro, Daesan-Eup, Seosan-Si, Chungnam, 31900, Korea			
T e l e p h o n e	82-41-660-6671	F a x	82-41-660-6757

2) Supplier :

HanwhaTotal Petrochemicals Co.,Ltd			
17~20F Hanwha Finance Plaza, 92, Sejong-daero, Jung-gu, Seoul 04525, Korea			
T e l e p h o n e	82-2-3415-9437	F a x	82-2-3415-9390

3) Competitive person

Departments	Safety Environment Division PSM Team		
T e l e p h o n e	82-41-660-6382, 6366	F a x	82-41-660-6348

2. Hazard Identification

A. GHS Classification

1) Physical Hazards


- Flammable liquids : Category 2

2) Health Hazards

- Reproductive toxicity : Category 2
- Specific target organ toxicity(Single exposure) : Category 3(Narcotic effects)
- Specific target organ toxicity(Repeated exposure) : Category 2
- Aspiration hazard : Category 1

3) Environmental Hazards

- Acute aquatic toxicity : Category 2
- Chronic aquatic toxicity : Category 2

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B. GHS label elements

1) Hazard symbols :



2) Signal Words : Danger

3) Hazard statements :

H225 Highly flammable liquid and vapour.

H304 May be fatal if swallowed and enters airways.

H336 May cause drowsiness and dizziness.

H361 Suspected of damaging fertility or the unborn child.

H373 May cause damage to organs through prolonged or repeated exposure (Refer Section SDS 11)

H401 Toxic to aquatic organisms.

H411 Toxic to aquatic life with long lasting effects.

4) Precautionary statements :

■ Prevention

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and understood.

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.

P233 Keep container tightly closed.

P240 Ground/bond container and receiving equipment.

P241 Use explosion-proof electrical/ventilating/lighting/equipment.

P242 Use only non-sparking tools. Flammable liquids (chapter 2.6) 1, 2, 3

P243 Take precautionary measures against static discharge.

P260 Do not breathe gas/mist/vapours/spray.

P261 Avoid breathing gas/mist/vapours/spray.

P271 Use only outdoors or in a well-ventilated area.

P273 Avoid release to the environment.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

■ Response


P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P308+P313 If exposed or concerned: Get medical advice/attention.

P312 Call a POISON CENTER or doctor/physician if you feel unwell.

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P314 Get medical advice/attention if you feel unwell.

P331 Do NOT induce vomiting.

P370+P378 In case of fire: Use Suitable extinguishing media for extinction.

P391 Collect spillage

■ Storage

P403+P233 Store in a well-ventilated place. Keep container tightly closed.

P403+P235 Store in a well-ventilated place. Keep cool.

P405 Store locked up.

■ Disposal

P501 Dispose of contents/container in accordance with local/regional/national/international Regulation.

C. Other hazards which do not result in classification: (NFPA Classification)

- NFPA grade (0 ~ 4 level) : Health : 0, Flammability : 3, Reactivity : 0

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Other Name	CAS No.	(%)
n-Hexane	Hexane	110-54-3	63~68
2-Methylpentane	Isohexane	107-83-5	20~30
Methyl cyclopentane	Cyclopentane, methyl-	96-37-7	5~10


4. FIRST AID MEASURES

A. Eye contact :

- Get medical attention immediately.
- Immediately flush eyes with plenty of water for at least 20 minutes and call a doctor/physician.

B. Skin contact :

- Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- Laundering enough contaminated clothing before reuse.
- Get medical attention immediately.
- Go to the hospital immediately if symptoms(flare, irritate) occur.
- In case of burns, immediately cool affected skin for as long as possible with cold water.

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- Do not remove clothing if adhering to skin.
- Wash skin with soap and water.

C. Inhalation contact

- Specific medical treatment is urgent.
- Do not induce vomiting.
- When exposed to large amounts of steam and mist, move to fresh air.

D. Ingestion contact

- If swallowed: Immediately call a poison center or doctor/physician.
- Do not induce vomiting.
- Get medical attention immediately
- May be fatal if swallowed and enters airways.

E. Delayed and immediate effects and also chronic effects from short and long term exposure

1) Inhalation

- Short term exposure : Irritation, nausea, dyspnea, headache, drowsiness, dizziness
- Long term exposure : Irritation, nausea, dyspnea, headache, drowsiness, dizziness

2) Skin contact

- Short term exposure : Not available
- Long term exposure : Not available

3) Eye contact

- Short term exposure : Not available
- Long term exposure : Not available

4) Ingestion

- Short term exposure : Irritation, nausea, dyspnea, headache, drowsiness, dizziness, unconsciousness, aspiration hazard
- Long term exposure : Not available


F. Notes to physician

- Notify medical personnel of the substance and have them take appropriate protective measures.
- If ingested, consider gastric lavage and active carbon slurry administration.
- If exposed, contact a physician and take special first aid measures such as follow-up investigations.

5. FIREFIGHTING MEASURES

A. Suitable (Unsuitable) extinguishing media

- 1) Suitable extinguishing media : Use water spray, alcohol resistant foam, powder fire extinguisher,

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dry sand earth and carbon dioxide.

2) Unsuitable extinguishing media : Not available

3) Unusual fire(big fire) : Use alcohol resistant foam or water spray.

B. Specific hazards arising from the chemical

1) Hazardous combustion product : Carbon oxide

2) Fire & Explosion hazard :

- Vapors may travel to a source of ignition and ignite.
- May form explosive mixtures at temperatures at or above the flashpoint.
- Containers may explode when heated.
- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- Spilled material may create fire or explosion hazard.
- May cause vapor explosion hazard indoors, outdoors or in sewers.


C. Special protective actions for firefighters

- Rescuers should put on appropriate protective gear.
- Evacuate area and fight fire from a safe distance.
- Many liquids are lighter than water.
- Most vapors are heavier than air, they will spread along ground and collect in low or confined areas.
- Move containers from fire area if you can do it without risk.
- Fire involving Tanks; Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- 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
- Fire involving Tanks; For large fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

6. Accidental Release Measures

A. Personal precautions, protective equipment and emergency procedures

- Do not breathe gas/mist/vapours/spray.
- Clean up spills immediately, observing precautions in Protective Equipment section.
- Isolate hazard area.
- Keep unnecessary and unprotected personnel from entering.
- Eliminate all ignition sources.
- All equipment used when handling the product must be grounded.

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- Stop leak if you can do it without risk.
- Please note that there are materials and conditions to avoid.

B. Environmental precautions

- Prevent runoff and contact with waterways, drains or sewers.
- If large amounts have been spilled, inform the relevant authorities.

C. Methods and materials for containment and cleaning up

- Absorb spills with inert material (e.g., dry sand or earth), then place in a chemical waste container.
- Wipe contaminated areas with water and detergent.
- Notification to central government, local government when emissions at least of the standard amount.
- Dispose of waste in accordance with local regulation.
- Small spill: Collect liquid in an appropriate container or absorb with an inert material sand or other non-combustible material.
- Large spill: Dike for later disposal. Stay upwind and keep out of low areas.


7. HANDLING AND STORAGE

A. Precautions for safe handling

- Use explosion-proof electrical/ventilating/lighting equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- Wash thoroughly after handling.
- Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition.
- Follow all MSDS/label precautions even after container is emptied because they may retain product residues.
- Loosen closure cautiously before opening.
- Use only with adequate ventilation.
- Avoid prolonged or repeated contact with skin.
- Please note that there are materials and conditions to avoid.
- You need measurement of air concentration and ventilation in low, closed and confined areas due to lack of oxygen.

B. Conditions for safe storage, including any incompatibilities

- Do not use plastic containers.
- Keep away from heat/sparks/open flames/hot surfaces. – No smoking.

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- Keep container tightly closed and in a well-ventilated place. Keep cool.
- Avoid direct sunlight.
- The container may be pressurized if exposed to heat.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A. Exposure limits

1) ACGIH TLV :

- [n-Hexane] : TWA=50ppm
- [2-Methylpentane] : TWA=500ppm, STEL=1,000ppm

2) OSHA PEL :

- [n-Hexane] : 50ppm(180mg/m³)(Vacated PELs -TWAs),
500ppm(1,800mg/m³)(Final PELs -TWAs)

3) NIOSH :

- [n-Hexane] : 50ppm(180mg/m³)
- [2-Methylpentane] : TWA=100ppm(350mg/m³)

4) Biological exposure limit


- [n-Hexane] : 0.4mg/L

5) EU

- Austria
 - [n-Hexane] : TWA[TMW]=20ppm(72mg/m³), STEL[KZW](4X15min)=80ppm(288mg/m³)
 - [2-Methylpentane] : TWA[TMW]=200ppm(715mg/m³)(Except Methyl cyclopentane and hexane)
STEL[KZW](4X15min) = 80ppm(288mg/m³)(Except Methyl cyclopentane)
- Belgium
 - [n-Hexane] : TWA=20ppm(72mg/m³)
 - [2-Methylpentane] : TWA=500ppm(1,786mg/m³), STEL=1,000ppm(3,551mg/m³)
- Czech
 - [n-Hexane] : TWA=70mg/m³
 - [2-Methylpentane] : TWA=1,000mg/m³, Ceilings=2,000 mg/m³(Except n-Hexane)
- Germany
 - [Methyl cyclopentane] : TWA MAK=500ppm(1,800mg/m³), TWA AGWE=500ppm(1,800mg/m³)(factor 2 exposure)

6) Others

- Argentina
 - [n-Hexane] : TWA[CMF]=50ppm
- Australia
 - [n-Hexane] : TWA=20ppm(72mg/m³)
 - [2-Methylpentane] : TWA=500ppm(1,760mg/m³), STEL=1,000ppm(3,500mg/m³)
- China
 - [n-Hexane] : TWA=100mg/m³, STEL=180mg/m³

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- Colombia
 - [2-Methylpentane] : TWA=500ppm, STEL=1,000ppm
- Hongkong
 - [2-Methylpentane] : TWA=500ppm(1,760mg/m³), STEL=1,000ppm(3,500mg/m³)

B. Engineering controls

- A system of local and/or general exhaust is recommended to keep employee exposures above the Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. The use of local exhaust ventilation is recommended to control emissions near the source.

C. Individual protection measures, such as personal protective equipment

1) Respiratory protection

- If required to control exposure, use only suitable respirators and components tested and approved under appropriate government standards such as NIOSH.
- Under conditions of frequent use or heavy exposure, Respiratory protection may be needed.
- Respiratory protection is ranked in order from minimum to maximum.
- Consider warning properties before use
- Any chemical cartridge respirator with organic vapor cartridge(s).
- Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s).
- Any air-purifying respirator with a full facepiece and an organic vapor canister.
- For Unknown Concentration or Immediately Dangerous to Life or Health : Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. Any self-contained breathing apparatus with a full facepiece.

2) Eye protection

- Wear primary eye protection such as splash resistant safety goggles with a secondary protection face shield.
- Provide an emergency eye wash station and quick drench shower in the immediate work area.

3) Hand protection

- Wear appropriate chemical resistant glove.

4) Skin protection


- Wear appropriate chemical resistant protective clothing.

5) Others: Not available

9. PHYSICAL AND CHEMICAL PROPERTIES

A. Appearance(physical state, color etc.) : Colorless clear liquid

B. Odor : Gasoline odor

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C. Odor Threshold : 60ppm (n-Hexane)
 D. pH : Neutral
 E. Melting point/Freezing point : Not available
 F. Boiling point/range : 65~70℃
 G. Flash point : -23.5℃(n-Hexane)
 H. Evaporation rate : 15.8 (Butyl acetate=1)(n-Hexane)
 I. Flammability (solid, liquid): Not applicable
 J. Flammability Limit (lower/upper) : 1.1 / 7.5 vol%
 K. Vapor pressure : 124mmHg(20℃) (n-Hexane)
 L. Solubility in water : 0.014%(20℃) (n-Hexane)
 M. Vapor density : 3(air=1) (n-Hexane)
 N. Specific gravity : 0.6754(15.56℃)
 O. Partition Coefficient(n-Octanol/water) : Not available
 P. Auto-ignition temperature : 225℃
 Q. Thermal decomposition : Not available
 R. Viscosity : 0.32cP (25℃)
 S. Molecular weight : About 85.5

10. STABILITY AND REACTIVITY

A. Chemical Stability

- Stable under recommended storage and handling conditions.

B. Possibility of hazardous reactions

- Hazardous Polymerization will not occur.
- Highly flammable liquid and vapour.
- Material may produce irritating and highly toxic gases by heat and combustion
- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- Vapors may form explosive mixtures with air.

C. Conditions to avoid


- Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

D. Incompatible materials

- Oxidizing agents, halogen, combustible material, reducing agent

E. Hazardous decomposition products

- Thermal decomposition product : Carbon oxides
- Corrosive/irritant/toxic fumes and gases

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11. TOXICOLOGICAL INFORMATION

A. Information on the likely routes of exposure

- 1) Respiratory tracts :
 - May be fatal if swallowed and enters airways.
 - May cause drowsiness and dizziness.
- 2) Oral : Not applicable
- 3) Skin contact : Not applicable
- 4) Eye contact : Not applicable

B. Delayed and immediate effects and also chronic effects from short and long term exposure

- 1) Acute toxicity :
 - Oral : Not classified (ATEmix= 25,864mg/kg bw)
 - [n-Hexane] : Rat(male), LD₅₀=24 mL/kg bw (Conversion value : 25,864mg/kg bw) (OECD TG 401)
 - Dermal : Not classified (ATEmix> 2,000mg/kg bw)
 - [n-Hexane] : Rabbit, LD₅₀> 2,000mg/kg bw
 - Inhalation : Not classified (ATEmix> 5,000ppm)
 - [n-Hexane] : Rat(male), LC₅₀(24h) > 5,000ppm(OECD TG 403)
- 2) Skin corrosion/irritation : Not classified
 - [n-Hexane] : Skin irritation test using rabbit showed no irritation. (OECD TG 404)
- 3) Serious eye damage/irritation : Not classified
 - [n-Hexane] : Eye irritation test using rabbit showed no irritation. (Overall irritation score = 0)
- 4) Respiratory sensitization : Not available
- 5) Skin sensitization : Not classified
 - [n-Hexane] : Skin sensitization test using mouse showed no sensitization. (OECD TG 429)
- 6) Carcinogenicity : Not classified
 - KOREA-ISHL : Not listed
 - OSHA : Not listed
 - NTP : Not listed
 - IARC : Not listed
 - ACGIH : Not listed
 - EU CLP : Not listed
- 7) Germ cell mutagenicity : Not classified
 - [n-Hexane] : In vitro bacterial reverse mutation test : negative regardless of metabolic activation system(OECD TG 471, GLP), Gene mutation test using mammalian cultured cells : negative regardless of metabolic activation system(OECD TG 476, GLP), In vivo dominant lethal chromosome aberration test : negative

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8) Reproductive toxicity : Category 2

- [n-Hexane] : Acute inhalation toxicity test using rats result that lesions to the epididymis were seen in 4 of 6 animals sacrificed immediately after exposure. 3 of these animals also had lesions to the testis. No animals died from the exposure, therefore the LC50 is > 5000 ppm (OECD TG 403)

9) STOT-single exposure : Category 3 (Narcotic effects)

- [n-Hexane] : Dizziness and inhibition of central nervous system appeared by acute inhalation toxicity to human.

10) STOT-repeated exposure : Category 2

- [n-Hexane] : The LOAEC for female mice was 500 ppm based on nasal lesions. No NOAEC was found for female mice. The LOAEC for male mice was 1000 ppm based on nasal lesions, and the NOAEC was 500 ppm. Mean body weights of males in the 1000 ppm, 22 hr, exposure group and 10,000 ppm group were significantly reduced. Female mice in the 1000 ppm, 22 hr, exposure group and 10,000 ppm showed decreased locomotor activity. Segmented neutrophils were significantly increased in male mice exposed to 10,000 ppm.

11) Aspiration hazard : Category 1

- [n-Hexane] : Hydrocarbons, viscosity=0.3 mPas (dynamic)(Conversion value: 0.45 mm²/s) (25°C)

12. Ecological Information

A. Ecotoxicity

- Acute aquatic toxicity : Category 2
- Chronic aquatic toxicity : Category 2

1) Fish :

- [n-Hexane] : (*Oryzias latipes*) : LC50(48h)> 1,000 µg/L

2) Crustacea :

- [n-Hexane] : (*Daphnia magna*) : LC50(48h)=45 mmol/m³ (Conversion value : 3.9 mg/l)

3) Algae : Not available


B. Persistence and Degradability

1) Persistence :

- [n-Hexane] : Expected to be high persistence because Log Kow is more than 4. (Log Kow = 4 (20°C, pH=7))
- [Methyl cyclopentane] : Expected to be low persistence because Log Kow is less than 4. (Log Kow = 3.37)

2) Degradability :

- [Methyl cyclopentane] : half-life of about 2.3 in the atmosphere by photochemically induced hydroxyl radical reaction.

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C. Bioaccumulation potential

1) Biodegradation :

- [n-Hexane] : Biodegradation occurs well and there is low potential for bioaccumulation (For 25 days, Biodegradation = 98%)(read-across CAS No. 64742-49-0)(OECD TG 301F)

2) Bioaccumulation :

- [n-Hexane] : Expected to be high bioaccumulative potential because BCF is more than 500. (BCF = 501.187(Estimate))
- [Methyl cyclopentane] : Expected to be low bioaccumulative potential because BCF is less than 500. (BCF = 210)

D. Mobility in soil :

- [n-Hexane] : Can be adsorbed on soil (Koc=2,187.76 (Estimate))
- [Methyl cyclopentane] Can be adsorbed on soil (Koc=1,600)

E. Other adverse effects : Not available

13. DISPOSAL CONSIDERATIONS

A. Disposal methods

- Since more than two kinds of designated waste is mixed, it is difficult to treat separately, then can be reduction or stabilization by incineration or similar process.
- If water separation is possible, pre-process with Water separation process.
- Dispose by incineration.

B. Special precautions for disposal

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

14. TRANSPORT INFORMATION


A. UN No. (IMDG) : 1208

B. Proper shipping name : HEXANES

C. Hazard Class : 3

D. IMDG Packing group : II

E. Marine pollutant : Applicable

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F. Special precautions for user related to transport or transportation measures

- EmS FIRE SCHEDULE : F-E (Non-water-reactive flammable liquids)
- EmS SPILLAGE SCHEDULE : S-D (Flammable liquids)

15. Regulatory Information

A. Additional national and/or international regulatory information

☐ Information of EU Classification

- Classification :
 - [n-Hexane] : Flam. Liq. 2, Repr. 2, Asp. Tox. 1, STOT SE 3, STOT RE 2 *, Skin Irrit. 2, Aquatic Chronic 2
- Risk Phrases :
 - [n-Hexane] : H225, H361f ***, H304, H336, H373 **, H315, H411
- Safety Phrase :
 - [n-Hexane] : P210, P233, P240, P241, P242, P243, P280, P303+P361+P353, P370+P378, P403+P235, P201, P202, P308+P313, P301+P310, P331, P261, P271, P304+P340, P312, P403+P233, P405, P260, P314, P264, P302+P352, P321, P332+P313, P362+P364, P273, P391, P501

☐ U.S. Federal regulations

- OSHA PROCESS SAFETY (29CFR1910.119) : Not regulated
- CERCLA Section 103 (40CFR302.4) :
 - [n-Hexane] : 2,270kg
- EPCRA Section 302 (40CFR355.30) : Not regulated
- EPCRA Section 304 (40CFR355.40) : Not regulated
- EPCRA Section 313 (40CFR372.65) :
 - [n-Hexane] : Applicable

☐ Rotterdam Convention listed ingredients : Not regulated

☐ Stockholm Convention listed ingredients : Not regulated

☐ Montreal Protocol listed ingredients : Not regulated

16. OTHER INFORMATION

A. Reference

- ☐ TSCA; http://iaspub.epa.gov/sor_internet/registry/substreg/searchandretrieve/searchbylist/search.do
- ☐ EU Regulation 1272/2008
- ☐ TOMES; LOLI ; <http://csi.micromedex.com/fraMain.asp?Mnu=0>
- ☐ UN Recommendations on the transport of dangerous goods 17th
- ☐ IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>
- ☐ ECHA CHEM; <http://echa.europa.eu/web/guest/information-on-chemicals/registered->

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substances

- ☐ OECD SIDS; <http://webnet.oecd.org/Hpv/UI/Search.aspx>
- ☐ HSDB; <http://toxnet.nlm.nih.gov/cgi-bin/sis/search2>
- ☐ EPA; <http://www.epa.gov/iris>
- ☐ InChEM; <http://www.inchem.org/>
- ☐ EPISUITE Program ver.4.1

B. Key acronyms

- ☐ ACGIH(American Conference of Governmental Industrial Hygienists)
- ☐ ECHA(European Chemicals Agency)
- ☐ OECD(Organization for Economic Co-operation and Development)
- ☐ CERCLA(Comprehensive Environmental Response, Compensation, and Liability Act)
- ☐ IARC(International Agency for Research on Cancer)
- ☐ NIOSH(National Institute for Occupational Safety and Health)
- ☐ OSHA(Occupational Safety and Health Administration)
- ☐ NTP(National Toxicology Program)
- ☐ TSCA(Toxic Substances Control Act)
- ☐ NFPA(National Fire Protection Association)
- ☐ LC50(Lethal Concentration 50% kill)
- ☐ LD50(Lethal Dose 50% kill)
- ☐ EC50(50% Effect Concentration)
- ☐ STEL(Short Term Exposure Limit)
- ☐ TWA(Time weight Average)
- ☐ TLV(Threshold Limit Value)

C. Issue date : 2009.11.27

D. Revision number and date :

- ☐ Revision number : Rev. 7
- ☐ Revision data : 2018. 05. 28

E. Other

- This SDS is prepared according to the Globally Harmonized System (GHS).
- This safety data sheet is based on current knowledge and information that we know.
- Please note that this information is not a guarantee of the product itself.