Material Safety Data Sheet

DOW CHEMICAL KOREA LIMITED

Product name: DOW CORNING™ 977 Silicone High Performance Sealant-Custom Color

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DOW CHEMICAL KOREA LIMITED encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: DOW CORNING™ 977 Silicone High Performance Sealant-Custom Color

Recommended use of the chemical and restrictions on use
Identified uses: Adhesive, binding agents Construction materials and additives Prohibit to sell and use as general consumer uses.
Uses advised against: We recommend that you use this product in a manner consistent with the listed use. If your intended use is not consistent with the stated use, please contact your sales or technical service representative.

COMPANY IDENTIFICATION
DOW CHEMICAL KOREA LIMITED
520, YEONGDONG-DAERO, GANGNAM-GU
5TH FLOOR, I-PARK TOWER
SEOUL TEUGBYEOLSI 06170
SOUTH KOREA

Customer Information Number: 82-(0)2-3490-0700
SDSQuestion@dow.com

EMERGENCY TELEPHONE NUMBER
24-Hour Emergency Contact: 080-369-2436
Local Emergency Contact: 080-369-2436

2. HAZARDS IDENTIFICATION

GHS Classification
Skin sensitisation : Category 1

GHS label elements
Hazard pictograms :

Signal word : Warning
Hazard statements : H317 May cause an allergic skin reaction.

Precautionary statements : **Prevention:**
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P271 Use only outdoors or in a well-ventilated area.
P272 Contaminated work clothing should not be allowed out of the workplace.
P280 Wear protective gloves.
Response:
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P321 Specific treatment (see supplemental first aid instructions on this label).
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
P362 + P364 Take off contaminated clothing and wash it before reuse.
Disposal:
P501 Dispose of contents and container according to wastes control act.

Other hazards
No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

This product is a mixture.

Component	Common Name	CASRN	Concentration	KECI Number
Amorphous fumed silica	No data available	112945-52-5	< 1.0 %	KE-30953
Calcium Carbonate	No data available	471-34-1	>= 40.0 - < 50.0 %	KE-04487
Polydimethylsiloxane hydroxy-terminated	No data available	70131-67-8	>= 40.0 - < 50.0 %	KE-31115
2-Butanone, O,O',O''-(methylsilylidyne)trioxime	No data available	22984-54-9	>= 1.0 - < 10.0 %	KE-03880
Siloxanes and silicones, dimethyl	No data available	63148-62-9	>= 1.0 - < 10.0 %	KE-31068
Iron oxide (Fe2O3)	No data available	1309-37-1	>= 1.0 - < 10.0 %	KE-10897
Fatty acids (C12-18 and C18 unsaturated)	No data available	90990-15-1	>= 1.0 - < 10.0 %	KE-14253

C.I. Pigment Red 48:2	No data available	7023-61-2	>= 1.0 - < 10.0 %	KE-07930
Carbon black	No data available	1333-86-4	>= 1.0 - < 10.0 %	KE-04682
Ultramarine blue pigment	No data available	57455-37-5	>= 1.0 - < 10.0 %	KE-07844
Iron hydroxide oxide	No data available	20344-49-4	>= 1.0 - < 10.0 %	KE-21101
Chromium oxide (Cr2O3)	No data available	1308-38-9	>= 1.0 - < 10.0 %	KE-10237
Triiron tetraoxide	No data available	1317-61-9	>= 1.0 - < 10.0 %	KE-34314
C.I. Pigment Blue 15	No data available	147-14-8	>= 1.0 - < 10.0 %	KE-33250
C.I. Pigment Yellow 119	No data available	68187-51-9	>= 1.0 - < 10.0 %	KE-08053
C.I. Pigment Green 7	No data available	1328-53-6	>= 1.0 - < 10.0 %	KE-07881
Titanium dioxide	No data available	13463-67-7	>= 1.0 - < 10.0 %	KE-33900
C.I. Pigment Yellow 184	No data available	14059-33-7	>= 1.0 - < 10.0 %	KE-03372
Methyl Ethyl Ketoxime	No data available	96-29-7	>= 0.1 - < 1.0 %	KE-03881

4. FIRST AID MEASURES

Description of first aid measures
General advice:
First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air; if effects occur, consult a physician.

Skin contact: Remove material from skin immediately by washing with soap and plenty of water. Remove contaminated clothing and shoes while washing. Seek medical attention if irritation persists. Wash clothing before reuse. Discard items which cannot be decontaminated, including leather articles such as shoes, belts and watchbands.

Eye contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

Ingestion: No emergency medical treatment necessary.

Most important symptoms and effects, both acute and delayed:

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

Indication of any immediate medical attention and special treatment needed
Notes to physician: No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. FIREFIGHTING MEASURES

Extinguishing media

Suitable extinguishing media: Water spray. Alcohol-resistant foam. Carbon dioxide (CO2). Dry chemical.

Unsuitable extinguishing media: None known..

Special hazards arising from the substance or mixture

Hazardous combustion products: Carbon oxides. Silicon oxides. Nitrogen oxides (NOx). Chlorine compounds. Copper oxides. Metal oxides.

Unusual Fire and Explosion Hazards: Exposure to combustion products may be a hazard to health..

Advice for firefighters

Fire Fighting Procedures: Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations..
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use water spray to cool unopened containers. Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Remove undamaged containers from fire area if it is safe to do so. Evacuate area.

Special protective equipment for firefighters: In the event of fire, wear self-contained breathing apparatus.. Use personal protective equipment..

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Remove all sources of ignition. Use personal protective equipment. Follow safe handling advice and personal protective equipment recommendations.

Environmental precautions: Discharge into the environment must be avoided. Prevent further leakage or spillage if safe to do so. Retain and dispose of contaminated wash water. Local authorities should be advised if significant spillages cannot be contained.

Methods and materials for containment and cleaning up: Wipe up or scrape up and contain for salvage or disposal. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine

which regulations are applicable. For large spills, provide dyking or other appropriate containment to keep material from spreading. If dyked material can be pumped, Sections 13 and 15 of this SDS provide information regarding certain local or national requirements. Dispose of saturated absorbent or cleaning materials appropriately, since spontaneous heating may occur.
See sections: 7, 8, 11, 12 and 13.

7. HANDLING AND STORAGE

Precautions for safe handling: Do not get on skin or clothing. Do not swallow. Avoid contact with eyes. Protect from moisture. Take care to prevent spills, waste and minimize release to the environment. Handle in accordance with good industrial hygiene and safety practice.
Use only with adequate ventilation. See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.

Conditions for safe storage: Keep in properly labelled containers. Store locked up. Store in accordance with the particular national regulations.

Do not store with the following product types: Strong oxidizing agents.
Unsuitable materials for containers**:** Do not store in or use iron or steel containers.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters
If exposure limits exist, they are listed below. If no exposure limits are displayed, then no values are applicable.

Component	Regulation	Type of listing	Value
Calcium Carbonate	Dow IHG	TWA	1 mg/m3
	KR OEL	TWA	10 mg/m3
Iron oxide (Fe2O3)	ACGIH	TWA Respirable fraction	5 mg/m3
	Further information: pneumoconiosis: Pneumoconiosis; A4: Not classifiable as a human carcinogen		
	KR OEL	TWA	5 mg/m3 , Iron
	KR OEL	TWA Fume	5 mg/m3 , Iron
Carbon black	ACGIH	TWA Inhalable fraction	3 mg/m3
	Further information: bronchitis: Bronchitis; A3: Confirmed animal carcinogen with unknown relevance to humans		
	KR OEL	TWA	3.5 mg/m3
Ultramarine blue pigment	ACGIH	TWA Respirable fraction	1 mg/m3 , Aluminium
	Further information: LRT irr: Lower Respiratory Tract irritation; pneumoconiosis: Pneumoconiosis; neurotoxicity: Neurotoxicity; A4: Not classifiable as a human carcinogen; varies: varies		
Chromium oxide (Cr2O3)	ACGIH	TWA Inhalable fraction	0.003 mg/m3 , chromium
	Further information: URT irr: Upper Respiratory Tract irritation; skin irr: Skin irritation; A4: Not classifiable as a human carcinogen; varies: varies		
	KR OEL	TWA	0.5 mg/m3 , chromium
Titanium dioxide	Dow IHG	TWA	2.4 mg/m3

	ACGIH	TWA	10 mg/m3 , Titanium dioxide
	Further information: LRT irr: Lower Respiratory Tract irritation; A4: Not classifiable as a human carcinogen		
	KR OEL	TWA	10 mg/m3
Methyl Ethyl Ketoxime	US WEEL	TWA	10 ppm
	Further information: DSEN: Dermal Sensitization Notation		
	Dow IHG	TWA	0.15 ppm
	Further information: Skin Sensitizer		

Although some of the components of this product may have exposure guidelines, no exposure would be expected under normal handling conditions due to the physical state of the material.
The following substance(s), which have Occupational Exposure Limit(s) (OEL), may be formed during handling or processing:
Methyl ethyl ketoxime

Exposure controls
Engineering controls: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

Individual protection measures
Eye/face protection: Use safety glasses (with side shields).
Skin protection
Hand protection: Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Butyl rubber. Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Ethyl vinyl alcohol laminate ("EVAL"). Polyvinyl alcohol ("PVA"). Polyvinyl chloride ("PVC" or "vinyl"). Viton. Examples of acceptable glove barrier materials include: Natural rubber ("latex"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.
Other protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.
Respiratory protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. For most conditions, no respiratory protection should be needed; however, if handling at elevated temperatures without sufficient ventilation, use an approved air-purifying respirator.
The following should be effective types of air-purifying respirators: Organic vapor cartridge.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state	paste
Color	in accordance with the product description

Odor	not significant
Odor Threshold	No data available
pH	Not applicable
Melting point/range	No data available
Freezing point	No data available
Boiling point (760 mmHg)	Not applicable
Flash point	**Seta closed cup** 83 °C
Evaporation Rate (Butyl Acetate = 1)	Not applicable
Flammability (solid, gas)	Not classified as a flammability hazard
Lower explosion limit	No data available
Upper explosion limit	No data available
Vapor Pressure	Not applicable
Relative Vapor Density (air = 1)	No data available
Relative Density (water = 1)	1.31
Water solubility	No data available
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Dynamic Viscosity	Not applicable
Kinematic Viscosity	Not applicable
Explosive properties	Not explosive
Oxidizing properties	The substance or mixture is not classified as oxidizing.
Molecular weight	No data available
Particle size	No data available

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Reactivity: Not classified as a reactivity hazard.

Chemical stability: Stable under normal conditions.

Possibility of hazardous reactions: Can react with strong oxidizing agents.

Conditions to avoid: Do not expose to temperatures above 212 °F/100 °C. Exposure to moisture

Incompatible materials: Oxidizing agents

Hazardous decomposition products:
Decomposition products can include and are not limited to: Formaldehyde. Methyl Ethyl Ketoxime.

11. TOXICOLOGICAL INFORMATION

Toxicological information appears in this section when such data is available.

Information on the likely route of exposure
Please refer to the information below.
Acute toxicity

Acute oral toxicity
Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.

As product: Single dose oral LD50 has not been determined.

Based on information for component(s):
LD50, Rat, > 5,000 mg/kg Estimated.

Acute dermal toxicity
Prolonged skin contact is unlikely to result in absorption of harmful amounts.

As product: The dermal LD50 has not been determined.

Based on information for component(s):
LD50, > 2,000 mg/kg Estimated.

Acute inhalation toxicity
Brief exposure (minutes) is not likely to cause adverse effects. Vapor from heated material may cause respiratory irritation.
As product: The LC50 has not been determined.

Skin corrosion/irritation
Brief contact is essentially nonirritating to skin.

Serious eye damage/eye irritation
May cause slight temporary eye irritation.

Skin and Respiratory Sensitization
For skin sensitization:
Contains component(s) which have demonstrated the potential for contact allergy in mice.

For respiratory sensitization:
No relevant information found.

Specific Target Organ Systemic Toxicity (Single Exposure)
Evaluation of available data suggests that this material is not an STOT-SE toxicant.

Specific Target Organ Systemic Toxicity (Repeated Exposure)
Contains component(s) which have been reported to cause effects on the following organs in animals:
Blood.

Carcinogenicity

Contains component(s) which have caused cancer in laboratory animals. During use of the material, small amounts of methylethylketoxime (MEKO) will be released. Rodents exposed to chronic MEKO inhalation throughout their lifetimes showed significant increases in liver tumour rates. Contains an additional component(s) that is/are encapsulated in the product and are not expected to be released under normal processing conditions or foreseeable emergency.

Teratogenicity
Contains component(s) which did not cause birth defects or any other fetal effects in lab animals.

Reproductive toxicity
Contains component(s) which did not interfere with reproduction in animal studies. Contains component(s) which did not interfere with fertility in animal studies.

Mutagenicity
Contains a component(s) which were negative in in vitro genetic toxicity studies. Contains component(s) which were negative in animal genetic toxicity studies.

Aspiration Hazard
Based on physical properties, not likely to be an aspiration hazard.

COMPONENTS INFLUENCING TOXICOLOGY:

Amorphous fumed silica

Acute inhalation toxicity
Vapors are unlikely due to physical properties. Dust may cause irritation to upper respiratory tract (nose and throat).

The LC50 has not been determined.

Calcium Carbonate

Acute inhalation toxicity
LC50, Rat, male and female, 4 Hour, dust/mist, > 3 mg/l The LC50 value is greater than the Maximum Attainable Concentration. No deaths occurred at this concentration.

Polydimethylsiloxane hydroxy-terminated

Acute inhalation toxicity
The LC50 has not been determined.

2-Butanone, O,O',O''-(methylsilylidyne)trioxime

Acute inhalation toxicity
The LC50 has not been determined.

Siloxanes and silicones, dimethyl

Acute inhalation toxicity
The LC50 has not been determined.

Iron oxide (Fe2O3)

Acute inhalation toxicity
Vapors are unlikely due to physical properties. Dust may cause irritation to upper respiratory tract (nose and throat). Exposure to metal oxide fumes may cause metal fume fever, characterized by influenza-like symptoms.

As product: The LC50 has not been determined.

Fatty acids (C12-18 and C18 unsaturated)

Acute inhalation toxicity

The LC50 has not been determined.

C.I. Pigment Red 48:2

Acute inhalation toxicity

LC50, Rat, male and female, 4 Hour, dust/mist, > 4.76 mg/l OECD Test Guideline 403

Carbon black

Acute inhalation toxicity

LC50, Rat, 1 Hour, dust/mist, 27 mg/l No deaths occurred at this concentration.

Ultramarine blue pigment

Acute inhalation toxicity

LC50, Rat, female, 4 Hour, dust/mist, 10 - 50 mg/l No deaths occurred at this concentration.

Iron hydroxide oxide

Acute inhalation toxicity

Dust may cause irritation to upper respiratory tract (nose and throat). Prolonged excessive exposure to dust may cause adverse effects.

The LC50 has not been determined.

Chromium oxide (Cr2O3)

Acute inhalation toxicity

No adverse effects are anticipated from single exposure to dust. Excessive exposure may cause irritation to upper respiratory tract (nose and throat) and lungs.

LC50, Rat, male and female, 4 Hour, dust/mist, > 5.41 mg/l OECD Test Guideline 403

Triiron tetraoxide

Acute inhalation toxicity

The LC50 has not been determined.

C.I. Pigment Blue 15

Acute inhalation toxicity

Dust may cause irritation to upper respiratory tract (nose and throat).

The LC50 has not been determined.

C.I. Pigment Yellow 119

Acute inhalation toxicity

No adverse effects are anticipated from single exposure to mist.

No deaths occurred at this concentration. LC50, Rat, 4 Hour, dust/mist, > 5 mg/l OECD Test Guideline 403

C.I. Pigment Green 7

Acute inhalation toxicity

The LC50 has not been determined.

Titanium dioxide

Acute inhalation toxicity
LC50, Rat, male, 4 Hour, dust/mist, > 6.82 mg/l No deaths occurred at this concentration.

C.I. Pigment Yellow 184

Acute inhalation toxicity
LC50, Rat, 4 Hour, dust/mist, > 5.15 mg/l No deaths occurred at this concentration.

Methyl Ethyl Ketoxime

Acute inhalation toxicity
LC50, Rat, male and female, 4 Hour, dust/mist, > 4.83 mg/l OECD Test Guideline 403

12. ECOLOGICAL INFORMATION

Ecotoxicological information appears in this section when such data is available.

Ecotoxicity

Amorphous fumed silica

Acute toxicity to fish
Based on information for a similar material:
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
For similar material(s):
LC50, Danio rerio (zebra fish), 96 Hour, > 100 mg/l, Method Not Specified.

Acute toxicity to aquatic invertebrates
For similar material(s):
EC50, Daphnia magna (Water flea), 48 Hour, > 100 mg/l, Method Not Specified.

Calcium Carbonate

Acute toxicity to fish
Material is practically non-toxic to fish on an acute basis (LC50 > 100 mg/L).

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), 48 Hour, > 100 mg/l, OECD Test Guideline 202

Acute toxicity to algae/aquatic plants
ErC50, Desmodesmus subspicatus (green algae), 72 Hour, > 14 mg/l, OECD Test Guideline 201

Polydimethylsiloxane hydroxy-terminated

Acute toxicity to aquatic invertebrates
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
EC50, Daphnia magna (Water flea), 48 Hour, 493 mg/l, OECD Test Guideline 202

Chronic toxicity to aquatic invertebrates
NOEC, Daphnia magna (Water flea), 21 d, 2,320 mg/l

Toxicity to Above Ground Organisms
Material is practically non-toxic to birds on an acute basis (LD50 > 2000 mg/kg).

2-Butanone, O,O',O''-(methylsilylidyne)trioxime

Acute toxicity to fish
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
For the hydrolysis product(s)
LC50, Oncorhynchus mykiss (rainbow trout), Static, 96 Hour, > 120 mg/l, OECD Test Guideline 203

Acute toxicity to aquatic invertebrates
For the hydrolysis product(s)
EC50, Daphnia magna (Water flea), static test, 48 Hour, > 120 mg/l, OECD Test Guideline 202

Acute toxicity to algae/aquatic plants
For the hydrolysis product(s)
EC50, Selenastrum capricornutum (green algae), Static, 72 Hour, Growth rate, 94 mg/l, OECD Test Guideline 201
For the hydrolysis product(s)
NOEC, Selenastrum capricornutum (green algae), Static, 72 Hour, Growth rate, 30 mg/l, OECD Test Guideline 201

Chronic toxicity to fish
NOEC, Oryzias latipes (Orange-red killifish), flow-through test, 14 d, 50 mg/l

Chronic toxicity to aquatic invertebrates
NOEC, Daphnia magna, semi-static test, 21 d, > 100 mg/l

Siloxanes and silicones, dimethyl

Acute toxicity to fish
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Fish, 96 Hour, > 100 mg/l

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), 48 Hour, > 100 mg/l

Acute toxicity to algae/aquatic plants
EC50, algae, 14 d, > 2,000 mg/l

Chronic toxicity to fish
NOEC, Cyprinodon variegatus (sheepshead minnow), 33 d, 91 mg/l

Toxicity to Above Ground Organisms
Material is practically non-toxic to birds on an acute basis (LD50 > 2000 mg/kg).
oral LD50, Colinus virginianus (Bobwhite quail), > 5,000 mg/kg

Iron oxide (Fe2O3)

Acute toxicity to fish
Material is practically non-toxic to fish on an acute basis (LC50 > 100 mg/L).
LC50, Danio rerio (zebra fish), static test, 96 Hour, > 50,000 mg/l

Acute toxicity to aquatic invertebrates

EC50, Daphnia magna (Water flea), static test, 48 Hour, > 100 mg/l, OECD Test Guideline 202

Toxicity to bacteria
EC50, Pseudomonas fluorescens, 24 Hour, >5,000 mg/l
EC50, activated sludge, static test, 3 Hour, Respiration rates., > 10,000 mg/l, ISO 8192

Fatty acids (C12-18 and C18 unsaturated)

Acute toxicity to fish
Typical for this family of materials.
Not expected to be acutely toxic to aquatic organisms.

C.I. Pigment Red 48:2

Acute toxicity to fish
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Brachydanio rerio (zebrafish), static test, 96 Hour, > 100 mg/l, OECD Test Guideline 203

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), static test, 48 Hour, > 100 mg/l, OECD Test Guideline 202

Acute toxicity to algae/aquatic plants
EC50, Pseudokirchneriella subcapitata (green algae), static test, 72 Hour, Growth rate, 100 mg/l, OECD Test Guideline 201

Toxicity to bacteria
NOEC, 3 Hour, 100 mg/l, OECD Test Guideline 209

Carbon black

Acute toxicity to fish
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Leuciscus idus (Golden orfe), static test, 96 Hour, > 1,000 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), 24 Hour, > 5,600 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants
NOEC, Desmodesmus subspicatus (green algae), 72 Hour, 10,000 mg/l, OECD Test Guideline 201

Ultramarine blue pigment

Acute toxicity to fish
Material is slightly toxic to aquatic organisms on an acute basis (LC50/EC50 between 10 and 100 mg/L in the most sensitive species tested).
LC50, Oryzias latipes (Medaka), 96 Hour, > 90 mg/l, OECD Test Guideline 203

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), static test, 48 Hour, > 21 mg/l

Acute toxicity to algae/aquatic plants
EC50, Pseudokirchneriella subcapitata (green algae), 72 Hour, Growth rate inhibition, > 99 mg/l, OECD Test Guideline 201

Chronic toxicity to aquatic invertebrates
NOEC, Daphnia magna (Water flea), 21 d, number of offspring, 26 mg/l

Iron hydroxide oxide

Acute toxicity to fish
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Leuciscus idus (Golden orfe), static test, 96 Hour, > 500 mg/l

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), 48 Hour, > 100 mg/l, OECD Test Guideline 202

Chromium oxide (Cr2O3)

Acute toxicity to fish
Not expected to be acutely toxic to aquatic organisms.
LC50, Danio rerio (zebra fish), static test, 96 Hour, > 10,000 mg/l, ISO 7346/1

Acute toxicity to algae/aquatic plants
EC50, Desmodesmus subspicatus (green algae), 72 Hour, > 848.6 mg/l, OECD Test Guideline 201

Toxicity to bacteria
EC50, 3 Hour, > 10,000 mg/l

Chronic toxicity to fish
NOEC, Danio rerio (zebra fish), 30 d, 1,000 mg/l

Chronic toxicity to aquatic invertebrates
No toxicity at the limit of solubility
NOEC, Daphnia magna (Water flea), 21 d, > 0.02 mg/l

Triiron tetraoxide

Acute toxicity to fish
Material is practically non-toxic to fish on an acute basis (LC50 > 100 mg/L).
LC50, Leuciscus idus (Golden orfe), static test, 48 Hour, > 1,000 mg/l, Method Not Specified.

Acute toxicity to aquatic invertebrates
LL50, Daphnia magna (Water flea), 48 Hour, > 10,000 mg/l

Toxicity to bacteria
EC50, 3 Hour, > 10,000 mg/l, OECD Test Guideline 209

C.I. Pigment Blue 15

Acute toxicity to fish
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Danio rerio (zebra fish), 96 Hour, > 100 mg/l, OECD Test Guideline 203

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), 48 Hour, > 500 mg/l

Acute toxicity to algae/aquatic plants
ErC50, Desmodesmus subspicatus (green algae), 72 Hour, > 100 mg/l, OECD Test Guideline 201

Toxicity to bacteria
EC10, Bacteria, 0.5 Hour, > 10,000 mg/l

Chronic toxicity to aquatic invertebrates
NOEC, Daphnia magna (Water flea), 21 d, > 1 mg/l

C.I. Pigment Yellow 119

Acute toxicity to fish
No relevant data found.

C.I. Pigment Green 7

Acute toxicity to fish
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Oncorhynchus mykiss (rainbow trout), static test, 96 Hour, 356 mg/l, Method Not Specified.

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), Static, 48 Hour, > 500 mg/l, Directive 84/449/EEC, C.2

Acute toxicity to algae/aquatic plants
EC50, Desmodesmus subspicatus (green algae), Static, 72 Hour, > 100 mg/l, OECD Test Guideline 201

Chronic toxicity to aquatic invertebrates
NOEC, Daphnia magna, semi-static test, 21 d, Immobilization, > 1 mg/l

Titanium dioxide

Acute toxicity to fish
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
NOEC mortality, Leuciscus idus (Golden orfe), static test, 48 Hour, > 1,000 mg/l

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), static test, 48 Hour, > 1,000 mg/l

Acute toxicity to algae/aquatic plants
EC50, Pseudokirchneriella subcapitata (green algae), 72 Hour, > 100 mg/l, OECD Test Guideline 201

Toxicity to bacteria
EC50, 3 Hour, > 1,000 mg/l, OECD Test Guideline 209

C.I. Pigment Yellow 184

Acute toxicity to fish

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Danio rerio (zebra fish), Static, 96 Hour, > 10,000 mg/l

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna, Static, 48 Hour, > 100 mg/l

Acute toxicity to algae/aquatic plants
EC50, Desmodesmus subspicatus (green algae), Static, 72 Hour, Growth rate, > 100 mg/l

Toxicity to bacteria
EC50, Pseudomonas putida, 16 Hour, > 10,000 mg/l

Methyl Ethyl Ketoxime

Acute toxicity to fish
Material is slightly toxic to aquatic organisms on an acute basis (LC50/EC50 between 10 and 100 mg/L in the most sensitive species tested).
LC50, Lepomis macrochirus (Bluegill sunfish), static test, 96 Hour, 48 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), static test, 48 Hour, 201 mg/l, Method Not Specified.

Acute toxicity to algae/aquatic plants
EC50, Scenedesmus capricornutum (fresh water algae), static test, 72 Hour, Growth rate, 11.8 mg/l, OECD Test Guideline 201 or Equivalent
NOEC, Scenedesmus capricornutum (fresh water algae), 72 Hour, 2.56 mg/l, OECD Test Guideline 201 or Equivalent

Toxicity to bacteria
EC50, Bacteria, 17 Hour, 281 mg/l

Chronic toxicity to fish
NOEC, Oryzias latipes (Orange-red killifish), 14 d, survival, 50 mg/l

Chronic toxicity to aquatic invertebrates
NOEC, Daphnia magna (Water flea), 21 d, number of offspring, > 100 mg/l

Persistence and degradability

Amorphous fumed silica
Biodegradability: Biodegradation is not applicable.

Calcium Carbonate
Biodegradability: Biodegradability is not applicable to inorganic substances.

Polydimethylsiloxane hydroxy-terminated
Biodegradability: Chemical degradation (hydrolysis) is expected in the environment.

2-Butanone, O,O',O''-(methylsilylidyne)trioxime
Biodegradability: Based on information for a similar material: This material rapidly hydrolyzes to products that are either readily or ultimately biodegradable.
10-day Window: Fail

Biodegradation: 0 %
Exposure time: 28 d
Method: OECD Test Guideline 301A

Siloxanes and silicones, dimethyl
Biodegradability: The product is not biodegradable.

Iron oxide (Fe2O3)
Biodegradability: Biodegradation is not applicable.

Fatty acids (C12-18 and C18 unsaturated)
Biodegradability: No relevant data found.

C.I. Pigment Red 48:2
Biodegradability: Material is not readily biodegradable according to OECD/EEC guidelines.
10-day Window: Fail
Biodegradation: 0 %
Exposure time: 28 d
Method: OECD Test Guideline 301B

Carbon black
Biodegradability: Biodegradation is not applicable.

Ultramarine blue pigment
Biodegradability: Biodegradation is not applicable.

Iron hydroxide oxide
Biodegradability: Biodegradation is not applicable.

Chromium oxide (Cr2O3)
Biodegradability: Biodegradation is not applicable.

Triiron tetraoxide
Biodegradability: Biodegradability is not applicable to inorganic substances.

C.I. Pigment Blue 15
Biodegradability: Material is not readily biodegradable according to OECD/EEC guidelines.
10-day Window: Not applicable
Biodegradation: 0 %
Exposure time: 28 d
Method: OECD Test Guideline 301C or Equivalent

C.I. Pigment Yellow 119
Biodegradability: No relevant data found.

C.I. Pigment Green 7
Biodegradability: Material is not readily biodegradable according to OECD/EEC guidelines.
10-day Window: Fail
Biodegradation: 5 %
Exposure time: 28 d
Method: OECD Test Guideline 301C

Titanium dioxide

Biodegradability: Biodegradation is not applicable.

C.I. Pigment Yellow 184

Biodegradability: No relevant data found.

Methyl Ethyl Ketoxime

Biodegradability: Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions. Material is inherently biodegradable (reaches > 20% biodegradation in OECD test(s) for inherent biodegradability).
10-day Window: Not applicable
Biodegradation: 70 %
Exposure time: 14 d
Method: OECD Test Guideline 302B or Equivalent

Theoretical Oxygen Demand: 2.57 mg/mg

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitization: OH radicals
Atmospheric half-life: 7.211 d
Method: Estimated.

Bioaccumulative potential

Amorphous fumed silica

Bioaccumulation: No relevant data found.

Calcium Carbonate

Bioaccumulation: Partitioning from water to n-octanol is not applicable.

Polydimethylsiloxane hydroxy-terminated

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 0.63 Measured
Bioconcentration factor (BCF): < 5.8 Cyprinus carpio (Carp) Measured

2-Butanone, O,O',O''-(methylsilylidyne)trioxime

Bioaccumulation: Bioconcentration potential is low (BCF less than 100 or log Pow greater than 7).
Partition coefficient: n-octanol/water(log Pow): 11.2

Siloxanes and silicones, dimethyl

Bioaccumulation: No bioconcentration is expected because of the relatively high molecular weight (MW greater than 1000).

Iron oxide (Fe2O3)

Bioaccumulation: Partitioning from water to n-octanol is not applicable.

Fatty acids (C12-18 and C18 unsaturated)

Bioaccumulation: No relevant data found.

C.I. Pigment Red 48:2

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): -0.75

Carbon black
Bioaccumulation: No relevant data found.

Ultramarine blue pigment
Bioaccumulation: No data available.

Iron hydroxide oxide
Bioaccumulation: Partitioning from water to n-octanol is not applicable.

Chromium oxide (Cr2O3)
Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 2.97 Estimated.
Bioconcentration factor (BCF): 39 Fish Estimated.

Triiron tetraoxide
Bioaccumulation: Partitioning from water to n-octanol is not applicable.

C.I. Pigment Blue 15
Bioaccumulation: Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5).
Partition coefficient: n-octanol/water(log Pow): 4.95 - 6.6 Estimated.
Bioconcentration factor (BCF): 1,290 Estimated.

C.I. Pigment Yellow 119
Bioaccumulation: Not applicable

C.I. Pigment Green 7
Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Bioconcentration factor (BCF): 0.51 - 74 Fish 42 d

C.I. Pigment Yellow 184
Bioaccumulation: No relevant data found.
Bioconcentration factor (BCF): < 14 Oryzias latipes (Orange-red killifish) OECD Test Guideline 305

Methyl Ethyl Ketoxime
Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 0.63 Measured
Bioconcentration factor (BCF): <= 5.8 Cyprinus carpio (Carp) 42 d Measured

Mobility in Soil

Amorphous fumed silica
Expected to be relatively immobile in soil (Koc > 5000).

Calcium Carbonate
No relevant data found.

Polydimethylsiloxane hydroxy-terminated
Potential for mobility in soil is high (Koc between 50 and 150).

Partition coefficient (Koc): 130 Estimated.

2-Butanone, O,O',O''-(methylsilylidyne)trioxime
No relevant data found.

Siloxanes and silicones, dimethyl
Expected to be relatively immobile in soil (Koc > 5000).

Iron oxide (Fe2O3)
No relevant data found.

Fatty acids (C12-18 and C18 unsaturated)
No relevant data found.

C.I. Pigment Red 48:2
No relevant data found.

Carbon black
No relevant data found.

Ultramarine blue pigment
No data available.

Iron hydroxide oxide
No relevant data found.

Chromium oxide (Cr2O3)
Potential for mobility in soil is high (Koc between 50 and 150).
Partition coefficient (Koc): 80 Estimated.

Triiron tetraoxide
No relevant data found.

C.I. Pigment Blue 15
Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.
Expected to be relatively immobile in soil (Koc > 5000).
Partition coefficient (Koc): > 5000 Estimated.

C.I. Pigment Yellow 119
No relevant data found.

C.I. Pigment Green 7
No relevant data found.

C.I. Pigment Yellow 184
No relevant data found.

Methyl Ethyl Ketoxime
Potential for mobility in soil is high (Koc between 50 and 150).
Partition coefficient (Koc): 130 Estimated.

Results of PBT and vPvB assessment

Amorphous fumed silica

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

Calcium Carbonate

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

Polydimethylsiloxane hydroxy-terminated

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

2-Butanone, O,O',O''-(methylsilylidyne)trioxime

This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

Siloxanes and silicones, dimethyl

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

Fatty acids (C12-18 and C18 unsaturated)

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

C.I. Pigment Red 48:2

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

Carbon black

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

Ultramarine blue pigment

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

Iron hydroxide oxide

This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

Chromium oxide (Cr2O3)

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

Triiron tetraoxide

This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

C.I. Pigment Blue 15

This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

C.I. Pigment Yellow 119

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

C.I. Pigment Green 7

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

Titanium dioxide

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

C.I. Pigment Yellow 184

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

Methyl Ethyl Ketoxime

This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

Other adverse effects

Amorphous fumed silica

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Calcium Carbonate

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Polydimethylsiloxane hydroxy-terminated

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

2-Butanone, O,O',O''-(methylsilylidyne)trioxime

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Siloxanes and silicones, dimethyl

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Iron oxide (Fe2O3)

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Fatty acids (C12-18 and C18 unsaturated)

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

C.I. Pigment Red 48:2

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Carbon black

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Ultramarine blue pigment

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Iron hydroxide oxide

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Chromium oxide (Cr2O3)

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Triiron tetraoxide

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

C.I. Pigment Blue 15

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

C.I. Pigment Yellow 119

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

C.I. Pigment Green 7

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Titanium dioxide

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

C.I. Pigment Yellow 184

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Methyl Ethyl Ketoxime

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

13. DISPOSAL CONSIDERATIONS

Disposal methods: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Incinerator or other thermal destruction device. For additional information, refer to: Handling & Storage Information, MSDS Section 7 Stability & Reactivity Information, MSDS Section10 Regulatory Information, MSDS Section 15

Disposal precautions: Empty containers should be recycled or otherwise disposed of by an approved waste management facility. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. Do not re-use containers for any purpose.

Contaminated packaging: All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations.

14. TRANSPORT INFORMATION

Classification for ROAD and Rail transport:

UN number	Not applicable
Proper shipping name	Not regulated for transport
Class	Not applicable
Packing group	Not applicable
Environmental hazards	Not applicable
Special precautions for user	No data available.

Classification for SEA transport (IMO-IMDG):

UN number	Not applicable
Proper shipping name	Not regulated for transport
Class	Not applicable
Packing group	Not applicable
Marine pollutant	Not applicable
Special precautions for user	No data available.
Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code	Consult IMO regulations before transporting ocean bulk

Classification for AIR transport (IATA/ICAO):

UN number	Not applicable
Proper shipping name	Not regulated for transport
Class	Not applicable
Packing group	Not applicable
Special precautions for user	No data available.

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

Regulation under the Occupational Safety and Health Act
The product is classified as hazardous by ISHL in Korea.

Harmful Substances Prohibited from Manufacturing

Not applicable

Harmful Substances Required Permission for Manufacture

Not applicable

Harmful Agents to be kept below Occupational Exposure Limits

Components	CASRN
Calcium Carbonate	471-34-1
Carbon black	1333-86-4
Iron oxide (Fe2O3)	1309-37-1
Titanium dioxide	13463-67-7
Chromium oxide (Cr2O3)	1308-38-9

Harmful Agents Required to be kept below Permission Levels

Not applicable

Hazardous substances requiring management

Components	CASRN
Iron oxide (Fe2O3)	1309-37-1
Ultramarine blue pigment	57455-37-5
Titanium dioxide	13463-67-7
Chromium oxide (Cr2O3)	1308-38-9
C.I. Pigment Yellow 119	68187-51-9
Iron hydroxide oxide	20344-49-4
Triiron tetraoxide	1317-61-9

Special Management Materials

Not applicable

Controlled Substances Subject to Environment Monitoring

Components	CASRN
Iron oxide (Fe2O3)	1309-37-1
Titanium dioxide	13463-67-7
Chromium oxide (Cr2O3)	1308-38-9
Amorphous fumed silica	112945-52-5

Controlled Substances Subject to Health Examination

Components	CASRN
Iron oxide (Fe2O3)	1309-37-1
Ultramarine blue pigment	57455-37-5
Chromium oxide (Cr2O3)	1308-38-9

Regulation under the Chemical Control Act

Toxic Chemicals

Not applicable

Restricted Chemicals

Not applicable

Prohibited Chemicals

Not applicable

Accident Precaution Chemicals

Not applicable

Dangerous Substances Safety Management Act

Not Applicable to Dangerous Materials

Waste Management Law

Industrial waste

Follow article 13 of the act to dispose the product waste

Other requirements in domestic and other countries

Korea. Korean Existing Chemicals Inventory (KECI):

All intentional components are listed on the inventory, are exempt, or are supplier certified.

The company that sold this product to the consumer could be subject to legal liability, including criminal sanctions for violation of K-BPR.

16. OTHER INFORMATION

Other information

none

Hazard Rating System
NFPA

Health	Flammability	Instability
2	1	0

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Legend

ACGIH	USA. ACGIH Threshold Limit Values (TLV)
Dow IHG	Dow Industrial Hygiene Guideline
KR OEL	Harmful Agents to be kept below Occupational Exposure Limits
TWA	Time weighted average
US WEEL	USA. Workplace Environmental Exposure Levels (WEEL)

Full text of other abbreviations
AICS - Australian Inventory of Chemical Substances; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of

Dangerous Goods; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

Information Source and References
This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

DOW CHEMICAL KOREA LIMITED urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.
KR