



# MATERIAL SAFETY DATA SHEET

DEAHEUNG CHEMICAL CO., LTD. [www.dhcbond.com](http://www.dhcbond.com)



Product Name	D-5250NF
--------------	----------

## 1. Product and Company Identification

- A. Product Name D-5250NF
- B. Recommended use of the chemical and restrictions on use
- Recommended use of the chemical Bond the Metal, wood, rubber, HPM, plastics etc.
  - Restrictions on use of the product Do not use for purposes other than adhesive.
- C. Manufacturer/Supplier/Distributor Information
- Name DAEHEUNG CHEMICAL CO., LTD.
  - Address 68, Sandan-ro 64beon-gil, Pyeongtaek-si, Gyeonggi-do, Korea
  - Emergency phone number 82-31-668-1424

## 2. Hazards identification

- A. Hazard-Risk Classification
- Flammable Liquid : Category 2
  - Acute toxicity (Inhalation:vapor) : Category 4
  - Skin Corrosion/Irritation : Category 1
  - Serous Eyes Damage/Eye Irritation : Category 1
  - Carcinogenicity : Category 1B
  - Germ cell mutagenicity : Category 2
  - Reproductive Toxicology : Category 2
  - Target Organ Toxicity (Single Exposure) : Category 3(Narcotic effects)
  - Target Organ Toxicity (Single Exposure) : Category 1
  - Target Organ Toxicity (Single Exposure) : Category 3(Respiratory tract irritation)
  - Target Organ Toxicity (Repeated Exposure) : Category 1
  - Aspiration Harzard : Category 1
  - Chronic hazards to the aquatic environment : Category 2

### B. Label elements including precautionary statements

- Symbol



- Signal Word

Danger

- Hazard-Risk Statement

H225 Highly flammable liquid and vapour Causes severe skin burns and eye damage  
H304 May be fatal if swallowed and enters airways  
H314 Causes severe skin burns and eye damage  
H318 Causes serious eye damage  
H332 Harmful if inhaled  
H335 May cause respiratory irritation  
H336 May cause drowsiness or dizziness  
H341 Suspected of causing genetic defects  
H350 May cause cancer  
H361 Suspected of damaging fertility or the unborn child

– Hazard-Risk Statement	H370 Causes damage to organs H372 Causes damage to organs through prolonged or repeated exposure H411 Toxic to aquatic life with long lasting effects
– Precautionary Statement	
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/light/equipment P242 Use only non-sparking tool 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 thoroughly after handling P270 Do not eat, drink or smoke when using this product 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 P301+330+331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting 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 P310 Immediately 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 P331 Do NOT induce vomiting P363 Wash contaminated clothing before reuse P370+378 In case of fire: Use Dry chemical, CO <sub>2</sub> , sand, earth, water spray or regular foam 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 to in accordance with local/regional/national/international regulation.

C. Other Hazard-Risk which are not included in the classification criteria (e.g. dust explosion hazard)

DICHLOROMETHANE	
Health	2
Fire	1
Reactivity	0
TOLUENE	
Health	2

Fire	3
Reactivity	0
TRICHLOROETHYLENE	
Health	2
Fire	1
Reactivity	0
TETRACHLOROETHYLENE	
Health	2
Fire	0
Reactivity	0
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE ...	
Health	1
Fire	1
Reactivity	0
NEOPRENE	
Health	1
Fire	1
Reactivity	0

### 3. Composition/Information on ingredients

Chemical Name	Other name	CAS number	Content(%)
DICHLOROETHYLENE	Methylene Chloride	75-09-2	15~25
TOLUENE	Methyl Benzene Toluol	108-88-3	5~15
TRICHLOROETHYLENE	TCE Trichloro ethylene	79-01-6	20~30
TETRACHLOROETHYLENE		127-18-4	10~20
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE ...	PHENOL, P-tert-BUTYL-,	25085-50-1	5~10
NEOPRENE	SYNTHETIC RUBBER	9010-98-4	10~20

### 4. First aid measures

#### A. Eye contact

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing

If eye irritation persists get medical advice/attention

#### B. Skin contact

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

If skin irritation occurs: Get medical advice/attention

Remove and isolate contaminated clothing and shoes.

In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.

Shower and wash with soap and water.

#### C. Inhalation

Do NOT induce vomiting

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

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

#### D. Ingestion

IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician

Do NOT induce vomiting

D. Ingestion	Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
E. Indication of immediate medical attention and notes for physician	Call a POISON CENTER or doctor/physician. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

## 5. Fire-Fighting measures

A. Suitable (and unsuitable) extinguishing media	Dry chemical, CO <sub>2</sub> , sand, earth, water spray or regular foam.
B. Specific hazards arising from the chemical (e.g. nature of any hazardous combustion products)	Highly flammable liquid and vapour Vapors may travel to source of ignition and flash back. Fire may produce irritating, corrosive and/or toxic gases. Those substances designated with a (P) may polymerize explosively when heated or involved in a fire. Containers may explode when heated. Flammable; may be ignited by heat, sparks or flames. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). When heated, vapors may form explosive mixtures with air: indoors, outdoors and sewers explosion hazards. Dust may form explosive mixtures with air
C. Special protective equipment and precautions for fire-fighters	Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection. Fight fire with normal precautions from a reasonable distance Vapors from liquefied gas are initially heavier than air and spread along ground. Move containers from fire area if you can do it without risk. Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire.

## 6. Accidental release measures

A. Personal precautions, protective equipment and emergency procedures	Avoid breathing dust/fume/gas/mist/vapours/spray ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain. Isolate spill or leak area immediately for at least 500 meters (1/3 mile) in all directions. Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire. All equipment used when handling the product must be grounded. Stop leak if you can do it without risk. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Use clean non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal.
B. Environmental precautions and protective procedures	Prevent entry into waterways, sewers, basements or confined areas.
C. Methods and materials for containment and cleaning up	Dike fire-control water for later disposal; do not scatter the material. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Use clean non-sparking tools to collect absorbed material. Dike far ahead of liquid spill for later disposal.

## 7. Handling and storage

A. Precautions for safe handling	<p>Do not handle until all safety precautions have been read and understood.</p> <p>Use explosion-proof electrical/ventilating/light/equipment.</p> <p>Use only non-sparking tools.</p> <p>Avoid breathing dust/fume/gas/mist/vapours/spray.</p> <p>Wash thoroughly after handling.</p> <p>Do not eat, drink or smoke when using this product.</p> <p>Use only outdoors or in a well-ventilated area.</p> <p>Follow all MSDS/label precautions even after container is emptied because it may retain product residues.</p> <p>Keep cool. Protect from sunlight.</p> <p>All equipment used when handling the product must be grounded.</p> <p>Store in a well ventilated place. Keep container tightly closed</p> <p>Heating may cause a fire or explosion</p> <p>Keep out of low areas.</p> <p>Ventilate closed spaces before entering.</p>
B. Conditions for safe storage (including any incompatibilities)	<p>Keep away from heat/sparks/open flames/hot surfaces – No smoking</p> <p>Store in a well ventilated place. Keep container tightly closed</p> <p>Store in a well ventilated place. Keep cool</p> <p>Do not eat, drink or smoke when using this product</p>

## 8. Exposure controls & personal protection

### A. Control parameters (e.g. occupational exposure limit values, biological limit values)

#### – Occupational exposure limit values

DICHLOROETHYLENE	TWA – 50ppm 175mg/m <sup>3</sup>
TOLUENE	TWA – 50ppm 188mg/m <sup>3</sup> STEL – 150ppm 560mg/m <sup>3</sup>
TRICHLOROETHYLENE	TWA – 50ppm 270mg/m <sup>3</sup> STEL – 200ppm 1080mg/m <sup>3</sup>
TETRACHLOROETHYLENE	TWA – 25ppm 170mg/m <sup>3</sup> STEL – 100ppm 680mg/m <sup>3</sup>
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available

#### – ACGIH limit values

DICHLOROETHYLENE	TWA 50ppm
TOLUENE	TWA 20ppm
TRICHLOROETHYLENE	TWA 10ppm, STEL 25ppm
TETRACHLOROETHYLENE	TWA 25ppm, STEL 100ppm
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available

#### – Biological limit values

DICHLOROETHYLENE	TWA 50ppm
TOLUENE	TWA 20ppm
TRICHLOROETHYLENE	TWA 10ppm STEL 25ppm
TETRACHLOROETHYLENE	No data available
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available

B. Appropriate engineering controls	Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Provide adequate ventilation.
-------------------------------------	--

### C. Personal protective equipment

- Respiratory protection                      The filter class must be suitable for the maximum contaminant concentration(gas/vapour/aerosol/particulates) that may arise when handling the product.
- Eye protection                                Wear eye protection/face protection.
- Hands protection                              Wear proper chemical resistant gloves.
- Body protection                                Wear proper Protective clothing.

## 9. Physical and chemical properties

### A. Appearance

Physical state	Viscous liquid
Color	Yellowish

### B. Odour

Solvent

### C. Odour threshold

No data available

### D. pH

Not Applicable

### E. Melting point/freezing point

Not Applicable

### F. Initial boiling point and boiling range

68.7 °C (40~74 °C)

### G. Flashing point

No data available

### H. Evaporation rate

No data available

### I. Flammability(solid, gas)

No data available

### J. Upper/lower flammability or explosive limits

15~23 % / 7.5~13 %

### K. Vapor pressure

100~400 mmHg (20 °C)

### L. Solubility

Not soluble in water

### M. Vapor density

2.9

### N. Relative density

1.20~1.30

### O Partition coefficient:n-octanol/water

No data available

### P. Auto-ignition temperature

556 °C

### Q. Decomposition temperature

No data available

### R. Viscosity

6,400~6,600 cps (20°C)

### S. Formula mass

No data available

## 10. Stability and reactivity

### A. Chemical stability and possibility of hazardous reactions

Highly flammable liquid and vapor  
Containers may explode when heated.  
  
HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.  
Vapor explosion and poison hazard indoors, outdoors or in sewers.  
  
Vapors may travel to source of ignition and flash back.  
Vapors may cause dizziness or suffocation.  
  
Fire may produce irritating, corrosive and/or toxic gases.  
Inhalation or contact with material may irritate or burn skin and eyes.  
  
B. Conditions to avoid                              Keep away from heat/sparks/open flames/hot surfaces – No smoking.  
C. Incompatible materials                              No data available  
D. Hazardous decomposition products                              Fire may produce irritating, corrosive and/or toxic gases.

## 11. Toxicological information

A. Information on the likely routes of exposure                              No data available

## B. Health hazards information

### - Acute toxic

#### Oral

DICHLOROETHYLENE	LD50 1600 mg/kg Rat
TOLUENE	LD50 2600 mg/kg Rat
TRICHLOROETHYLENE	LD50 5400 ~ 7200 mg/kg Rat
TETRACHLOROETHYLENE	LD50 13000 mg/kg Rat
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	LD50 40000 mg/kg Rat

#### Dermal

DICHLOROETHYLENE	No data available
TOLUENE	LD50 120000 mg/kg Rat
TRICHLOROETHYLENE	LD50 29000 mg/kg Rabbit
TETRACHLOROETHYLENE	LD50 5000 mg/kg Mouse
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available

#### Inhalation

DICHLOROETHYLENE	LC50 53 mg/ℓ 6 hr
TOLUENE	LC50 12.5 mg/ℓ 4 hr Rat
TRICHLOROETHYLENE	No data available
TETRACHLOROETHYLENE	Vapor LC50 27.8 mg/ℓ 4 hr Rat
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available

### - Skin corrosive/irritant

DICHLOROETHYLENE	Moderate irritation but no skin corrosion observed
TOLUENE	Based on the evidence of moderate skin irritation caused by toluene in rabbit primary skin irritation test (4 hour exposure) (EU-RAR No. 30, 2003).
TRICHLOROETHYLENE	Based on the evidence of severe primary skin irritation in rabbit primary skin irritation tests (EU-RAR No.31, 2004).
TETRACHLOROETHYLENE	Based on the description in the report on human epidemiological studies and rabbit skin irritation tests (CERI-NITE Hazard Assessment No.65 (2005)): Severe skin irritation associated with dermal necrosis is observed, although the substance should be placed in Category 1A from the viewpoint of safety.
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available

### - Serious eye damage/eye irritation

DICHLOROETHYLENE	Moderate or severe eyelid irritation
TOLUENE	Based on the description that the subjects recovered from the damage within 7 days in rabbit eye irritation test conducted in accordance with the OECD test guideline (EU-RAR No. 30, 2003), which suggests that toluene causes mild eye irritation.
TRICHLOROETHYLENE	Based on the description in EU-RAR No.31 (2004) of human accidents: an accidental exposure to a droplet of undiluted solution caused eye irritation and corneal epithelial damage, both of which healed completely after a few days; the substance is considered "mildly irritating" to the eyes, though the amount of the droplet is unknown. The results of rabbit eye irritation tests, meanwhile, suggest mild to severe conjunctivitis and epithelial keratosis (after seven days of exposure), both of which healed after two weeks.
TETRACHLOROETHYLENE	Based on the description in the report on rabbit eye irritation tests (CERI-NITE Hazard Assessment No.65 (2005)): "moderate irritant."
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available

NEOPRENE	No data available
- Respiratory sensitization	
DICHLOROETHYLENE	No data available
TOLUENE	No data available
TRICHLOROETHYLENE	Based on the description in EU-RAR No.31 (2004) "there is no report indicating respiratory sensitization in humans, while accidental inhalation exposure cases suggest that trichloroethane does not cause respiratory sensitization."
TETRACHLOROETHYLENE	No data available
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available
- Skin sensitization	
DICHLOROETHYLENE	No data available
TOLUENE	Based on the results of guinea pig maximization tests (EU-RAR No. 30, 2003) suggesting that toluene causes no skin irritation.
TRICHLOROETHYLENE	No data available
TETRACHLOROETHYLENE	No data available
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available
- Carcinogenicity	
Occupational Health and Safety Act	
DICHLOROETHYLENE	No data available
TOLUENE	No data available
TRICHLOROETHYLENE	Carcinogenicity
TETRACHLOROETHYLENE	No data available
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available
Ministry of Employment and Labor Notice	
DICHLOROETHYLENE	2
TOLUENE	No data available
TRICHLOROETHYLENE	1B
TETRACHLOROETHYLENE	1B
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available
IARC	
DICHLOROETHYLENE	2A
TOLUENE	3
TRICHLOROETHYLENE	1
TETRACHLOROETHYLENE	2A
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	3
OSHA	
DICHLOROETHYLENE	No data available
TOLUENE	No data available
TRICHLOROETHYLENE	No data available
TETRACHLOROETHYLENE	No data available
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available



ACGIH	
DICHLOROETHYLENE	A3
TOLUENE	A4
TRICHLOROETHYLENE	A2
TETRACHLOROETHYLENE	A3
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available
NTP	
DICHLOROETHYLENE	R
TOLUENE	No data available
TRICHLOROETHYLENE	R
TETRACHLOROETHYLENE	R
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available
EU CLP	
DICHLOROETHYLENE	2
TOLUENE	No data available
TRICHLOROETHYLENE	1B
TETRACHLOROETHYLENE	2
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available
- Germ Cell Mutagenicity	
DICHLOROETHYLENE	Based on negative data on heritable mutagenicity tests (dominant lethal tests) and somatic cell mutagenicity tests in vivo (micronucleus/chromosome aberration tests) and the absence of germ cell mutagenicity tests in vivo, described in CERi-NITE Hazard Assessment No.15 (2004), IARC 71 (1999) and EHC 164 (1996). One testing agency reported that the substance was weakly positive for inhalation toxicity in micronucleus, chromosome aberration and SCE tests in mice, but the responses were weak and considered ambiguous and indecisive in EHC 164 (1996) and thus was not considered "positive".
TOLUENE	Based on negative data on heritable mutagenicity tests (dominant lethal tests), the absence of data on germ cell mutagenicity and genotoxicity tests in vivo and the positive data on somatic cell mutagenicity tests in vivo (micronucleus tests, chromosome aberration tests), described in EHC 52 (1986), EU-RAR No. 30 (2003), IARC 71(1999)and ATSDR (2000), although the positive results obtained in vivo were not conclusive. Meanwhile, although some assessment documents have put "+" marks in the result tables (EU marked "negative" for all tests in the result table), all documents have comprehensively concluded that the substance is negative. Moreover, the test conducted in the former Soviet Union in 1970's was suspected of benzene contamination, and all Priority 1 assessment documents have judged the substance as negative. Considering the fact that negative results have been obtained in 6 other tests, the substance was considered negative for in vivo mutagenicity.
TRICHLOROETHYLENE	Based on negative data on multi-generation mutagenicity tests (dominant lethal tests), the absence of data on germ cell mutagenicity tests, positive data on somatic cell mutagenicity tests in vivo (micronucleus tests), and the absence of data on germ cell genotoxicity tests in vivo, described in CERi-NITE Hazard Assessment No.37 (2004), EU-RAR No.31 (2004), ATSDR (1997).
TETRACHLOROETHYLENE	Based on the negative data on multi-generation mutagenicity tests (dominant lethal tests), the absence of data on germ cell mutagenicity tests in vivo, and negative data on somatic cell mutagenicity tests in vivo (micronucleus tests) described in CERi-NITE Hazard Assessment No. 65, 2005, ATSDR (1997).

PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available
- Reproductive toxicity	
DICHLOROETHYLENE	No data available
TOLUENE	Based on the results of human epidemiological studies suggesting increased incidence of natural abortion after toluene exposure, abnormal development and malformation of newborns caused by prenatal toluene abuse and decreased plasma concentrations of luteinizing hormone and testosterone after toluene exposure, described in IRIS Toxicological review (2005), EU-RAR No.30 (2003), IARC 71(1999), IARC 47 (1989), EHC 52 (1986) and ATSDR (2000), the following conclusion by Ng et al. (1992) in EU RAR30 (2003): "the study suggests an increased risk of late spontaneous abortions associated with exposure to toluene at levels around 88 ppm (range 50-150 ppm). The results of this study are used as a basis for the risk characterisation of developmental toxicity in humans,"and the evidence of increased incidences of foetal death and delayed ossification, a decrease and unossification of sternbrae, a shift in rib profile, excess ribs, retarded skeletal development, delayed reflex response, learning disability and early vaginal opening and testes descent at dosing levels not toxic to dams from rat and mouse teratogenicity tests. According to Da-Silva et al.(1991), toluene was accumulated in breast milk, although no developmental toxicity via lactation was observed.
TRICHLOROETHYLENE	Based on the description in CERI-NITE Hazard Assessment No.37 (2004): Behavioral changes are observed in offspring at dosing levels not toxic to parental animals (Taylor et al.)
TETRACHLOROETHYLENE	Based on the description in CERI-NITE Hazard Assessment No.65 (2005), ACGIH (7th, 2001), ATSDR (1997) and NICNAS (2001): Adverse effects are observed in the embryonic development of rats and mice.
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available
- Specific target organ toxicity (single exposure)	
DICHLOROETHYLENE	Suppression of the central nervous system, such as cyanosis, headaches, chest pains, disturbance of consciousness, progressive vigilance disturbance, increased fatigue, lethargy, memory loss and loss of time sensation, and decreased critical flicker frequency as a measure for sensory function have been observed, and then neurobehavioural effects, such as diffused vigilance and impaired combined tracking monitoring performance, and other effects such as inflammation of the skins and lung with sclerosis, lung edema with bleeding, and cerebral edema with tonsillar herniation have been observed as acute toxicity symptoms in humans (CERI-NITE Hazard Assessment Report No.15 (2004)). Moreover, there have been adverse reports such as necrosis of the epithelial cells in the bronchi and bronchioles, swollen and vacuolated Clara cells, mildly increased cell divisions and changes in somatosensory evoked responses and EEG(CERI-NITE Hazard Assessment Report No.15 (2004)) within the guidance values for Category 2 in the single-dose studies. Based on these effects, the centralnervous system and respiratory organs are considered to be the target organs. Therefore, the substance was classified as Category 1 (central nervous system, respiratory organs) and Category 3 (narcotic effects).
TOLUENE	Based on the human evidence including "toluene is rapidly absorbed mainly through inhalation and acts on the central nervous system. Toluene causes fatigue, sleepiness, dizziness and mild respiratory irritation at 50-100 ppm, excitement associated with paresthesia and nausea at 200-400 ppm and central nervous system suppression leading to drunkenness, delirium and abnormal gait at 500-800 ppm" (CERI Hazard Data 96-4, 1997) and "irritation to the eyes, nose and pharynx" (EU-RAR No. 30, 2003) and the evidence from animal studies including "anesthesia" (EU-RAR No. 30, 2003).

TRICHLOROETHYLENE	Based on the human evidence including "loss of consciousness, headache, nausea, lacrimation, eye irritation" (CERI-NITE Hazard Assessment No.37 (2004)), and the evidence from animal studies including "anesthesia, eye/respiratory irritation, impaired coordination, depression of the central nervous system, respiratory depression; major toxic symptoms include depression of the central nervous system; no significant changes are observed in the lungs, liver and kidneys," "vacuolation of the Clara cells in the bronchial branches; patchy loss of the epithelium" (CERI-NITE Hazard Assessment No.37 (2004)).
TETRACHLOROETHYLENE	Based on the human evidence including "nausea, belching, headache, dizziness, malaise, extreme exhaustion, physical weakness, sleepiness, perspiration, a decrease in blood pressure, severe rigor, areflexia, hypomyotonia, visual impairment, adverse effects on the central nervous system (shallow respiration, etc.), pulmonary edema" (CERI-NITE Hazard Assessment No.65 (2005)), and the evidence from animal studies including "hepatic fatty degeneration (EHC 31 (1984)). The effects on experimental animals were observed at dosing levels within the guidance value ranges for Category 1
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	Inhalation irritation
- Specific target organ toxicity (repeated exposure)	
DICHLOROETHYLENE	Based on the human evidence including "intermittent headache, nausea, flickering vision, breathlessness, temporary memory disorder and right brain damage found in electroencephalography" (CERI-NITE Hazard Assessment No.15, 2004) and "cerebropathy associated with auditory/visionary hallucinations after exposure", "memory disorder associated with intellectual impairment, loss of balance, temporary bilateral degeneration of temporal lobe" (HSDB, 2000) and the evidence from animal studies including "hepatocytes positively stained for fat, mild vacuolation of hepatocytes" and "mutant hepatocytes" (CERI-NITE Hazard Assessment No.15, 2004). The effects on experimental animals were observed at dosing levels within the guidance value ranges for Category 1.
TOLUENE	Based on the human evidence including "Toluene induces drug dependency, and inhalant abuse of toluene causes chronic central nervous system damage including restricted vision, headache associated with nystagmus and hearing loss, tremor, ataxia and amnesia. Cerebral atrophy was found in CT tests, and renal dysfunction manifested as proteinuria and hematuria was also observed (CERI Hazard Data 96-4, 1997), "hearing loss, changes in brain-stem auditory evoked potential" (ATSDR, 2000) and "hepatic toxicity associated with an increase in SGOT, fatty degeneration of hepatic cells and lymphocytic infiltration (EU-RAR No. 30, 2003).
TRICHLOROETHYLENE	Based on the human evidence including "narcotic influence, adverse effects on the central nervous system and anaclisis (as suggested by epidemiological studies)," "depression of the central nervous system (as suggested by many reports on the repeated-dose toxicity to humans)" "exhaustion, vertigo, dizziness, headache, amnesia, lack of concentration (common symptoms)" (CERI-NITE Hazard Assessment No.37 (2004)).

## TETRACHLOROETHYLENE

Based on the human evidence including "a severe disorder of neuropsychological function (sensomobility, perception speed, cautiousness, memory, concentration, etc.), symptoms of autonomic disorder (pricking sense disorder, tingling sensation in the hands and feet, rheumatoid pain, staggering gait, etc.), changes in the personality structure (emotional instability, etc.)," "irregular defecation, constipation, diarrhea, decreased libido, alcohol intolerance, gait disorder, speech disorder, rigidity of the fingers, fever-related seizure, hepatopathy, cirrhosis, pulmonary edema, dyspnea" (CERI-NITE Hazard Assessment No.65 (2005)), and the evidence from animal studies including "nucleus hypertrophy of renal tubular epithelial cells, hepatocellular vacuolar degeneration and necrosis, inflammatory cellular infiltration, urinary cast, nephrosis," "diminished muscle tone, convulsions, restlessness, coma, areflexia, an increase in ALT levels, an increase in triglyceride concentrations, hepatic fatty degeneration, accumulation of BSP (bromo-sulfophthalein) (diminished renal excretion), tremor, depression of the central nervous system" (CERI-NITE Hazard Assessment No.65 (2005)). The effects on experimental animals were observed at dosing levels within the guidance value ranges for Category 1.

PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..

No data available

NEOPRENE

No data available

- Aspiration hazard

DICHLOROETHYLENE

No data available

TOLUENE

Based on the fact that toluene is a hydrocarbon and has a dynamic viscosity of 0.65 mm<sup>2</sup>/s (25degC) (calculated value).

TRICHLOROETHYLENE

Based on the description in ICSC (J) (2002): "May cause aspiration and chemical pneumonia if swallowed (liquid)."

TETRACHLOROETHYLENE

Based on the description in ICSC (J) 2003: "Effects of short-term exposure - may cause chemical pneumonia if swallowed."

PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..

No data available

NEOPRENE

No data available

## 12. Ecological information

### A. Aquatic and terrestrial ecotoxicity

- Fish

DICHLOROETHYLENE

LC50 5.2 mg/l 72 hr

TOLUENE

LC50 24 mg/l 96 hr *Oncorhynchus mykiss*

TRICHLOROETHYLENE

LC50 21.9 mg/l 96 hr *Pimephales promelas*

TETRACHLOROETHYLENE

No data available

PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..

No data available

NEOPRENE

No data available

- Shellfish

DICHLOROETHYLENE

EC50 1682 mg/l 48 hr

TOLUENE

EC50 11.5 mg/l 48 hr *Daphnia magna*

TRICHLOROETHYLENE

EC50 2.2 mg/l 48 hr *Daphnia magna*

TETRACHLOROETHYLENE

EC50 0.602 mg/l 48 hr

PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..

No data available

NEOPRENE

No data available

- Birds

DICHLOROETHYLENE

No data available

TOLUENE

No data available

TRICHLOROETHYLENE

EC50 36.5 mg/l 72 hr (*Chlamydomonas reinhardtii*(algae))

TETRACHLOROETHYLENE

EC50 509 mg/l 96 hr

PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..

No data available

NEOPRENE

No data available

## B. Persistence and degradability

### - Persistence

DICHLOROETHYLENE	No data available
TOLUENE	No data available
TRICHLOROETHYLENE	EC50 36.5 mg/l 72 hr(Chlamydomonas reinhardtii(algae))
TETRACHLOROETHYLENE	EC50 509 mg/l 96 hr
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available

### - Resolvability

DICHLOROETHYLENE	No data available
TOLUENE	No data available
TRICHLOROETHYLENE	No data available
TETRACHLOROETHYLENE	No data available
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available

## C. Bioaccumulative potential

### - Concentration

DICHLOROETHYLENE	BCF 40
TOLUENE	No data available
TRICHLOROETHYLENE	BCF 17
TETRACHLOROETHYLENE	BCF 77.1
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available

### - Bio resolvability

DICHLOROETHYLENE	13 (%)
TOLUENE	86 (%) 20 day
TRICHLOROETHYLENE	4 (%) 28 day
TETRACHLOROETHYLENE	11 (%)
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available

## D. Mobility in soil

DICHLOROETHYLENE	No data available
TOLUENE	No data available
TRICHLOROETHYLENE	No data available
TETRACHLOROETHYLENE	No data available
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available

## E. Other adverse effects

DICHLOROETHYLENE	No data available
TOLUENE	No data available
TRICHLOROETHYLENE	No data available
TETRACHLOROETHYLENE	No data available
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available

## 13. Disposal considerations

- |                        |   |
|------------------------|---|
| A. Disposal method     | Dispose according to the related regulations.   |
| B. Disposal precaution | Follow details of related waste management act. |

#### 14. Transport information

A. UN number	1133
B. UN proper shipping name	ADHESIVES containing flammable liquid
C. Transport hazard class:	3
D. Packing group (if applicable)	II
E. Marin pollution (yes/no)	Yes
F. Special precaution which a user to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises:	F-E, S-D

#### 15. Regulatory information

A. Industrial Safety and Health Act	
DICHLOROETHYLENE	Management harmful agents Working environment measurement target material (measurement period: 6 months) Special medical examination the substance (diagnostic period: 12 months) Exposure limits set material
TOLUENE	Management harmful agents Working environment measurement target material (measurement period: 6 months) Special medical examination the substance (diagnostic period: 12 months) Exposure limits set material
TRICHLOROETHYLENE	Management harmful agents Working environment measurement target material (measurement period: 6 months) Special medical examination the substance (diagnostic period: 12 months) Exposure limits set material
TETRACHLOROETHYLENE	Management harmful agents Working environment measurement target material (measurement period: 6 months) Special medical examination the substance (diagnostic period: 12 months) Exposure limits set material
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available
B. Toxic Chemical Control Act	
DICHLOROETHYLENE	No data available
TOLUENE	Awareness materials Toxic substances
TRICHLOROETHYLENE	Toxic substances Restricted substances
TETRACHLOROETHYLENE	Toxic substances Restricted substances
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	No data available
NEOPRENE	No data available
C. Dangerous Material Safety Control Act	The 4th type, the 1st petroleum type 2000

D. Wastes Management Act	Designated Wastes
E. Other requirements in domestic and other countries	
- Domestic regulation	
DICHLOROETHYLENE	Not applicable.
TOLUENE	Not applicable.
TRICHLOROETHYLENE	Not applicable.
TETRACHLOROETHYLENE	Not applicable.
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	Not applicable.
NEOPRENE	Not applicable.
- Other countries	
USA(OSHA)	
DICHLOROETHYLENE	Not applicable.
TOLUENE	Not applicable.
TRICHLOROETHYLENE	Not applicable.
TETRACHLOROETHYLENE	Not applicable.
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	Not applicable.
NEOPRENE	Not applicable.
USA(CERCLA)	
DICHLOROETHYLENE	453.599 kg 1000 lb
TOLUENE	453.599 kg 1000 lb
TRICHLOROETHYLENE	45.3599 kg 100 lb
TETRACHLOROETHYLENE	45.3599 kg 100 lb
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	Not applicable.
NEOPRENE	Not applicable.
USA(EPCRA 302)	
DICHLOROETHYLENE	Not applicable.
TOLUENE	Not applicable.
TRICHLOROETHYLENE	Not applicable.
TETRACHLOROETHYLENE	Not applicable.
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	Not applicable.
NEOPRENE	Not applicable.
USA(EPCRA 304)	
DICHLOROETHYLENE	Not applicable.
TOLUENE	Not applicable.
TRICHLOROETHYLENE	Not applicable.
TETRACHLOROETHYLENE	Not applicable.
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	Not applicable.
NEOPRENE	Not applicable.
USA(EPCRA 313)	
DICHLOROETHYLENE	Applicable.
TOLUENE	Applicable.
TRICHLOROETHYLENE	Applicable.
TETRACHLOROETHYLENE	Applicable.
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	Not applicable.
NEOPRENE	Not applicable.
USA (Rotterdam Convention material)	
DICHLOROETHYLENE	Not applicable.
TOLUENE	Not applicable.
TRICHLOROETHYLENE	Not applicable.
TETRACHLOROETHYLENE	Not applicable.

PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	Not applicable.
NEOPRENE	Not applicable.
USA (Stockholm Convention material)	
DICHLOROETHYLENE	Not applicable.
TOLUENE	Not applicable.
TRICHLOROETHYLENE	Not applicable.
TETRACHLOROETHYLENE	Not applicable.
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	Not applicable.
NEOPRENE	Not applicable.
USA (Substance Montreal Protocol)	
DICHLOROETHYLENE	Not applicable.
TOLUENE	Not applicable.
TRICHLOROETHYLENE	Not applicable.
TETRACHLOROETHYLENE	Not applicable.
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	Not applicable.
NEOPRENE	Not applicable.
EU (Classification)	
DICHLOROETHYLENE	Carc. Cat. 3; R40
TOLUENE	F; R11Repr.Cat.3; R63Xn; R48/20-65Xi; R38R67
TRICHLOROETHYLENE	Carc. Cat. 2; R45Muta. Cat. 3; R68R67Xi; R36/38R52-53
TETRACHLOROETHYLENE	Carc. Cat. 3; R40N; R51-53
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	Not applicable.
NEOPRENE	Not applicable.
EU (Risk Phrases)	
DICHLOROETHYLENE	R40
TOLUENE	R11, R38, R48/20, R63, R65, R67
TRICHLOROETHYLENE	R45, R36/38, R52/53, R67
TETRACHLOROETHYLENE	R40, R51/53
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	Not applicable.
NEOPRENE	Not applicable.
EU (Safety Phrases)	
DICHLOROETHYLENE	S2, S23, S24/25, S36/37
TOLUENE	S2, S36/37, S46, S62
TRICHLOROETHYLENE	S53, S45, S61
TETRACHLOROETHYLENE	S2, S23, S36/37, S61
PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE..	Not applicable.
NEOPRENE	Not applicable.

## 16. Other information

### A. Information source and references

DICHLOROETHYLENE

NLM(Oral)

CERI-NITE No.15 (2004)(Inhalation)

EHC 164 (1996)(Fish)

TOLUENE

EU-RAR No.30 (2003)(Oral)

ACGIH (7th; 2001)(Dermal)

EU-RAR No.30 (2003)(Inhalation)

HSDB (2005)(Persistence)



TRICHLOROETHYLENE

CERI·NITE No.37 (2004)(Reproductive toxicity)

CERI·NITE No.37 (2004)(Specific target organ toxicity (repeated exposure))

ICSC (2002)(Aspiration hazard)

IUCLID(Fish)

IUCLID(Shellfish)

ECHA(OECD TG301D)(Bird)

HSBD(Persistence)

IUCLID(Concentration)

IUCLID(Bio resolvability)

TETRACHLOROETHYLENE

EHC 31 (1984)(Inhalation)

PARA-TERTIARY-BUTYLPHENOL-FORMALDEHYDE ...

NEOPRENE

Corporate Solution From Thomson Micromedex(<http://csi.micromedex.com>)(Oral)

Source of data : Korea Occupational Safety and Health Agency (KOSHA)>

- B. Issuing date May 4, 2016
- C. Revision number and date
- D. others