



Akzonobel Industrial Coatings Korea

MATERIAL SAFETY DATA SHEET

231 THINNER(A01)

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Version: R0001.0003

1. IDENTIFICATION

A. Product name

- 231 THINNER(A01)

B. Recommended use and restriction on use

- General use : Thinner
- Restriction on use : Do not use for other purposes

C. Manufacturer / Supplier / Distributor information

○ Manufacturer information

- Company name : Akzonobel Industrial Coatings Korea Ltd.
- Address : 60, Bonsan 1-ro 56beon-gil, Jinyeong-eup, Gimhae-si, Gyeongsangnam-do, Korea
- Dept. :
- Telephone number :
- Emergency telephone number : (82) 55-720-0200
- Fax number :
- E-mail address :

○ Supplier/Distributor information

- Company name : Akzonobel Industrial Coatings Korea Ltd.
- Address : 11, Byeolmang-ro 459beon-gil, Danwon-gu, Ansan-si, Gyeonggi-do, Korea
- Dept. :
- Telephone number :
- Emergency telephone number : (82) 31-490-4200
- Fax number :
- E-mail address :

2. HAZARD IDENTIFICATION

A. GHS Classification

- Acute toxicity (dermal) : Category3
- Acute toxicity (inhalation: vapor) : Category3
- Carcinogenicity : Category2
- Reproductive toxicity : Category1A
- Germ cell mutagenicity : Category2
- Serious eye damage/irritation : Category2
- Flammable liquids : Category3
- Specific target organ toxicity(Single exposure) : Category1
- Specific target organ toxicity(Single exposure) : Category3(Narcotic effects)
- Specific target organ toxicity(Single exposure) : Category3(Respiratory tract irritation)
- Specific target organ toxicity(Repeated exposure) : Category1
- Skin corrosion/irritation : Category2



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B. GHS label elements

○ Hazard symbols



○ Signal words

- Danger

○ Hazard statements

- H226 Flammable liquid and vapour
- H311 Toxic in contact with skin
- H315 Causes skin irritation
- H319 Causes serious eye irritation
- H331 Toxic if inhaled
- H335 May cause respiratory irritation.
- H336 May cause drowsiness and dizziness.
- H341 Suspected of causing genetic defects
- H351 Suspected of causing cancer
- H360 May damage fertility or the unborn child
- H370 Causes damage to organs(Refer Section SDS 11)
- H372 Causes damage to organs through prolonged or repeated exposure (Refer Section SDS 11)

○ Precautionary statements

1) 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 dust/fume/gas/mist/vapours/spray.
- P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
- P264 Wash hands thoroughly after handling.
- P270 Do not eat, drink or smoke when using this product.
- P271 Use only outdoors or in a well-ventilated area.
- P280 Wear protective gloves/protective clothing/eye protection/face protection.
- P281 Use personal protective equipment as required.

2) Response

- P302+P352 IF ON SKIN: Wash with plenty of soap and water.
- 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.
- P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P307+P311 If exposed: Call a POISON CENTER or doctor/physician.
- P308+P313 If exposed or concerned: Get medical advice/attention.
- P311 Call a POISON CENTER or doctor/physician.
- P312 Call a POISON CENTER or doctor/physician if you feel unwell.
- P314 Get medical advice/attention if you feel unwell.
- P321 Specific treatment
- P322 Specific measures
- P332+P313 If skin irritation occurs: Get medical advice/attention.
- P337+P313 If eye irritation persists: Get medical advice/attention.
- P361 Remove/Take off immediately all contaminated clothing.



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- P362 Take off contaminated clothing and wash before reuse.
- P363 Wash contaminated clothing before reuse.
- P370+P378 In case of fire: Use Suitable extinguishing media for extinction(Refer Section MSDS 5).

3) 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.

4) 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)

o NFPA grade (0 ~ 4 level)

- Health : 2, Flammability : 3, Reactivity : 0

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Trade names and Synonyms	CAS No.	Content(%)
Toluene	Methylbenzene	108-88-3	20 ~ 30
4-Methyl-2-pentanone	Methylisobutyl ketone, MIBK	108-10-1	10 ~ 20
Acetic acid ethyl ester	Ethyl acetate	141-78-6	10 ~ 20
2-Butoxyethanol	Ethylene glycol monobutyl ether	111-76-2	10 ~ 20
Isobutyl acetate	Acetic acid, 2-methylpropyl ester	110-19-0	10 ~ 20
Cyclohexanone	Hexanon	108-94-1	1 ~ 10
DIACETONE ALCOHOL	4-Hydroxy-4-methyl-2-pentanone	123-42-2	1 ~ 10
Isobutanol	Isobutyl alcohol	78-83-1	1 ~ 10

4. FIRST AID MEASURES

A. Eye contact

- Do not rub your eyes.
- Immediately flush eyes with plenty of water for at least 15 minutes and call a doctor/physician.
- Get medical attention immediately.
- Go to the hospital immediately if symptoms(flare, irritate) occur.
- Remove contact lenses if worn.

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.
- Prevent the spread of the skin.
- Remove contaminated clothing, shoes and isolate.
- Take the doctor's examination.
- Wash thoroughly after handling.
- Wear gloves when washing the patient, and please avoid contact with contaminated clothing.

C. Inhalation contact

- When exposed to large amounts of steam and mist, move to fresh air.
- Take specific treatment if needed.
- Get medical attention immediately.
- If breathing is stopped or irregular, give artificial respiration and supply oxygen.
- Take the doctor's examination.



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D. Ingestion contact

- About whether I should induce vomiting Take the advice of a doctor.
- Rinse your mouth with water immediately.
- Get medical attention immediately.

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

- Not available

F. Notes to physician

- Notify medical personnel of contaminated situations and have them take appropriate protective measures.
- If exposed or concerned, get medical attention/advice.

5. FIREFIGHTING MEASURES**A. Suitable (Unsuitable) extinguishing media**

- Dry chemical, carbon dioxide, regular foam extinguishing agent, spray
- Avoid use of water jet for extinguishing

B. Specific hazards arising from the chemical

- Not available

C. Special protective actions for firefighters

- Move containers from fire area, if you can do without the risk.
- Keep unauthorized personnel out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- Notify your local firestation and inform the location of the fire and characteristics hazard.
- Using a unattended and water devices in case of large fire and leave alone to burn if you do not imperative.
- Keep containers cool with water spray.
- Vapor or gas is burned at distant ignition sources can be spread quickly.
- The extremely low flash point made by fire-fighters may be less effective at digesting weeks.

6. ACCIDENTAL RELEASE MEASURES**A. Personal precautions, protective equipment and emergency procedures**

- Ventilate closed spaces before entering.
- Move container to safe area from the leak area.
- Remove all sources of ignition.
- Do not direct water at spill or source of leak.
- Avoid skin contact and inhalation.
- Cleanup and disposal under expert supervision is advised.
- Keep unauthorized people away, isolate hazard area and deny entry.

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

- Large spill : Stay upwind and keep out of low areas. Dike for later disposal.
- Notification to central government, local government. When emissions at least of the standard amount
- Dispose of waste in accordance with local regulation.
- Appropriate container for disposal of spilled material collected.
- Small leak: sand or other non-combustible material, please let use absorption.



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- Wipe off the solvent.
- Dike for later disposal.
- Do not use plastic containers.
- Spilled material should be treated as a potential risk of waste collected.

7. HANDLING AND STORAGE

A. Precautions for safe handling

- Avoid direct physical contact.
- Comply with all applicable laws and regulations for handling
- Do not handle until all safety precautions have been read and understood.
- Operators should wear antistatic footwear and clothing.
- Do not inhale the steam prolonged or repeated.
- Avoid contact with heat, sparks, flame or other ignition sources.
- Contaminated work clothing should not be allowed out of the workplace.

B. Conditions for safe storage, including any incompatibilities

- Save in cool, dry and well ventilated place.
- Do not use damaged containers.
- Save applicable laws and regulations.
- Do not apply any physical shock to container.
- Keep sealed when not in use.
- By specifying a storage area for carcinogenic substances.
- Collected them in sealed containers.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A. Exposure limits

- o ACGIH TLV
 - [Toluene] : TWA 50 ppm
 - [4-Methyl-2-pentanone] : TWA 50 ppm
 - [Acetic acid ethyl ester] : TWA 400 ppm
 - [2-Butoxyethanol] : TWA 20 ppm
 - [Isobutyl acetate] : TWA 150 ppm
 - [Cyclohexanone] : TWA 20 ppm
 - [DIACETONE ALCOHOL] : TWA 50 ppm
 - [Isobutanol] : TWA 50 ppm

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. Personal protective equipment

- o Respiratory protection
 - 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.



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- **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.
- **Hand protection**
 - Wear appropriate chemical resistant glove.
- **Skin protection**
 - Wear appropriate chemical resistant protective clothing.
- **Others**
 - Not available

9. PHYSICAL AND CHEMICAL PROPERTIES

A. Appearance	
- Appearance	Liquid
- Color	Clear
B. Odor	Not available
C. Odor threshold	Not available
D. pH	Not available
E. Melting point/Freezing point	Not available
F. Initial Boiling Point/Boiling Ranges	Not available
G. Flash point	34 °C
H. Evaporation rate	Not available
I. Flammability(solid, gas)	Not available
J. Upper/Lower Flammability or explosive limits	Not available
K. Vapour pressure	Not available
L. Solubility	Not available
M. Vapour density	Not available
N. Specific gravity	0.83 ~ 0.93
O. Partition coefficient of n-octanol/water	Not available
P. Autoignition temperature	465 °C
Q. Decomposition temperature	Not available
R. Viscosity	Not available
S. Molecular weight	Not available

10. STABILITY AND REACTIVITY

A. Chemical stability

- This material is stable under recommended storage and handling conditions.

B. Possibility of hazardous reactions

- Cylinders exposed to fire may vent and release flammable gas.

C. Conditions to avoid

- Avoid contact with incompatible materials and condition.
- Avoid : Accumulation of electrostatic charges, Heating, Flames and hot surfaces
- Avoid contact with heat, sparks, flame or other ignition sources.

D. Incompatible materials

- Not available

E. Hazardous decomposition products

- May emit flammable vapour if involved in fire.



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11. TOXICOLOGICAL INFORMATION

A. Information on the likely routes of exposure

- **(Respiratory tracts)**
 - May cause respiratory irritation.
- **(Oral)**
 - Not available
- **(Eye/Skin)**
 - Causes serious eye irritation
 - Causes skin irritation

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

- **Acute toxicity**
 - * **Oral**
 - [Toluene] : LD50 2600 mg/kg Rat
 - [4-Methyl-2-pentanone] : LD50 = 2080 mg/kg Rat
 - [Acetic acid ethyl ester] : LD50 5620 mg/kg Rat
 - [2-Butoxyethanol] : LD50 = 1746 mg/kg Rat
 - [Isobutyl acetate] : LD50 = 15400 mg/kg Rat
 - [Cyclohexanone] : LD50 = 1800 mg/kg Rat
 - [DIACETONE ALCOHOL] : LD50 = 2520 mg/kg Rat
 - [Isobutanol] : LD50 = 2460 mg/kg Rat
 - * **Dermal**
 - [Toluene] : LD50 120000 mg/kg Rat
 - [4-Methyl-2-pentanone] : LD50 = 3000 mg/kg rabbit
 - [Acetic acid ethyl ester] : LD50 > 18000 mg/kg Rabbit
 - [2-Butoxyethanol] : LD50 = 99 mg/kg Rabbit
 - [Isobutyl acetate] : LD50 = 17400 mg/kg rabbit
 - [Cyclohexanone] : LD50 = 947 mg/kg Rabbit
 - [DIACETONE ALCOHOL] : LD50 = 13630 mg/kg Rabbit
 - [Isobutanol] : LD50 = 2460 mg/kg Rabbit
 - * **Inhalation**
 - [Toluene] : LC50 12.5 mg/ℓ 4 hr Rat
 - [4-Methyl-2-pentanone] : LC50 = 8.2 mg/ℓ Rat
 - [Acetic acid ethyl ester] : Steam LC50 100 mg/ℓ 4 hr Rat (LC50 = 200 mg/L/1hr conversion $\frac{1}{10}$)
 - [2-Butoxyethanol] : LC50 = 2.2 mg/ℓ 4 hr Rat
 - [Isobutyl acetate] : LC50 = 8000 ppm 4 hr Rat
 - [Cyclohexanone] : Steam LC50 = 2.375 mg/ℓ Mouse
- **Skin corrosion/irritation**
 - Causes skin irritation
- **Serious eye damage/irritation**
 - Causes serious eye irritation
- **Respiratory sensitization**
 - Not available
- **Skin sensitization**
 - Not available
- **Carcinogenicity**
 - * **IARC**
 - [4-Methyl-2-pentanone] : 2B
 - [2-Butoxyethanol] : 3
 - [Cyclohexanone] : 3
 - * **OSHA**
 - Not available
 - * **ACGIH**



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- [4-Methyl-2-pentanone] : A3
- [2-Butoxyethanol] : A3
- [Cyclohexanone] : A3

*** NTP**

- Not available

*** EU CLP**

- Not available

○ **Germ cell mutagenicity**

- Suspected of causing genetic defects

○ **Reproductive toxicity**

- May damage fertility or the unborn child

○ **STOT-single exposure**

- Causes damage to organs(Refer Section SDS 11)
- May cause drowsiness and dizziness.
- May cause respiratory irritation.

○ **STOT-repeated exposure**

- Causes damage to organs through prolonged or repeated exposure (Refer Section SDS 11)

○ **Aspiration hazard**

- Not available

12. ECOLOGICAL INFORMATION

A. Ecotoxicity

○ **Fish**

- [Toluene] : LC50 24 mg/ℓ 96 hr Oncorhynchus mykiss
- [4-Methyl-2-pentanone] : LC50 = 540 mg/ℓ 96 hr
- [Acetic acid ethyl ester] : LC50 230 mg/ℓ 96 hr Pimephales promelas
- [2-Butoxyethanol] : LC50 = 1250 mg/ℓ 96 hr
- [Isobutyl acetate] : LC50 = 17 mg/ℓ 96 hr
- [Cyclohexanone] : LC50 = 527 mg/ℓ 96 hr Pimephales promelas
- [DIACETONE ALCOHOL] : LC50 = 420 mg/ℓ 96 hr
- [Isobutanol] : LC50 = 1000 mg/ℓ 96 hr

○ **Crustaceans**

- [Toluene] : EC50 11.5 mg/ℓ 48 hr Daphnia magna
- [4-Methyl-2-pentanone] : EC50 = 170 mg/ℓ 48 hr
- [Acetic acid ethyl ester] : EC50 717 mg/ℓ 48 hr Daphnia magna
- [2-Butoxyethanol] : LC50 = 5.4 mg/ℓ 96 hr
- [Cyclohexanone] : EC50 = 820 mg/ℓ 24 hr Daphnia magna
- [Isobutanol] : EC50 = 1250 mg/ℓ 24 hr

○ **Algae**

- [Acetic acid ethyl ester] : EC50 1800 ~ 3200 mg/ℓ 72 hr (Selenastrum sp.)
- [Cyclohexanone] : EC50 = 32.9 mg/ℓ 72 hr (Chlamydomonas reinhardtii(Algae))

B. Persistence and degradability

○ **Persistence**

- [Toluene] : log Kow 2.73
- [4-Methyl-2-pentanone] : log Kow = 1.38
- [Acetic acid ethyl ester] : log Kow 0.73
- [2-Butoxyethanol] : log Kow = 0.83
- [Isobutyl acetate] : log Kow = 1.78
- [Cyclohexanone] : log Kow = 0.81
- [Isobutanol] : log Kow = 0.8

○ **Degradability**

- [Acetic acid ethyl ester] : BOD5/COD 0.81



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C. Bioaccumulative potential○ **Bioaccumulative potential**

- [Acetic acid ethyl ester] : BCF 30
- [Cyclohexanone] : BCF = 2.4 (Estimates)

○ **Biodegradation**

- [Toluene] : 86 (%) 20 day
- [Acetic acid ethyl ester] : 100 (%) 28 day
- [2-Butoxyethanol] : Biodegradability = 96 (%)
- [DIACETONE ALCOHOL] : Biodegradability = 100 (%) 14 day (Aerobic, Easily decomposed)

D. Mobility in soil

- [Isobutanol] : log Kow = 0.8 (1)

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.
- Will be pre-processed by the separation of oil and water.

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, person who establish and operate waste disposal facilities.
- Dispose of waste in accordance with all applicable laws and regulations.

14. TRANSPORT INFORMATION**A. UN number**

- 1263

B. Proper shipping name

- Paint including paint, lacquer, enamel, stain, shellac solutions, varnish, polish, liquid filler, and liquid lacquer base

C. Hazard class

- 3

D. Packing group

- III

E. Marine pollutant

- Not applicable

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

- Local transport follows in accordance with Dangerous goods Safety Management Law.
- Package and transport follow in accordance with Department of Transportation (DOT) and other regulatory agency requirements.
- EmS FIRE SCHEDULE : F-E (Non-water-reactive flammable liquids)
- EmS SPILLAGE SCHEDULE : S-E (Flammable liquids, floating on water)



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15. REGULATORY INFORMATION

A. National and/or international regulatory information

○ POPs Management Law

- Not applicable

○ Information of EU Classification

* Classification

- [Toluene] : F; R11 Repr.Cat.3; R63 Xn; R48/20-65 Xi; R38 R67
- [4-Methyl-2-pentanone] : F; R11 Xn; R20 Xi; R36/37 R66
- [Acetic acid ethyl ester] : F; R11 Xi; R36 R66 R67
- [2-Butoxyethanol] : Xn; R20/21/22 Xi; R36/38
- [Isobutyl acetate] : F; R11 R66
- [Cyclohexanone] : R10Xn; R20
- [DIACETONE ALCOHOL] : Xi; R36
- [Isobutanol] : R10 Xi; R37/38-41 R67

* Risk Phrases

- [Toluene] : R11, R38, R48/20, R63, R65, R67
- [4-Methyl-2-pentanone] : R11, R20, R36/37, R66
- [Acetic acid ethyl ester] : R11, R36, R66, R67
- [2-Butoxyethanol] : R20/21/22, R36/38
- [Isobutyl acetate] : R11, R66
- [Cyclohexanone] : R10, R20
- [DIACETONE ALCOHOL] : R36
- [Isobutanol] : R10, R37/38, R41, R67

* Safety Phrase

- [Toluene] : S2, S36/37, S46, S62
- [4-Methyl-2-pentanone] : S2, S9, S16, S29
- [Acetic acid ethyl ester] : S2, S16, S26, S33
- [2-Butoxyethanol] : S2, S36/37, S46
- [Isobutyl acetate] : S2, S16, S23, S25, S29, S33
- [Cyclohexanone] : S2, S25
- [DIACETONE ALCOHOL] : S2, S24/25
- [Isobutanol] : S2, S7/9, S13, S26, S37/39, S46

○ U.S. Federal regulations

* OSHA PROCESS SAFETY (29CFR1910.119)

- Not applicable

* CERCLA Section 103 (40CFR302.4)

- [Toluene] : 453.599 kg 1000 lb
- [4-Methyl-2-pentanone] : 2267.995 kg 5000 lb
- [Acetic acid ethyl ester] : 2267.995 kg 5000 lb
- [Isobutyl acetate] : 2267.995 kg 5000 lb
- [Cyclohexanone] : 2267.995 kg 5000 lb
- [Isobutanol] : 2267.995 kg 5000 lb

* EPCRA Section 302 (40CFR355.30)

- Not applicable

* EPCRA Section 304 (40CFR355.40)

- Not applicable

* EPCRA Section 313 (40CFR372.65)

- [Toluene] : Applicable
- [4-Methyl-2-pentanone] : Applicable

○ Rotterdam Convention listed ingredients

- Not applicable

○ Stockholm Convention listed ingredients

- Not applicable

○ Montreal Protocol listed ingredients



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- Not applicable

16. OTHER INFORMATION

A. 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

B. Issue date

- 2013-06-25

C. Revision number and Last date revised

- 2 times, 2013-07-01

D. Other

- This MSDS is prepared according to the Globally Harmonized System (GHS).



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