1. Identification

A. Product name : NOROO WAY ROAD MARKING(MMA) YELLOW (SP-A)

B. Recommended Use and Restriction on Use
- ○ General use : For concrete floor
- ○ Restriction on use : Restricted to use other than recommended use

C. Manufacturer / Supplier / distributor information
- ○ Company name : NOROO Paint & Coatings Co., Ltd.
- ○ Address : 351, Bakdal-ro, Manan-gu, Anyang-si, Gyeonggi-do, Korea
- ○ Emergency telephone number : +82-31-467-6114

2. Hazard identification

A. GHS Classification
Acute toxicity (inhalation: gas) Category 4
Carcinogenicity Category 1A
Flammable liquids Category 2
Serious eye damage/irritation Category 2A
Specific target organ toxicity(Single exposure) Category 3
Skin sensitization Category 1
Skin corrosion/irritation Category 2
Respiratory sensitization Category 1

B. GHS label elements
○ Hazard symbols

○ Signal words : DANGER
○ Hazard statements :
H332 Harmful if inhaled
H350 May cause cancer
H225 Highly flammable liquid and vapour
H319 Causes serious eye irritation
H335+H336 May cause respiratory irritation, May cause drowsiness and dizziness.
H317 May cause an allergic skin reaction
H315 Causes skin irritation
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled
○ Precautionary statements
- Prevention
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.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P261 Do not breathe dust/fume/gas/mist/vapours/spray.
P271 Use only outdoors or in a well-ventilated area.
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P281 Use personal protective equipment as required.
P210 Keep away from heat/sparks/open flames/hot surfaces. ? No smoking.
P264 Wash hands thoroughly after handling.
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P272 Contaminated work clothing should not be allowed out of the workplace.
P285 In case of inadequate ventilation wear respiratory protection.
P233 Keep container tightly closed.
- Response
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312 Call a POISON CENTER or doctor/physician if you feel unwell.
P308+P313 If exposed or concerned: Get medical advice/attention.
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337+P313 If eye irritation persists: Get medical advice/attention.
P302+P352 IF ON SKIN: Wash with plenty of soap and water.
P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
P321 Specific treatment
P363 Wash contaminated clothing before reuse.
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362 Take off contaminated clothing and wash before reuse.
P304+P341 IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a

position comfortable for breathing.
P342+P311 If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.
P370+P378 In case of fire: Use Suitable extinguishing media for extinction(Refer Section MSDS 5).

- Storage
P405 Store locked up.
P403+P235 Store in a well-ventilated place. Keep cool.
P403+P233 Store in a well-ventilated place. Keep container tightly closed.

- Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulation

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

NFPA grade / Chemical Name	Health	Flammability	Reactivity
S1(Trade secrets)	NO DATA	NO DATA	NO DATA
Quartz (SiO2)	1	0	0
Limestone	1	0	0
2-Methyl-2-propenoic acid methyl ester	2	3	2
2-Propenoic acid 2-ethyl-2-[[(1-oxo-2-propenyl)oxy]methyl]-1,3-propanediyl ester	2	1	0
n-Butyl Acrylate	3	2	2
[(1-Methyl-1,2-ethanediyl)bis[oxy(methyl-2,1-ethanediyl)]diacrylate	2	1	2
Titanium dioxide	1	0	0
Barium sulfate, natural	1	0	0
2-Ethylhexyl acrylate	2	2	2
2,2'-[(3,3'-Dichloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(4-chloro-2,5-dimethoxyphenyl)-3-oxobutyramide] (C.I. pigment yellow 083)	1	1	0
1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	1	1	0

3. Composition/information on ingredients

Chemical Name	Trade names and Synonyms	CAS-NO	Content(%)
S1(Trade secrets)	-	-	19~29
Quartz (SiO2)	Quartz (SiO2)	14808-60-7	16~26
Limestone	Limestone	1317-65-3	13~23
2-Methyl-2-propenoic acid methyl ester	2-Methyl-2-propenoic acid methyl ester	80-62-6	12~22
2-Propenoic acid 2-ethyl-2-[[(1-oxo-2-propenyl)oxy]methyl]-1,3-propanediyl ester	2-Propenoic acid 2-ethyl-2-[[(1-oxo-2-propenyl)oxy]methyl]-1,3-propanediyl ester	15625-89-5	5~15
n-Butyl Acrylate	n-Butyl Acrylate	141-32-2	4~14
[(1-Methyl-1,2-ethanediyl)bis[oxy(methyl-2,1-ethanediyl)]diacrylate	[(1-Methyl-1,2-ethanediyl)bis[oxy(methyl-2,1-ethanediyl)]diacrylate	42978-66-5	1~10
Titanium dioxide	Titanium dioxide	13463-67-7	1~10
Barium sulfate, natural	Barium sulfate, natural	7727-43-7	1~10
2-Ethylhexyl acrylate	2-Ethylhexyl acrylate	103-11-7	1~10
2,2'-[(3,3'-Dichloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(4-chloro-2,5-dimethoxyphenyl)-3-oxobutyramide] (C.I. pigment yellow 083)	2,2'-[(3,3'-Dichloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(4-chloro-2,5-dimethoxyphenyl)-3-oxobutyramide] (C.I. pigment yellow 083)	5567-15-7	1~10
1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	6422-86-2	1~10

4. First-aid measures

A. Eye Contact : If irritation, pain, swelling, tears or glaring happens, take medical assistant immediately Flush exposed eyes with plenty of water for more than 15minutes.

B. Skin Contact : Wash off with soap and water for more than 15 minutes. And take medical assistant immediately. If symptoms like irritation or pain occurs, take medical assistant immediately. Remove exposed clothing, and wash off exposed area with soap and water.

C. Inhalation : Take a medical assistant immediately. Remove contaminated clothing and shoes, and isolate it. If hard to breathe, administering oxygen Perform the artificial respiration, using the pocket mask with one way valves or other respiratory medical devices. If inhalated or swallowed, do not perform the inhalation phase of breathing If not breathing, perform the artificial respiration. Avoid from exposure, and move into an area with fresh air.

D. Ingestion Contact : It is need to be considered that early removal of some ingested material by gastric lavage must be weighed against potential complications of bleeding or perforation Take proper medical assistant by symtoms. If ingested large quantity, take medical assistant. Do not try to induce vomiting, if occurs, keep head below hips to prevent swallow into lungs. Inducing vomit.

E. Notes to Physician : There is no specific antidote and take an appropriate medical treatment.

5. Fire-fighting measures

A. Suitable (Unsuitable) extinguishing media

○ Suitable extinguishing media : Powder extinguishing agent, gaseous Extinguishing Agent, and regular foam.
○ (Unsuitable) extinguishing media : Water is not appropriate extinguishing agent
○ Case of big fire : Use appropriate protective device depend on the situation. Stay away more than 800m to avoid tank explosion. Spread large amount of the extinguishing agent as a mist form with staying against wind.

B. Specific hazards arising from the chemical
○ Pyrolysate : Carbon dioxide, toxic carbon compounds/Nitrogen compounds/sulfur compounds
○ Fire and Explosion danger : Risk of medium-sized fire.

C. Special protective actions for fire-fighters
○ Personal Precautions, protective equipment : Gas mask or air respirator, heat resistant clothing, heat resistant helmet, heat resistant gloves, heat resistant boots
○ Emergency procedures : Block the area except for the fire-suppression personnel. Cooling containers with water long time after extinguish fire. If there is no risk, moving containers away from fire. Use appropriate extinguishing agents to catch fire.

6. Accidental release measures

A. Personal Precautions, protective equipment and emergency procedures
○ Personal Precautions, protective equipment : Gas mask for organic gases, other appropriate protective device / clothing / gloves.
○ Emergency procedures : Do not contact on the bare skin Do work with the personal protected devices such as gas mask for organic gases other appropriate protective devices / clothing / gloves. Spray water to reduce amount of steam. Take an action to block the leakage if there is no risk.

B. Environmental precautions
○ Atmosphere : Using local ventilation to Minimize the exposure to worker. Do install the local ventilations and full ventilation system
○ Soil : Use absorbent to collect the appropriate container. Trap spilled material at bottom in deep water pockets, excavated holding areas or within sand bag barriers.
○ Under water : Collect spilled material with mechanic devices Use absorbent to collect the appropriate container.

C. Methods and materials for containment and cleaning up
○ Small spill : Move to appropriate container for disposal of spilled material collected. Absorb for use sand or other non-combustible material.
○ Large spill : Notify to central and local government, when emissions are above regulation. Prohibit access of unnecessary people, isolate hazard area to secure.

7. Handling and storage

A. Precautions for safe handling : Use local ventilations and a full ventilation system when handling Seal the container for minimizing the petroleum steam Ground for preventing the static discharge Keep or handle followed by Dangerous goods Safety Management Act

B. Conditions for safe storage, including any incompatibilities : Stored in an isolated place, freezing caution, high temperature body caution. Avoid strong oxidizing agents, acid. Storage temperature: 5 ~ 35 ℃ Avoid direct sunlight while storing outdoor. Because of evaporation and contamination concerns, airtight the container and store in a well-ventilated building.

8. Exposure controls/personal protection

A. Exposure Limits
○ S1 (Trade secrets)
- ACGIH : NO DATA
- Biological exposure indices : NO DATA

○ Quartz (SiO2)
- ACGIH : NO DATA
- Biological exposure indices : NO DATA

○ Limestone
- ACGIH : NO DATA
- Biological exposure indices : NO DATA

○ 2-Methyl-2-propenoic acid methyl ester
- ACGIH : NO DATA
- Biological exposure indices : NO DATA

○ 2-Propenoic acid 2-ethyl-2-[[(1-oxo-2-propenyl)oxy]methyl]-1,3-propanediyl ester
- ACGIH : NO DATA
- Biological exposure indices : NO DATA

○ n-Butyl Acrylate
- ACGIH : NO DATA
- Biological exposure indices : NO DATA

○ [(1-Methyl-1,2-ethanediyl)bis[oxy(methyl-2,1-ethanediyl)]diacrylate
- ACGIH : NO DATA
- Biological exposure indices : NO DATA

○ Titanium dioxide
- ACGIH : NO DATA
- Biological exposure indices : NO DATA

○ Barium sulfate, natural
- ACGIH : NO DATA
- Biological exposure indices : NO DATA

○ 2-Ethylhexyl acrylate
- ACGIH : NO DATA

- Biological exposure indices : NO DATA

○ 2,2'-[(3,3'-Dichloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(4-chloro-2,5-dimethoxyphenyl)-3-oxobutyramide] (C.I. pigment yellow 083)
- ACGIH : NO DATA
- Biological exposure indices : NO DATA

○ 1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester
- ACGIH : NO DATA
- Biological exposure indices : NO DATA

B. Engineering Controls :
▷ Do install the local ventilations and full ventilation system
▷ Using local ventilation to Minimize the exposure to worker.
▷ NO DATA
▷ NO DATA

C. Personal Protective Equipment
○ Respiratory protection : Use the personal protect respirator for organic solvent or higher level of capacity when workers are supposed to be exposed under unsuitable respiratory working condition, or longer period exposure than standard level. Respirators should be authorized by Korea Occupational Safety and Health Agency
○ Eye protection : Let workers do wear the safety glasses in case hazard caused by mist may be expected. Install washing facilities and an emergency washing facilities close to workplace. Use the respirator for organic solvent or higher level.
○ Hand protection : Wear the chemical protective gloves Do the workers wear the impermeable protective gloves made from rubber/PVC due to skin irritation may be supposed by chronicle and long period exposure.
○ Skin protection : Wear appropriate chemical protective clothing. Work after wearing the impermeable protective apron made by rubber/PVC in case hazard caused by exposure or spill, wear the impermeable whole body protective clothing if needed.

9. Physical and chemical properties

A. Appearance : liquid

B. Odor : solvent odor

C. Odor threshold : NO DATA

D. PH : NO DATA

E. Melting point/Freezing point(℃) : NO DATA

F. Initial Boiling Point/Boiling Ranges(℃) : 100.8

G. Flash point(℃) : 10

H. Evaporating Rate : NO DATA

I. Flammability(solid, gas)(℃) : NON Flammable

J. Upper/Lower Flammability or explosive limits : NO DATA

K. Vapour pressure : 38.5mmHg(25℃)

L. Solubility : NO DATA

M. Vapour density : 3.6

N. Specific gravity : 0.9~1.8

O. Partition coefficient of n-octanol/water : NO DATA

P. Autoignition temperature(℃) : 421

Q. Decomposition temperature(℃) : NO DATA

R. Viscosity : 100~8000CPS

S. Molecular weight : NO DATA

10. Stability and reactivity

A. Chemical stability : NO DATA

B. Possibility of hazardous reactions : Avoid contaminants and friction Do not contact with heat, spark, flame or other flammable sources

C. Conditions to avoid : Oxidation agent, metal and combustable materials

D. Hazardous decomposition products : Thermal decomposition products (carbon etc.,)

11.Toxicological information

A. Information on the likely routes of exposure
○ Respiratory tracts : Adverse lung effects, Dyspnoea, Hypothermia, Vomitting
○ Oral : Vomitting, Diarrhea, Stomach pain, Irregular heartbeat
○ Skin : Irritation, Burn, Adverse nerve effects
○ Eye : Irritation, eye damage

B. Delayed and immediate effects and also chronic effects from short and long term exposure
○ S1 (Trade secrets)
- Acute toxicity

Oral : NO DATA
Dermal : NO DATA
Inhalation : NO DATA
- Skin corrosion/irritation : NO DATA
- Serious eye damage/irritation : NO DATA
- Respiratory sensitization : NO DATA
- Skin sensitization : NO DATA
- Carcinogenicity
IARC : NO DATA
OSHA : NO DATA
ACGIH : NO DATA
NTP : NO DATA
EU CLP : NO DATA
- Germ cell mutagenicity : NO DATA
- Reproductive toxicity : NO DATA
- STOT-single exposure : NO DATA
- STOT-repeated exposure : NO DATA
- Aspiration hazard : NO DATA

○ Quartz (SiO2)
- Acute toxicity
Oral : NO DATA
Dermal : NO DATA
Inhalation : NO DATA
- Skin corrosion/irritation : NO DATA
- Serious eye damage/irritation : NO DATA
- Respiratory sensitization : NO DATA
- Skin sensitization : NO DATA
- Carcinogenicity
IARC : Group 1
OSHA : NO DATA
ACGIH : A2
NTP : K
EU CLP : NO DATA
- Germ cell mutagenicity : in vivo Mutagenictest (Bone Marrow Micronucleus test) result Negative, chromosomal abnormalities testresult Negative, Micronucleus testresult Positive
- Reproductive toxicity : in vivo Mutagenictest (Bone Marrow Micronucleus test) result Negative, chromosomal abnormalities testresult Negative, Micronucleus testresult Positive
- STOT-single exposure : NO DATA
- STOT-repeated exposure : NO DATA
- Aspiration hazard : NO DATA

○ Limestone
- Acute toxicity
Oral : NO DATA
Dermal : NO DATA
Inhalation : NO DATA
- Skin corrosion/irritation : NO DATA
- Serious eye damage/irritation : NO DATA
- Respiratory sensitization : NO DATA
- Skin sensitization : NO DATA
- Carcinogenicity
IARC : NO DATA
OSHA : NO DATA
ACGIH : NO DATA
NTP : NO DATA
EU CLP : NO DATA
- Germ cell mutagenicity : NO DATA
- Reproductive toxicity : NO DATA
- STOT-single exposure : NO DATA
- STOT-repeated exposure : NO DATA
- Aspiration hazard : NO DATA

○ 2-Methyl-2-propenoic acid methyl ester
- Acute toxicity
Oral : LD50 = 7900 mg/kg Rat
Dermal : LD50 = 5000 mg/kg Rabbit
Inhalation : LD50 = 5000 mg/kg Rabbit
- Skin corrosion/irritation : rabbit skin Irritation test result middle 정도 Irritation이 보고됨.
- Serious eye damage/irritation : Using the rabbit eye irritation test results - Middle stimulus
- Respiratory sensitization : Reported respiratory sensitization.
- Skin sensitization : Skin sensitization:
- Carcinogenicity
IARC : Group 3
OSHA : NO DATA
ACGIH : A4
NTP : NO DATA
EU CLP : NO DATA
- Germ cell mutagenicity : Germ cell in vivo Mutagenic Dominant lethal test - Negative
- Reproductive toxicity : Maternal toxicity in rat teratogenicity test results (mortality, weight loss, etc.) are expressed in the fetal dose toxicity (early fetal death, occurrence of hematoma) reported evidence.
- STOT-single exposure : Sex in the human airway irritation, talryeok, fever, dizziness, nausea, headache, drowsiness have been reported.
- STOT-repeated exposure : NO DATA
- Aspiration hazard : NO DATA

○ 2-Propenoic acid 2-ethyl-2-[[(1-oxo-2-propenyl)oxy]methyl]-1,3-propanediyl ester
- Acute toxicity
  Oral : LD50 = 5000 mg/kg Rat
  Dermal : LD50 = 5170 mg/kg Rabbit
  Inhalation : LD50 = 5170 mg/kg Rabbit
- Skin corrosion/irritation : middlestimulus
- Serious eye damage/irritation : Middle stimulus
- Respiratory sensitization : NO DATA
- Skin sensitization : Repeated contact dermatitis, skin sensitization reported
- Carcinogenicity
  IARC : NO DATA
  OSHA : NO DATA
  ACGIH : NO DATA
  NTP : NO DATA
  EU CLP : NO DATA
- Germ cell mutagenicity : NO DATA
- Reproductive toxicity : NO DATA
- STOT-single exposure : NO DATA
- STOT-repeated exposure : NO DATA
- Aspiration hazard : NO DATA

○ n-Butyl Acrylate
- Acute toxicity
  Oral : LD50 = 900 mg/kg Rat
  Dermal : LD50 = 1800 mg/kg Rabbit
  Inhalation : LD50 = 1800 mg/kg Rabbit
- Skin corrosion/irritation : (in rabbit) middle or red spots and swelling, skin Irritation have been reported in humans.
- Serious eye damage/irritation : Irritating to the eyes of rabbits and mild corneal opacity and courtyards also reported more injuries.
- Respiratory sensitization : NO DATA
- Skin sensitization : Hypersensitivity reactions in guinea pigs and in human allergic contact dermatitis have been reported.
- Carcinogenicity
  IARC : Group 3
  OSHA : NO DATA
  ACGIH : A4
  NTP : NO DATA
  EU CLP : NO DATA
- Germ cell mutagenicity : Using mammalian bone marrow chromosome aberration test - Negative
- Reproductive toxicity : Using mammalian bone marrow chromosome aberration test - Negative
- STOT-single exposure : A rat respiratory tract irritation, increased nasal secretions, mucosal congestion appears.
- STOT-repeated exposure : NO DATA
- Aspiration hazard : Aspiration hazard likely to be reported as that.

○ [(1-Methyl-1,2-ethanediyl)bis[oxy(methyl-2,1-ethanediyl)]diacrylate
- Acute toxicity
  Oral : LD50 = 6200 mg/kg Rat
  Dermal : LD50 > 2000 mg/kg Rabbit
  Inhalation : LD50 > 2000 mg/kg Rabbit
- Skin corrosion/irritation : usuallystimulus(rabbit)
- Serious eye damage/irritation : Severe irritation(rabbit)
- Respiratory sensitization : NO DATA
- Skin sensitization : Skin sensitization
- Carcinogenicity
  IARC : NO DATA
  OSHA : NO DATA
  ACGIH : NO DATA
  NTP : NO DATA
  EU CLP : NO DATA
- Germ cell mutagenicity : NO DATA
- Reproductive toxicity : NO DATA
- STOT-single exposure : Respiratory irritation
- STOT-repeated exposure : NO DATA
- Aspiration hazard : NO DATA

○ Titanium dioxide
- Acute toxicity
  Oral : LD50 > 10000 mg/kg Rat
  Dermal : LD50 > 10000 mg/kg Rabbit
  Inhalation : LD50 > 10000 mg/kg Rabbit
- Skin corrosion/irritation : (in rabbit) skin Irritation test result weak Irritation or non-irritating
- Serious eye damage/irritation : Using the rabbit eye irritation test results - Mild irritant
- Respiratory sensitization : NO DATA
- Skin sensitization : negative patch test results in people
- Carcinogenicity
  IARC : Group 2B
  OSHA : NO DATA
  ACGIH : A4
  NTP : NO DATA
  EU CLP : NO DATA
- Germ cell mutagenicity : Mouse Micronucleustest Negative, Mouse Chromosomal abnormalitiestest Negative
- Reproductive toxicity : Mouse Micronucleustest Negative, Mouse Chromosomal abnormalitiestest Negative

- STOT-single exposure : NO DATA
- STOT-repeated exposure : Reported occupational pneumoconiosis in the exposed workers for more than 20 years.
- Aspiration hazard : NO DATA

○ Barium sulfate, natural
- Acute toxicity
  Oral : LD50 > 3000 mg/kg Rat
  Dermal : NO DATA
  Inhalation : NO DATA
- Skin corrosion/irritation : Non-irritating to human
- Serious eye damage/irritation : e irritation have been reported in humans.
- Respiratory sensitization : NO DATA
- Skin sensitization : NO DATA
- Carcinogenicity
  IARC : NO DATA
  OSHA : NO DATA
  ACGIH : NO DATA
  NTP : NO DATA
  EU CLP : NO DATA
- Germ cell mutagenicity : NO DATA
- Reproductive toxicity : NO DATA
- STOT-single exposure : NO DATA
- STOT-repeated exposure : NO DATA
- Aspiration hazard : NO DATA

○ 2-Ethylhexyl acrylate
- Acute toxicity
  Oral : LD50 = 4000 ~ 6000 mg/kg Rat
  Dermal : LD50 > 10,000 mg/kg Rabbit
  Inhalation : LD50 > 10,000 mg/kg Rabbit
- Skin corrosion/irritation : rabbit skin is exposed to severe Irritation tinged
- Serious eye damage/irritation : Severe eye irritation in animal studies
- Respiratory sensitization : NO DATA
- Skin sensitization : Show positive reactions in human patch test-animal sensitization testing appears to moderate
- Carcinogenicity
  IARC : Group 3
  OSHA : NO DATA
  ACGIH : NO DATA
  NTP : NO DATA
  EU CLP : NO DATA
- Germ cell mutagenicity : In vitro bacterial mutation test of a Negative result - In vivo UDS assay [OECD TG 486], chromosomal aberration mutagenicity test result of the Negative
- Reproductive toxicity : In vitro bacterial mutation test of a Negative result - In vivo UDS assay [OECD TG 486], chromosomal aberration mutagenicity test result of the Negative
- STOT-single exposure : NO DATA
- STOT-repeated exposure : NO DATA
- Aspiration hazard : NO DATA

○ 2,2'-[(3,3'-Dichloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(4-chloro-2,5-dimethoxyphenyl)-3-oxobutyramide] (C.I. pigment yellow 083)
- Acute toxicity
  Oral : LD50 > 5000 mg/kg Rat
  Dermal : NO DATA
  Inhalation : NO DATA
- Skin corrosion/irritation : OECD Guide-404 rabbit middle irritant(Slightly irritating)
- Serious eye damage/irritation : OECD Guide-405 rabbit : (not irritating)
- Respiratory sensitization : NO DATA
- Skin sensitization : NO DATA
- Carcinogenicity
  IARC : NO DATA
  OSHA : NO DATA
  ACGIH : NO DATA
  NTP : NO DATA
  EU CLP : NO DATA
- Germ cell mutagenicity : IN VITRO - AMES TEST - Negative
- Reproductive toxicity : IN VITRO - AMES TEST - Negative
- STOT-single exposure : NO DATA
- STOT-repeated exposure : NO DATA
- Aspiration hazard : NO DATA

○ 1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester
- Acute toxicity
  Oral : NO DATA
  Dermal : NO DATA
  Inhalation : NO DATA
- Skin corrosion/irritation : People with weak stimulus of intermittent exposure causes skin
- Serious eye damage/irritation : Light enough to be stimulating recovery in three days (OECD 405, GLP)
- Respiratory sensitization : NO DATA
- Skin sensitization : NO DATA
- Carcinogenicity
  IARC : NO DATA
  OSHA : NO DATA
  ACGIH : NO DATA
  NTP : NO DATA

- EU CLP : NO DATA
- Germ cell mutagenicity : NO DATA
- Reproductive toxicity : NO DATA
- STOT-single exposure : NO DATA
- STOT-repeated exposure : NO DATA
- Aspiration hazard : NO DATA

12. Ecological information

A. Ecotoxicity

○ S1 (Trade secrets)
- Fish : NO DATA
- Crustaceans : NO DATA
- Algae : NO DATA

○ Quartz (SiO2)
- Fish : NO DATA
- Crustaceans : NO DATA
- Algae : NO DATA

○ Limestone
- Fish : NO DATA
- Crustaceans : NO DATA
- Algae : NO DATA

○ 2-Methyl-2-propenoic acid methyl ester
- Fish : LC50 = 191 ㎎/ℓ 96 hr
- Crustaceans : NO DATA
- Algae : NO DATA

○ 2-Propenoic acid 2-ethyl-2-[[(1-oxo-2-propenyl)oxy]methyl]-1,3-propanediyl ester
- Fish : NO DATA
- Crustaceans : NO DATA
- Algae : NO DATA

○ n-Butyl Acrylate
- Fish : NO DATA
- Crustaceans : NO DATA
- Algae : EC50 = 1.7 ㎎/ℓ 72 hr

○ [(1-Methyl-1,2-ethanediyl)bis[oxy(methyl-2,1-ethanediyl)]diacrylate
- Fish : NO DATA
- Crustaceans : EC50 = 88.7 ㎎/ℓ 48 hr Daphnia magna
- Algae : EC50 > 28 ㎎/ℓ 72 hr Scenedesmus subspicatus

○ Titanium dioxide
- Fish : NO DATA
- Crustaceans : EC50 > 1000 ㎎/ℓ 48 hr
- Algae : NO DATA

○ Barium sulfate, natural
- Fish : NO DATA
- Crustaceans : EC50 = 32 ㎎/ℓ 48 hr Daphnia magna
- Algae : EC50 = 1890.263 ㎎/ℓ 96 hr

○ 2-Ethylhexyl acrylate
- Fish : LC50 = 1.8 ㎎/ℓ 96 hr Oncorhynchus mykiss
- Crustaceans : EC50 = 1.3 ㎎/ℓ 48 hr Daphnia magna
- Algae : EC50 = 44 ㎎/ℓ 72 hr Other (Scenedesmus quadricaud)

○ 2,2'-[(3,3'-Dichloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(4-chloro-2,5-dimethoxyphenyl)-3-oxobutyramide] (C.I. pigment yellow 083)
- Fish : LC50 = 45 ㎎/ℓ 48 hr Oncorhynchus mykiss
- Crustaceans : NO DATA
- Algae : NO DATA

○ 1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester
- Fish : NO DATA
- Crustaceans : NO DATA
- Algae : NO DATA

B. Persistence and degradability

○ S1 (Trade secrets)
- Persistence : NO DATA
- Degradability : NO DATA

○ Quartz (SiO2)
- Persistence : NO DATA
- Degradability : NO DATA

○ Limestone
- Persistence : NO DATA
- Degradability : NO DATA

○ 2-Methyl-2-propenoic acid methyl ester
- Persistence : NO DATA
- Degradability : NO DATA

○ 2-Propenoic acid 2-ethyl-2-[[(1-oxo-2-propenyl)oxy]methyl]-1,3-propanediyl ester
- Persistence : log Kow = 2.86 (Estimates)
- Degradability : NO DATA

○ n-Butyl Acrylate
- Persistence : NO DATA
- Degradability : BOD5/COD = 0.37

○ [(1-Methyl-1,2-ethanediyl)bis[oxy(methyl-2,1-ethanediyl)]diacrylate
- Persistence : log Kow = 2.77
- Degradability : NO DATA

○ Titanium dioxide
- Persistence : NO DATA
- Degradability : NO DATA

○ Barium sulfate, natural
- Persistence : log Kow = 0.63
- Degradability : NO DATA

○ 2-Ethylhexyl acrylate
- Persistence : log Kow = 4.09
- Degradability : NO DATA

○ 2,2'-[(3,3'-Dichloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(4-chloro-2,5-dimethoxyphenyl)-3-oxobutyramide] (C.I. pigment yellow 083)
- Persistence : log Kow = 7.54
- Degradability : NO DATA

○ 1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester
- Persistence : log Kow = 8.390
- Degradability : NO DATA

C. Bioaccumulative potential

○ S1 (Trade secrets)
- Bioaccumulative potential : NO DATA
- Biodegration : NO DATA

○ Quartz (SiO2)
- Bioaccumulative potential : NO DATA
- Biodegration : NO DATA

○ Limestone
- Bioaccumulative potential : NO DATA
- Biodegration : NO DATA

○ 2-Methyl-2-propenoic acid methyl ester
- Bioaccumulative potential : BCF = 4.295
- Biodegration : Biodegradability = 94.3 (%)

○ 2-Propenoic acid 2-ethyl-2-[[(1-oxo-2-propenyl)oxy]methyl]-1,3-propanediyl ester
- Bioaccumulative potential : NO DATA
- Biodegration : NO DATA

○ n-Butyl Acrylate
- Bioaccumulative potential : NO DATA
- Biodegration : Biodegradability = 61.3 (%)

○ [(1-Methyl-1,2-ethanediyl)bis[oxy(methyl-2,1-ethanediyl)]diacrylate
- Bioaccumulative potential : NO DATA
- Biodegration : Biodegradability > 90 (%)

○ Titanium dioxide
- Bioaccumulative potential : NO DATA
- Biodegration : NO DATA

○ Barium sulfate, natural
- Bioaccumulative potential : BCF = 3.162
- Biodegration : NO DATA

○ 2-Ethylhexyl acrylate
- Bioaccumulative potential : BCF = 280
- Biodegration : (BOD(14 days) 51.7%)

○ 2,2'-[(3,3'-Dichloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(4-chloro-2,5-dimethoxyphenyl)-3-oxobutyramide] (C.I. pigment yellow 083)
- Bioaccumulative potential : BCF = 10
- Biodegration : Biodegradability = 6 (%) 28 day (Non-biodegradability)

○ 1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester
- Bioaccumulative potential : NO DATA
- Biodegration : NO DATA

D. Mobility in soil

○ S1 (Trade secrets)
▷ NO DATA

○ Quartz (SiO2)
▷ NO DATA

○ Limestone
▷ NO DATA

○ 2-Methyl-2-propenoic acid methyl ester
▷ NO DATA

○ 2-Propenoic acid 2-ethyl-2-[[(1-oxo-2-propenyl)oxy]methyl]-1,3-propanediyl ester
▷ NO DATA

○ n-Butyl Acrylate
▷ NO DATA

○ [(1-Methyl-1,2-ethanediyl)bis[oxy(methyl-2,1-ethanediyl)]diacrylate
▷ NO DATA

○ Titanium dioxide
▷ NO DATA

○ Barium sulfate, natural
▷ NO DATA

○ 2-Ethylhexyl acrylate
▷ Koc = 54954

○ 2,2'-[(3,3'-Dichloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(4-chloro-2,5-dimethoxyphenyl)-3-oxobutyramide] (C.I. pigment yellow 083)
▷ NO DATA

○ 1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester
▷ Koc = 870,000

E. Other adverse effects

○ S1 (Trade secrets)
▷ NO DATA
○ Quartz (SiO2)
▷ NO DATA
○ Limestone
▷ NO DATA
○ 2-Methyl-2-propenoic acid methyl ester
▷ NO DATA
○ 2-Propenoic acid 2-ethyl-2-[[(1-oxo-2-propenyl)oxy]methyl]-1,3-propanediyl ester
▷ NO DATA
○ n-Butyl Acrylate
▷ NO DATA
○ [(1-Methyl-1,2-ethanediyl)bis[oxy(methyl-2,1-ethanediyl)]diacrylate
▷ NO DATA
○ Titanium dioxide
▷ NO DATA
○ Barium sulfate, natural
▷ NO DATA
○ 2-Ethylhexyl acrylate
▷ NO DATA
○ 2,2'-[(3,3'-Dichloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(4-chloro-2,5-dimethoxyphenyl)-3-oxobutyramide] (C.I. pigment yellow 083)
▷ NO DATA
○ 1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester
▷ NO DATA

13. Disposal considerations

A. Disposal methods : Disposal material should keep in the airtighted container, and consign according to Waste Mateial Management Act

B. Special precautions for disposal : Discard it followed by appropriate regulations Prohibit the unauthorized disposal and incineration due to adversely affect natural ecosystems

14. Transport information

A. UN number : 1263

B. Proper shipping name : Paint (including paint, lacquer, enamel, colorants, shellac solutions, varnish, polish, liquid filler and liquid lacquer sealer) or related materials (including paint diluent and reductant).

C. Hazard class : 3

D. Packing group : II

E. Marine pollutant : N/A

F. Special precautions for user related to transport or transportation measures
○ EmS FIRE SCHEDULE : F-E
○ EmS SPILLAGE SCHEDULE : S-E

15. Regulatory information

○ S1 (Trade secrets)
- Information of EU Classification
▷ Classification : NO DATA
▷ Risk Phrases : NO DATA
▷ Safety Phrase : NO DATA
- U.S. Federal regulations
▷ OSHA PROCESS SAFETY (29CFR1910.119) : NO DATA
▷ CERCLA Section 103 (40CFR302.4) : NO DATA
▷ EPCRA Section 302 (40CFR355.30) : NO DATA
▷ EPCRA Section 304 (40CFR355.40) : NO DATA
▷ EPCRA Section 313 (40CFR372.65) : NO DATA
- Rotterdam Convention listed ingredients : NO DATA
- Stockholm Convention listed ingredients : NO DATA
- Montreal Protocol listed ingredients : NO DATA

○ Quartz (SiO2)
- Information of EU Classification
▷ Classification : NO DATA
▷ Risk Phrases : NO DATA
▷ Safety Phrase : NO DATA
- U.S. Federal regulations
▷ OSHA PROCESS SAFETY (29CFR1910.119) : notapplicable
▷ CERCLA Section 103 (40CFR302.4) : notapplicable
▷ EPCRA Section 302 (40CFR355.30) : notapplicable
▷ EPCRA Section 304 (40CFR355.40) : notapplicable
▷ EPCRA Section 313 (40CFR372.65) : notapplicable
- Rotterdam Convention listed ingredients : NO DATA
- Stockholm Convention listed ingredients : NO DATA
- Montreal Protocol listed ingredients : NO DATA

○ Limestone
- Information of EU Classification

▷ Classification : NO DATA
▷ Risk Phrases : NO DATA
▷ Safety Phrase : NO DATA
- U.S. Federal regulations
▷ OSHA PROCESS SAFETY (29CFR1910.119) : notapplicable
▷ CERCLA Section 103 (40CFR302.4) : notapplicable
▷ EPCRA Section 302 (40CFR355.30) : notapplicable
▷ EPCRA Section 304 (40CFR355.40) : notapplicable
▷ EPCRA Section 313 (40CFR372.65) : notapplicable
- Rotterdam Convention listed ingredients : NO DATA
- Stockholm Convention listed ingredients : NO DATA
- Montreal Protocol listed ingredients : NO DATA

○ 2-Methyl-2-propenoic acid methyl ester
- Information of EU Classification
▷ Classification : NO DATA
▷ Risk Phrases : NO DATA
▷ Safety Phrase : NO DATA
- U.S. Federal regulations
▷ OSHA PROCESS SAFETY (29CFR1910.119) : notapplicable
▷ CERCLA Section 103 (40CFR302.4) : 453.599 kg 1000 lb
▷ EPCRA Section 302 (40CFR355.30) : notapplicable
▷ EPCRA Section 304 (40CFR355.40) : notapplicable
▷ EPCRA Section 313 (40CFR372.65) : pertinent
- Rotterdam Convention listed ingredients : NO DATA
- Stockholm Convention listed ingredients : NO DATA
- Montreal Protocol listed ingredients : NO DATA

○ 2-Propenoic acid 2-ethyl-2-[[(1-oxo-2-propenyl)oxy]methyl]-1,3-propanediyl ester
- Information of EU Classification
▷ Classification : NO DATA
▷ Risk Phrases : NO DATA
▷ Safety Phrase : NO DATA
- U.S. Federal regulations
▷ OSHA PROCESS SAFETY (29CFR1910.119) : notapplicable
▷ CERCLA Section 103 (40CFR302.4) : notapplicable
▷ EPCRA Section 302 (40CFR355.30) : notapplicable
▷ EPCRA Section 304 (40CFR355.40) : notapplicable
▷ EPCRA Section 313 (40CFR372.65) : notapplicable
- Rotterdam Convention listed ingredients : NO DATA
- Stockholm Convention listed ingredients : NO DATA
- Montreal Protocol listed ingredients : NO DATA

○ n-Butyl Acrylate
- Information of EU Classification
▷ Classification : NO DATA
▷ Risk Phrases : NO DATA
▷ Safety Phrase : NO DATA
- U.S. Federal regulations
▷ OSHA PROCESS SAFETY (29CFR1910.119) : notapplicable
▷ CERCLA Section 103 (40CFR302.4) : notapplicable
▷ EPCRA Section 302 (40CFR355.30) : notapplicable
▷ EPCRA Section 304 (40CFR355.40) : notapplicable
▷ EPCRA Section 313 (40CFR372.65) : pertinent
- Rotterdam Convention listed ingredients : NO DATA
- Stockholm Convention listed ingredients : NO DATA
- Montreal Protocol listed ingredients : NO DATA

○ [(1-Methyl-1,2-ethanediyl)bis[oxy(methyl-2,1-ethanediyl)]diacrylate
- Information of EU Classification
▷ Classification : NO DATA
▷ Risk Phrases : NO DATA
▷ Safety Phrase : NO DATA
- U.S. Federal regulations
▷ OSHA PROCESS SAFETY (29CFR1910.119) : notapplicable
▷ CERCLA Section 103 (40CFR302.4) : notapplicable
▷ EPCRA Section 302 (40CFR355.30) : notapplicable
▷ EPCRA Section 304 (40CFR355.40) : notapplicable
▷ EPCRA Section 313 (40CFR372.65) : notapplicable
- Rotterdam Convention listed ingredients : NO DATA
- Stockholm Convention listed ingredients : NO DATA
- Montreal Protocol listed ingredients : NO DATA

○ Titanium dioxide
- Information of EU Classification
▷ Classification : NO DATA
▷ Risk Phrases : NO DATA
▷ Safety Phrase : NO DATA
- U.S. Federal regulations
▷ OSHA PROCESS SAFETY (29CFR1910.119) : notapplicable
▷ CERCLA Section 103 (40CFR302.4) : notapplicable
▷ EPCRA Section 302 (40CFR355.30) : notapplicable
▷ EPCRA Section 304 (40CFR355.40) : notapplicable
▷ EPCRA Section 313 (40CFR372.65) : notapplicable
- Rotterdam Convention listed ingredients : NO DATA
- Stockholm Convention listed ingredients : NO DATA

- Montreal Protocol listed ingredients : NO DATA

○ Barium sulfate, natural
- Information of EU Classification
  ▷ Classification : NO DATA
  ▷ Risk Phrases : NO DATA
  ▷ Safety Phrase : NO DATA
- U.S. Federal regulations
  ▷ OSHA PROCESS SAFETY (29CFR1910.119) : notapplicable
  ▷ CERCLA Section 103 (40CFR302.4) : notapplicable
  ▷ EPCRA Section 302 (40CFR355.30) : notapplicable
  ▷ EPCRA Section 304 (40CFR355.40) : notapplicable
  ▷ EPCRA Section 313 (40CFR372.65) : notapplicable
- Rotterdam Convention listed ingredients : NO DATA
- Stockholm Convention listed ingredients : NO DATA
- Montreal Protocol listed ingredients : NO DATA

○ 2-Ethylhexyl acrylate
- Information of EU Classification
  ▷ Classification : NO DATA
  ▷ Risk Phrases : NO DATA
  ▷ Safety Phrase : NO DATA
- U.S. Federal regulations
  ▷ OSHA PROCESS SAFETY (29CFR1910.119) : notapplicable
  ▷ CERCLA Section 103 (40CFR302.4) : notapplicable
  ▷ EPCRA Section 302 (40CFR355.30) : notapplicable
  ▷ EPCRA Section 304 (40CFR355.40) : notapplicable
  ▷ EPCRA Section 313 (40CFR372.65) : notapplicable
- Rotterdam Convention listed ingredients : NO DATA
- Stockholm Convention listed ingredients : NO DATA
- Montreal Protocol listed ingredients : NO DATA

○ 2,2'-[(3,3'-Dichloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(4-chloro-2,5-dimethoxyphenyl)-3-oxobutyramide] (C.I. pigment yellow 083)
- Information of EU Classification
  ▷ Classification : NO DATA
  ▷ Risk Phrases : NO DATA
  ▷ Safety Phrase : NO DATA
- U.S. Federal regulations
  ▷ OSHA PROCESS SAFETY (29CFR1910.119) : notapplicable
  ▷ CERCLA Section 103 (40CFR302.4) : notapplicable
  ▷ EPCRA Section 302 (40CFR355.30) : notapplicable
  ▷ EPCRA Section 304 (40CFR355.40) : notapplicable
  ▷ EPCRA Section 313 (40CFR372.65) : notapplicable
- Rotterdam Convention listed ingredients : NO DATA
- Stockholm Convention listed ingredients : NO DATA
- Montreal Protocol listed ingredients : NO DATA

○ 1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester
- Information of EU Classification
  ▷ Classification : NO DATA
  ▷ Risk Phrases : NO DATA
  ▷ Safety Phrase : NO DATA
- U.S. Federal regulations
  ▷ OSHA PROCESS SAFETY (29CFR1910.119) : notapplicable
  ▷ CERCLA Section 103 (40CFR302.4) : notapplicable
  ▷ EPCRA Section 302 (40CFR355.30) : notapplicable
  ▷ EPCRA Section 304 (40CFR355.40) : notapplicable
  ▷ EPCRA Section 313 (40CFR372.65) : notapplicable
- Rotterdam Convention listed ingredients : NO DATA
- Stockholm Convention listed ingredients : NO DATA
- Montreal Protocol listed ingredients : NO DATA

16. Other information

A. Reference
This MSDS is based on 'Industrial safety and health' Act paragraph 41 and Proclamation of Ministry of Labor and Employment 2016-19, and considered domestic regulations.
This MSDS is based on KOSHA, NITE, ESIS, NLM, SIDS, IPCS, NCIS.

B. Issue date : 2016-01-28 오후 5:42:12

C. Revision number and Last date revised : 3.(2019-04-04 오전 11:42:30)

D. Other : " WWW.NOROO.CO.KR"