NOROO

SAFETY DATA SHEET

According to OSHA Hazcom Standard 29 CFR 1910.1200

SUPER ENAMEL KS M 6020 TYPE 2 GRADE 2 (YELLOW)

Date of issue: 2025-09-26 Revision date: 2026-09-08 Version: 1.6

1. IDENTIFICATION

A. Product name

- SUPER ENAMEL KS M 6020 TYPE 2 GRADE 2 (YELLOW)

B. Recommended use and restriction on use

- General use : 유성 페인트
- Restriction on use : Not for use other than as recommended.

C. Manufacturer / Supplier / Distributor information

- Company name : NOROO Paint & Coatings
- Address : 351, Bakdal-ro, Manan-gu, Anyang-si, Gyeonggi-do, Republic of Korea
- Emergency telephone number : 031-467-6114

2. HAZARD IDENTIFICATION

A. GHS Classification

- Flammable liquids : Category3
- Acute toxicity (inhalation: vapor) : Category4
- Skin corrosion/irritation : Category2
- Serious eye damage/irritation : Category1
- Respiratory sensitization : Category1
- Skin sensitization : Category1
- Germ cell mutagenicity : Category1B
- Carcinogenicity : Category1B
- Reproductive toxicity : Category2
- Specific target organ toxicity(Repeated exposure) : Category1
- Aspiration hazard : Category1

B. GHS label elements

○ Hazard symbols



○ Signal words

- Danger

○ Hazard statements

- H226 Flammable liquid and vapour
- H304 May be fatal if swallowed and enters airways
- H315 Causes skin irritation

- H317 May cause an allergic skin reaction
- H318 Causes serious eye damage
- H332 Harmful if inhaled
- H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled
- H340 May cause genetic defects
- H350 May cause cancer
- H361 Suspected of damaging fertility or the unborn child
- H372 Causes damage to organs through prolonged or repeated exposure

○ Precautionary statements

1) Prevention

- P201 Obtain special instructions before use.
- P202 Do not handle until all safety precautions have been read and understood.
- P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- P233 Keep container tightly closed.
- P240 Ground and bond container and receiving equipment.
- P241 Use explosion-proof electrical/ventilating/lighting/equipment.
- P242 Use non-sparking tools.
- P243 Take action to prevent static discharges.
- P260 Do not breathe dust/fume/gas/mist/vapours/spray.
- P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
- P264 Wash hands thoroughly after handling.
- P270 Do not eat, drink or smoke when using this product.
- P271 Use only outdoors or in a well-ventilated area.
- P272 Contaminated work clothing should not be allowed out of the workplace.
- P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.
- P281
- P284 In case of inadequate ventilation wear respiratory protection.

2) Response

- P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- P302+P352 IF ON SKIN: Wash with plenty of soap and water.
- P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower]
- P304+P340 IF INHALED: Remove person to fresh air and keep 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.
- 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 (if in eyes, wash with plenty of running water; if in contact with skin, wash with plenty of running water; if inhaled, move to fresh air; if ingested, seek medical advice on whether to induce vomiting).
- P331 Do NOT induce vomiting.
- P332+P313 If skin irritation occurs: Get medical advice/attention.
- P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
- P342+P311 If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.
- P362 Take off contaminated clothing and wash before reuse.
- P362+P364 Take off contaminated clothing and wash before reuse.

- P370+P378 In case of fire: Use Suitable extinguishing media for extinction(Refer Section SDS 5).

3) Storage

- P403+P235 Store in a well-ventilated place. Keep cool.
- P405 Store locked up.

4) Disposal

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

C. Other hazards which do not result in classification

- Not available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Trade names and Synonyms	CAS No.	Content(%)
수소탈황된 중질 나프타 (석유)	지방족탄화수소 ; 나프타, 하이드로탈황 중유 ; 하이드로탈황 중나프타 (석유)	64742-82-1	15~24
지방 산, 식물성-기름(FATTY ACIDS, VEGETABLE-OIL)	지방 산, 식물성-기름(FATTY ACIDS, VEGETABLE-OIL)	61788-66-7	12~20
프탈 무수물	1,3-아이소벤조푸란다이온 ; 프탈산 무수화물 ; 1,2-벤젠다이카복실산 무수화물 ; 1,3-다이옥소프탈란 ; 2-벤조푸란-1,3-다이온 ; 아로마틱 다이카복실산 무수화물 ; 1,3-다이하이드로-1,3-다이옥소아이소벤조푸란 ; 1,3-다이옥소나프탈란 ; 1,3-프탈란다이온 ; 프탈란다이온 ; 프탈란하이드라이드 ;	85-44-9	5~15
펜타에리스리톨	1,3-프로판다이올, 2,2-비스(하이드록시메틸)- ; 펜타에리스리톨 ; 테트라메틸올메테인 ; 2,2-비스(하이드록시메틸)-1,3-프로판다이올 ; 프로판-1,3-다이올, 2,2-비스(하이드록시메틸)- ; 메테인 테트라메틸올 ; 모노펜타에리스리톨 ; 테트라하이드록시메틸올메탄 ; 2,2-비스(하이드록시메틸)프로판-1,3-다이올	115-77-5	1~8
크실렌	자일롤 ; 메틸톨루엔 ; 다이메틸벤젠	1330-20-7	1~6
이산화 티타늄	산화 티타늄 ; 과산화 티타늄 ; 다이옥소티타늄 ; 피그먼트 화이트 6	13463-67-7	1~6
황산 바륨	황산 바륨염 (1:1) ; 황산 바륨 ; 중정석 ;	7727-43-7	1~5
탄산 다이메틸	다이메틸 에스터 탄산 ; 메틸 카보네이트	616-38-6	1~5
뷰탄아마이드, 2,2'-[(3,3'-다이클로로[1,1'-바이페닐]-4,4'-다이일)비스(2,1-다이아젠다이일)]비스[N-(4-클로로-2,5-다이메톡시페닐)-3-옥소-	뷰탄아마이드, 2,2'-[(3,3'-다이클로로[1,1'-바이페닐]-4,4'-다이일)비스(2,1-디아젠다이일)]비스[N-(4-클로로-2,5-다이메톡시페닐)-3-옥소- ; 뷰탄아마이드, 2,2'-[(3,3'-다이클로로[1,1'-바이페닐]-4,4'-다이일)비스(아조)]비스[N-(4-클로로-2,5-다이메톡시페닐)-3-옥소- ; 뷰탄아마이드, 2,2'-[(3,3'-다이클로로[1,1'-바이페닐]-4,4'-다이일)비스(아조)]비스[N-(4-클로로-2,5-다이메톡시페닐)-3-옥소- ; 뷰탄아마이드,2,2'-{(3,3'-다이클로로{1,1'바이페닐}-4,4'다이일)비스(아조)}비스{n-(4-클로로-2,5-다이메톡시 -페닐)-3-옥소- ; 2,2'-[(3,3'-다이클로로[1,1'-바이페닐]-4,4'-다이일)비스(아조)]비스[N-(4-클로로-2,5-다이메톡시페닐)-3-옥소뷰탄아마이드 ; 아세토아세타닐라이드, 2,2''-[(3,3'-다이클로로-4,4'-바이페닐일린)비스(아조)]비스[4'-클로로-2',5'-다이메톡시- ;	5567-15-7	1~5
영업비밀	영업비밀	-	1~5

1,2-에테인다이올	1,2-다이하이드록시에테인 ; 에틸렌 알콜 ; 에틸렌 다이하이드레이트 ; 2-하이드록시에탄올 ; 에탄-1,2-다이올 ; 모노에틸렌 글라이콜 ;	107-21-1	1~5
산화 비스무트 바나듐 (바이오4V)(BISMUTH VANADIUM OXIDE (BIO4V))	산화 비스무트 바나듐 (바이오 4V)(BISMUTH VANADIUM OXIDE (BIO4V))	14059-33-7	1~5
2,2'-[(2,2',5,5'-Tetrachloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(2,4-dimethylphenyl)-3-oxobutyramide] (C.I. 염료 황색 81)	2,2'-[(2,2',5,5'-Tetrachloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(2,4-dimethylphenyl)-3-oxobutyramide] (C.I. 염료 황색 81)	22094-93-5	1~5
뷰틸 아세테이트	부틸 에스터 아세트산 ; 1-부틸 아세트산 ; 부틸 아세트산 ; n-부틸 에스터 아세트산 ; 부틸 에타노산 ; 1-아세톡시뷰테인	123-86-4	1~5
다이아이소뷰틸케톤	4-헵탄온, 2,6-다이메틸- ; 헵탄-4-온, 2,6-다이메틸- ; 2,6-다이메틸-4-헵탄온 ; 다이아이소뷰틸케톤 ; 아이소발레론 ; s-다이아이소프로필아세톤 ; 2,6-다이메틸-4-헵테인온 ; 발레론 ; 2,6-다이메틸헵탄-4-온	108-83-8	1~5
솔벤트 나프타 (석유), 중질 지방족화합물	솔벤트 나프타 (석유), 중질 지방족화합물	64742-96-7	1~5
(E,E)-9,11-Octadecadienoic acid; Isolinoleic acid	(E,E)-9,11-Octadecadienoic acid; Isolinoleic acid	544-71-8	1~5
쿠멘	(1-메틸에틸)-벤젠 ; 2-페닐프로페인 ; i-프로필벤젠 ; 메틸 에틸 벤젠 ; 큐몰 ; 프로판-2-일벤젠	98-82-8	0.1~1

4. FIRST AID MEASURES

A. Eye contact

- Do not rub your eyes.
- Immediately flush eyes with plenty of water for at least 15 minutes and call a doctor/physician.
- Get medical attention immediately.
- Remove contact lenses if worn.

B. Skin contact

- Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- Wash contaminated clothing thoroughly before re-using.
- Get medical attention immediately.
- Go to the hospital immediately if symptoms(flare, irritate) occur.
- Remove contaminated clothing, shoes and isolate.
- Wash thoroughly after handling.
- Wear gloves when washing the patient, and please avoid contact with contaminated clothing.

C. Inhalation contact

- Take specific treatment if needed.
- When exposed to large amounts of steam and mist, move to fresh air.
- Get medical attention immediately.
- Go to the hospital immediately if symptoms(flare, irritate) occur.
- If breathing is stopped or irregular, give artificial respiration and supply oxygen.

D. Ingestion contact

- Please be advised by doctor whether induction of vomit is demanded or not.
- Rinse your mouth with water immediately.
- Get medical attention immediately.
- If swallowed, large amounts of water to drink and do not induce vomiting.

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

- Not available

F. Notes to physician

- Notify medical personnel of contaminated situations and have them take appropriate protective measures.
- If exposed or concerned, get medical attention/advice.
- Remove to fresh air and keep at rest in a position comfortable for breathing.

5. FIREFIGHTING MEASURES

A. Suitable (Unsuitable) extinguishing media

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

B. Specific hazards arising from the chemical

- Causes damage to organs through prolonged or repeated exposure
- Causes serious eye damage
- Causes skin irritation
- Flammable liquid and vapour
- Harmful if inhaled

C. Special protective actions for firefighters

- Avoid inhalation of materials or combustion by-products.
- Cool containers with water until well after fire is out.
- Do not approach the tank surrounded by fire until it is extinguished.
- In case of conflagration, use automatic fire sprinkler. Major fire may require withdrawal, allowing the object itself to burn.
- Keep unauthorized personnel out.
- Move containers from fire area, if you can do without the risk.
- Notify your local firestation and inform the location of the fire and characteristics hazard.
- Use appropriate extinguishing measure suitable for surrounding fire.
- Wear appropriate protective equipment.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- Due to the extremely low flash point, irrigating fire extinguishing may be less effective when put out a fire.

6. ACCIDENTAL RELEASE MEASURES

A. Personal precautions, protective equipment and emergency procedures

- Do not touch spilled material. Stop leak if you can do it without risk.
- Handle the damaged containers or spilled material after wearing appropriate protective equipment
- Move container to safe area from the leak area.
- Must work against the wind, let the upwind people to evacuate.
- Remove all sources of ignition.
- Ventilate closed spaces before entering.
- Wear proper personal protective apparatus as indicated in Section 8 and avoid skin contact and inhalation.

B. Environmental precautions

- Avoid dispersal of spilt material and runoff and contact with waterways, drains and sewers. If large spills, advise emergency services.
- If large amounts have been spilled, inform the relevant authorities.
- Prevent runoff and contact with waterways, drains or sewers.

C. Methods and materials for containment and cleaning up

- Appropriate container for disposal of spilled material collected.
- Dike for later disposal.
- Disposal of waste shall be in compliance with the Wastes Control Act
- Large spill : Stay upwind and keep out of low areas. Dike for later disposal.
- Notify the central and local government if the emission reach the standard threshold.
- Small leak: sand or other non-combustible material, please let use absorption.

- Wipe off the solvent.

7. HANDLING AND STORAGE

A. Precautions for safe handling

- Avoid contact with incompatible materials.
- Avoid direct physical contact.
- Comply with all applicable laws and regulations for handling
- Dealing only with a well-ventilated place.
- Do not handle until all safety precautions have been read and understood.
- Do not inhale the steam prolonged or repeated.
- Get the manual before use.
- Refer to Engineering controls and personal protective equipment.
- Since emptied containers retain product residue(vapor, liquid, solid) follow all MSDS and label warnings even after container is emptied.
- Wash thoroughly after handling.

B. Conditions for safe storage, including any incompatibilities

- Avoid direct sunlight.
- Check regularly for leaks.
- Do not apply any physical shock to container.
- Do not apply direct heat.
- Do not use damaged containers.
- Keep in the original container.
- Keep sealed when not in use.
- No open fire.
- Please pay attention to incompatibilities materials and conditions to avoid.
- Prevent static electricity and keep away from combustible materials or heat sources.
- Save in cool, dry and well ventilated place.
- Store according to current laws and regulations

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A. Exposure limits

○ ACGIH TLV

- [프탈 무수물] : TWA 0.002 mg/m3, STEL 0.005 mg/m3
- [펜타에리스리톨] : TWA, 10 mg/m3
- [크실렌] : TWA 20 ppm
- [황산 바륨] : TWA 5 mg/m3, Inhalable particulate matter (containing no asbestos and <1% crystalline silica)
- [1,2-에테인다이올] : TWA 25 ppm, STEL 50 ppm (10 mg/m3)
- [뷰틸 아세테이트] : TWA 50 ppm , STEL 150 ppm
- [다이아이소뷰틸케톤] : TWA, 25 ppm (145 mg/m3)
- [쿠멘] : TWA 5 ppm

○ OSHA PEL

- [프탈 무수물] : 2 ppm, 12 mg/m3
- [펜타에리스리톨] : 15 mg/m3 (Total dust), 5 mg/m3 (Respirable fraction)
- [크실렌] : 100 ppm, 435 mg/m3
- [이산화 티타늄] : 15 mg/m3 (Total dust)
- [황산 바륨] : 15 mg/m3 (Total dust), 5 mg/m3 (Respirable fraction)
- [뷰틸 아세테이트] : 150 ppm, 710 mg/m3
- [다이아이소뷰틸케톤] : 50 ppm, 290 mg/m3
- [쿠멘] : 50 ppm, 245 mg/m3

B. Engineering controls

- Business owner is recommended to maintain below recommended exposure limits for the working place with general exhaust of gas/vapour/mist/fume.

C. Individual protection measures, such as personal protective equipment

○ Respiratory protection

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

○ Eye protection

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

○ Hand protection

- Wear appropriate chemical resistant glove.

○ Skin protection

- Wear appropriate chemical resistant protective clothing.

○ Others

- Not available

9. PHYSICAL AND CHEMICAL PROPERTIES

A. Appearance	
- Appearance	액체
- Color	Not available
B. Odor	ODOR
C. Odor threshold	자료없음
D. pH	Not available
E. Melting point/Freezing point	자료없음
F. Initial Boiling Point/Boiling Ranges	Not available
G. Flash point	38
H. Evaporation rate	자료없음
I. Flammability(solid, gas)	자료없음
J. Upper/Lower Flammability or explosive limits	Not available
K. Vapour pressure	자료없음
L. Solubility	자료없음
M. Vapour density	자료없음
N. Specific gravity(Relative density)	1.0692
O. Partition coefficient of n-octanol/water	자료없음
P. Autoignition temperature	210
Q. Decomposition temperature	자료없음
R. Viscosity	Not available
S. Molecular weight	자료없음

10. STABILITY AND REACTIVITY

A. Chemical Stability

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

B. Possibility of hazardous reactions

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

C. Conditions to avoid

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

D. Incompatible materials

- Not available

E. Hazardous decomposition products

- May emit flammable vapour if involved in fire.

11. TOXICOLOGICAL INFORMATION

A. Information on the likely routes of exposure

○ Respiratory tracts

- May be fatal if swallowed and enters airways
- May cause allergy or asthma symptoms or breathing difficulties if inhaled

○ Oral

- Not available

○ Eye·Skin

- Causes serious eye damage
- Causes skin irritation
- May cause an allergic skin reaction

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

○ Acute toxicity

* Oral

- Product (ATEmix) : 2000mg/kg < ATEmix <= 5000mg/kg
- [수소탈황된 중질 나프타 (석유)] : LD50 > 5000 ㎎/㎏ Rat (ECHA)
- [프탈 무수물] : LD50 1530 mg/kg Rat (ECHA)
- [펜타에리스리톨] : LD50 >5110 mg/kg Rat(OECD 401,GLP) (ECHA)
- [크실렌] : LD50 3523 mg/kg Rat (EU Method B.1) (ECHA)
- [이산화 티타늄] : LD50 > 10000 ㎎/㎏ Rat (HSDB)
- [황산 바륨] : LD50 > 3000 ㎎/㎏ Rat (IUCLID)
- [탄산 다이메틸] : LD50 > 5000 mg/kg Rat (OECD TG 401, GLP) (ECHA)
- [뷰탄아마이드, 2,2'-[(3,3'-다이클로로[1,1'-바이페닐]-4,4'-다이일)비스(2,1-다이아젠다이일)]비스[N-(4-클로로-2,5-다이메톡시페닐)-3-옥소-] : LD50 > 15000 mg/kg Rat (OECD TG 401)(ECHA)
- [1,2-에테인다이올] : LD50 300~2000 mg/kg (EU Harmonized Cat. 4) (ECHA)
- [산화 비스무트 바나듐 (바이오4V)(BISMUTH VANADIUM OXIDE (BIO4V))] : LD50 > 5000 mg/kg bw Rat (OECD Guideline 401, GLP) (ECHA)
- [뷰틸 아세테이트] : LD50 10760 mg/kg Rat (12.2 mL/kg) (OECD TG 423) (ECHA)
- [다이아이소뷰틸케톤] : LD50 > 2000 mg/kg Rat (OECD TG 401,GLP)(ECHA)
- [솔벤트 나프타 (석유), 중질 지방족화합물] : LD50 > 5000 ㎎/㎏ Rat (Read across 68333-23-3)(OECD TG 420,GLP) (ECHA)
- [쿠멘] : LD50 2910 mg/kg Rat (HSDB)

* Dermal

- Product (ATEmix) : 2000mg/kg < ATEmix <= 5000mg/kg

- [수소탈황된 중질 나프타 (석유)] : LD50 >3160 ㎎/㎏ Rabbit (IUCLID)

- [펜타에리스리톨] : LD50 >10000 mg/kg rabbit (OECD 402) (ECHA)

- [크실렌] : LD50 1700 mg/kg Rabbit (NITE)、EU Harmonized Cat. 4 (ECHA)

- [이산화 티타늄] : LD50 > 10000 ㎎/㎏ Rabbit (IUCLID)

- [탄산 다이메틸] : LD50 > 2000 mg/kg Rabbit (GLP) (ECHA)

- [뷰탄아마이드, 2,2'-[(3,3'-다이클로로[1,1'-바이페닐]-4,4'-다이일)비스(2,1-다이아젠다이일)]비스[N-(4-클로로-2,5-다이메톡시페닐)-3-옥소-] : LD50 > 3000 mg/kg Rat (OECD TG 402)(ECHA)

- [1,2-에테인다이올] : LD50 >3500 ㎎/㎏ Mouse (ECHA,GLP)

- [뷰틸 아세테이트] : LD50 > 14112 mg/kg Rabbit (> 16 mL/kg) (OECD TG 402) (ECHA)

- [다이아이소뷰틸케톤] : LD50 > 2000 mg/kg (OECD 402,GLP)(ECHA)

- [솔벤트 나프타 (석유), 중질 지방족화합물] : LD50 > 2000 ㎎/㎏ Rabbit (Read across 68333-23-3)(OECD TG 402,GLP) (ECHA)

- [쿠멘] : LD50 10600 mg/kg Guinea pig (HSDB)

* Inhalation

- Product (ATEmix) : 10.0mg/L 4hr < ATEmix <= 20.0mg/L 4hr

- [수소탈황된 중질 나프타 (석유)] : Vapor LC50 > 7.63 mg/L/4hr No death, Not classified (ECHA)

- [프탈 무수물] : Aerosol LC50 > 2.14 mg/L 4 hr Rat (OECD TG 403, GLP) (ECHA)

- [펜타에리스리톨] : Dust LC50 >5.15 mg/L air 4hr Rat(OECD 403,GLP) (ECHA)

- [크실렌] : Vapor LC50 > 10 ~ 20 mg/L 4hr, EU Harmonized Cat. 4 (ECHA)

- [이산화 티타늄] : LC50 >3.43 ㎎/ℓ Rat (OECD TG 403)

- [탄산 다이메틸] : Vapor LC50 > 5.36 mg/L 4 hr Rat No death Not classified (OECD TG 403, GLP) (ECHA)

- [뷰탄아마이드, 2,2'-[(3,3'-다이클로로[1,1'-바이페닐]-4,4'-다이일)비스(2,1-다이아젠다이일)]비스[N-(4-클로로-2,5-다이메톡시페닐)-3-옥소-] : Dust LC50 > 0.23 mg/L 4hr Rat (OECD TG 403,GLP)(ECHA)

- [1,2-에테인다이올] : Aerosol LC50 > 2.5 mg/L 6 hr(conversion to > 3.75 mg/L 4 hr)Rat (ECHA,GLP)

- [산화 비스무트 바나듐 (바이오4V)(BISMUTH VANADIUM OXIDE (BIO4V))] : Dust LC50 > 5.15 mg/L 4 hr Rat No death (OECD Guideline 403, GLP) (ECHA)

- [뷰틸 아세테이트] : Vapor LC50 > 6.6 mg/L 4 hr Rat No death Not classified (OECD TG 403, GLP) (ECHA)

- [다이아이소뷰틸케톤] : Vapour LC50 > 14.5 mg/L 4hr Rat (OECD TG 403)(ECHA)

- [솔벤트 나프타 (석유), 중질 지방족화합물] : Vapour LC50 > 5.28 ㎎/ℓ 4 hr Rat No death(Read across 8008-20-6)(OECD TG 403,GLP) (ECHA)

- [쿠멘] : Vapor LC50 55.7 mg/L 4 hr (8000 ppm 8 hr) Rat (HSDB)

○ Skin corrosion/irritation

- Causes skin irritation

○ Serious eye damage/irritation

- Causes serious eye damage

○ Respiratory sensitization

- May cause allergy or asthma symptoms or breathing difficulties if inhaled

○ Skin sensitization

- May cause an allergic skin reaction

○ Carcinogenicity

* IARC

- [크실렌] : Group 3

- [이산화 티타늄] : Group 2B

- [쿠멘] : Group 2B

* OSHA

- Not available

* ACGIH

- [프탈 무수물] : A4

- [크실렌] : A4

- [이산화 티타늄] : A4

- [1,2-에테인다이올] : A4

- [쿠멘] : A3

* NTP

- Not available

* EU CLP

- [수소탈황된 중질 나프타 (석유)] : Carc. 1B (Note P)

- [쿠멘] : Carc. 1B

○ Germ cell mutagenicity

- May cause genetic defects

○ Reproductive toxicity

- Suspected of damaging fertility or the unborn child

○ STOT-single exposure

- Not available

○ STOT-repeated exposure

- Causes damage to organs through prolonged or repeated exposure

○ Aspiration hazard

- May be fatal if swallowed and enters airways

12. ECOLOGICAL INFORMATION

A. Ecotoxicity

○ Fish

- [프탈 무수물] : LC50 > 99 mg/L 96 hr Oryzias latipes (OECD TG 203, GLP), NOEC 10 mg/L 60 d Oncorhynchus mykiss (OECD TG 210) (ECHA)

- [펜타에리스리톨] : LC50 > 100 mg/L 96hr Oryzias latipes (OECD TG 203,GLP)(ECHA)

- [크실렌] : LC50 7.6 mg/L 96 hr Oncorhynchus mykiss (Read-across 95-47-6) (OECD TG 203) (ECHA), NOEC 0.714 mg/L 35 d Danio rerio (Read-across 106-42-3) (OECD TG 210, GLP) (ECHA)

- [이산화 티타늄] : LL50 >100 ㎎/ℓ 96 hr Oryzias latipes(OECD TG 203)

- [탄산 다이메틸] : LC50 >= 100 mg/L 9 6hr Danio rerio (OECD TG 203, GLP) (ECHA)

- [뷰탄아마이드, 2,2'-[(3,3'-다이클로로[1,1'-바이페닐]-4,4'-다이일)비스(2,1-다이아젠다이일)]비스[N-(4-클로로-2,5-다이메톡시페닐)-3-옥소-] : LC50 > 100 mg/L 96hr Danio rerio (OECD TG 203,GLP)(ECHA)

- [1,2-에테인다이올] : LC50 72860 ㎎/ℓ 96 hr Pimephales promelas (ECHA)

- [산화 비스무트 바나듐 (바이오4V)(BISMUTH VANADIUM OXIDE (BIO4V))] : LC50 > 10000 mg/L 96 hr Danio rerio (OECD Guideline 203, GLP) (ECHA)

- [뷰틸 아세테이트] : LC50 18 mg/L 96 hr Pimephales promelas (OECD TG 203) (ECHA)

- [다이아이소뷰틸케톤] : LC50 30 mg/L 96hr Oncorhynchus mykiss (OECD TG 203,GLP)(ECHA)

- [쿠멘] : LC50 4.7 mg/L 96 hr Cyprinodon variegatus (EPA OTS 797.1400, GLP) (ECHA)

○ Crustaceans

- [수소탈황된 중질 나프타 (석유)] : LC50 4.3 ㎎/ℓ 96 hr other(Crangon crangon) (IUCLID)

- [프탈 무수물] : EC50 71 mg/L 48 hr Daphnia magna (OECD TG 202, GLP), NOEC 16 mg/L 21 d Daphnia magna (OECD TG 211, GLP) (ECHA)

- [펜타에리스리톨] : NOEC 1000 mg/L 21day Daphnia magna (OECD TG 211,GLP)(ECHA)

- [크실렌] : EC50 4.7 mg/L 48 hr Daphnia magna (Read-across 108-38-3) (NIER), NOEC 1.17 mg/L 7 d Ceriodaphnia dubia (ECHA)

- [이산화 티타늄] : EC50 >100 ㎎/ℓ 48 hr Daphnia magna(48h-EL50Daphnia magna>100 mg/L, 48h-EC50>100, 48h-EC10=91.2 mg/L, OECD TG 202)

- [황산 바륨] : EC50 32 ㎎/ℓ 48 hr Daphnia magna (ECOTOX)

- [탄산 다이메틸] : EC50 > 100 mg/L 48 hr Daphnia magna (OECD TG 202, GLP), NOEC 25 mg/L 21 d Daphnia magna (OECD TG 211, GLP) (ECHA)

- [뷰탄아마이드, 2,2'-[(3,3'-다이클로로[1,1'-바이페닐]-4,4'-다이일)비스(2,1-다이아젠다이일)]비스[N-(4-클로로-2,5-다이메톡시페닐)-3-옥소-] : EC50 > 100 mg/L 48hr Daphnia magna (OECD TG 202,GLP), NOEC > 10 mg/L 21day Daphnia magna (OECD TG 211,GLP) (ECHA)

- [1,2-에테인다이올] : EC50 >100 ㎎/ℓ 48 hr Daphnia magna (OECD TG 202, GLP), NOEC 8590 mg/L 7 d Ceriodaphnia dubia (ECHA)

- [산화 비스무트 바나듐 (바이오4V)(BISMUTH VANADIUM OXIDE (BIO4V))] : EC50 > 100 mg/L 48 hr Daphnia magna (OECD Guideline 202, GLP) (ECHA)

- [뷰틸 아세테이트] : EC50 44 mg/L 48 hr Daphnia sp. (OECD TG 202), NOEC 23.2 mg/L 21 d Daphnia magna (OECD TG 211, GLP, Read-across CAS No. 110-19-0) (ECHA)

- [다이아이소뷰틸케톤] : EC50 37.2 mg/L 48hr Daphnia magna (OECD TG 202,GLP)(ECHA)

- [쿠멘] : EC50 2.14 mg/L 48 hr Daphnia magna (OECD TG 202, GLP), NOEC 0.35 mg/L 21 d Daphnia magna (OECD TG 211, GLP) (ECHA)

○ Algae

- [프탈 무수물] : EC50 68 mg/L, NOEC 32 mg/L 72 hr Selenastrum capricornutum (OECD TG 201, GLP) (ECHA)

- [펜타에리스리톨] : EC50> 1000 mg/L, NOEC 1000 mg/L 72hr Raphidocelis subcapitata (OECD TG 201,GLP)(ECHA)

- [크실렌] : EC50 4.7 mg/L 72 hr Raphidocelis subcapitata (Read-across 95-47-6) (OECD TG 201) (ECHA)

- [이산화 티타늄] : ErL50 >100 ㎎/ℓ 72 hr (Pseudokirchneriella subcapitata, 72h-ErL50 Pseudokirchneriella subcapitata >100 mg/L growth rate, static, 72h-EyL50 >100 mg/L static, OECD TG 201)

- [황산 바륨] : EC50 1890.263 ㎎/ℓ 96 hr (Estimate)

- [탄산 다이메틸] : EC50 > 100 mg/L 72 hr, NOEC >= 100 mg/L 72 hr Raphidocelis subcapitata (OECD TG 201, GLP) (ECHA)

- [뷰탄아마이드, 2,2'-[(3,3'-다이클로로[1,1'-바이페닐]-4,4'-다이일)비스(2,1-다이아젠다이일)]비스[N-(4-클로로-2,5-다이메톡시페닐)-3-옥소-] : EC50 > 100 mg/L, NOEC 100 mg/L 72hr Raphidocelis subcapitata (OECD TG 201,GLP)(ECHA)

- [1,2-에테인다이올] : EC50 6500 ~ 13000 ㎎/ℓ 96 hr Raphidocelis subcapitata (EPA 600/9-78-018) (ECHA)

- [산화 비스무트 바나듐 (바이오4V)(BISMUTH VANADIUM OXIDE (BIO4V))] : EC50 > 100 mg/L, NOEC >= 100 mg/L 72 hr Desmodesmus subspicatus (OECD Guideline 201, GLP) (ECHA)

- [뷰틸 아세테이트] : EC50 392 mg/L 48 hr, NOEC 196 mg/L 48 hr Raphidocelis subcapitata (OECD TG 201, GLP) (Read-across CAS No. 110-19-0) (ECHA)

- [다이아이소뷰틸케톤] : EC50 46.9 mg/L, NOEC 3.55 mg/L 72hr Raphidocelis subcapitata (OECD TG 201,GLP)(ECHA)

- [쿠멘] : EC50 2.01 mg/L 72 hr, NOEC 1.49 mg/L 72 hr Desmodesmus subspicatus (OECD TG 201, GLP) (ECHA)

B. Persistence and degradability

○ Persistence

- [수소탈황된 중질 나프타 (석유)] : 6 log Kow ~ 2.1 log Kow (Estimate) (IUCLID)

- [프탈 무수물] : log Pow 1.6 (ECHA)

- [펜타에리스리톨] : log Pow -1.7 (23℃,pH6.1)(OECD TG 107)(ECHA)

- [크실렌] : log Pow 3.12 (Read-across 95-47-6) (ECHA)

- [탄산 다이메틸] : log Kow 0.354 (20 °C) (OECD TG 107, GLP) (ECHA)

- [뷰탄아마이드, 2,2'-[(3,3'-다이클로로[1,1'-바이페닐]-4,4'-다이일)비스(2,1-다이아젠다이일)]비스[N-(4-클로로-2,5-다이메톡시페닐)-3-옥소-] : log Pow 0.02 (24℃,pH7)(ECHA)

- [1,2-에테인다이올] : log Pow -1.36 (ECHA)

- [2,2'-[(2,2',5,5'-Tetrachloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(2,4-dimethylphenyl)-3-oxobutyramide] (C.I. 염료 황색 81)] : log Kow 9.40 (Estimate)

- [뷰틸 아세테이트] : log Pow 2.3 (25°C) (OECD TG 117, GLP) (ECHA)

- [다이아이소뷰틸케톤] : log Pow 3.71 (OECD TG 117,GLP)(ECHA,25℃)

- [쿠멘] : log Pow 3.55 (23 °C) (OECD TG 107) (ECHA)

○ Degradability

- Not available

C. Bioaccumulative potential

○ Bioaccumulative potential

- [프탈 무수물] : BCF 3.16 L/kg (Read-across) (ECHA)

- [크실렌] : BCF 25.9 dimensionless (ECHA)

- [황산 바륨] : BCF = 3.162

- [뷰탄아마이드, 2,2'-[(3,3'-다이클로로[1,1'-바이페닐]-4,4'-다이일)비스(2,1-다이아젠다이일)]비스[N-(4-클로로-2,5-다이메톡시페닐)-3-옥소-] : BCF 0 ~ 6.2dimensionless (OECD TG 305,GLP)(ECHA)

- [2,2'-[(2,2',5,5'-Tetrachloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(2,4-dimethylphenyl)-3-oxobutyramide] (C.I. 염료 황색 81)] : BCF 10 (Estimate)

- [다이아이소뷰틸케톤] : BCF 130 (ECHA)

- [쿠멘] : BCF 35.5 (ECHA)

○ Biodegradation

- [프탈 무수물] : Readily biodegradable, 85.2 % degradation (O2 consumption) 14d (OECD TG 301 C, GLP) (ECHA)

- [펜타에리스리톨] : Readily biodegradable, 83.7 % degradation (CO2 evolution) 28day (OECD TG 310)(ECHA)

- [크실렌] : Readily biodegradable, 94 % degradation (O2 consumption) 28d (Read-across 95-47-6) (OECD TG 301 F, GLP) (ECHA)

- [탄산 다이메틸] : Readily biodegradable, 86 % 28 d (O2 consumption) (OECD TG 301 C, GLP) (ECHA)

- [뷰탄아마이드, 2,2'-[(3,3'-다이클로로[1,1'-바이페닐]-4,4'-다이일)비스(2,1-다이아젠다이일)]비스[N-(4-클로로-2,5-다이메톡시페닐)-3-옥소-] : Not readily biodegradable, 1% degradation (CO2 evolution) 28day (OECD TG 301B,GLP)(ECHA)

- [1,2-에테인다이올] : Readily biodegradable, 90~100% 10day (OECD TG 301A,GLP)(ECHA)

- [2,2'-[(2,2',5,5'-Tetrachloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(2,4-dimethylphenyl)-3-oxobutyramide] (C.I. 염료 황색 81)] : Cut-off value = -0.9633 : non-degradable BIOWIN 5 (Estimate)

- [뷰틸 아세테이트] : 83 % 28 d, Readily biodegradable (OECD TG 301 D) (ECHA)

- [다이아이소뷰틸케톤] : Readily biodegradable, 88% 20day (OECD TG 301D)(ECHA)

- [솔벤트 나프타 (석유), 중질 지방족화합물] : Readily biodegradable, 61% degradation (O2 consumption) 9day (Read across 64742-94-5)(OECD TG 301F,GLP)(ECHA)

- [쿠멘] : Readily biodegradable, 70 % 20 d (O2 consumption) (ECHA)

D. Mobility in soil

- [프탈 무수물] : Koc 2 ~ 31 (Read across CAS No. 88-99-3) (OECD TG 106) (ECHA)

- [크실렌] : log Koc ca. 2.73 dimensionless (Read-across 95-47-6) (OECD TG 121) (ECHA)

- [2,2'-[(2,2',5,5'-Tetrachloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(2,4-dimethylphenyl)-3-oxobutyramide] (C.I. 염료 황색 81)] : Koc 29610000 (Can be adsorbed in the soil)

- [다이아이소뷰틸케톤] : log Koc 2.07 dimensionless (OECD TG 121,GLP)(ECHA,25℃)

- [쿠멘] : Koc 884 (log Koc 2.946) (calculation) (ECHA)

E. Other adverse effects

- [쿠멘] : Classified as chronic aquatic environment hazard cat 2. (EU Hamonized Cat. 2) (ECHA)

13. DISPOSAL CONSIDERATIONS

A. Disposal methods

- It shall be treated by incineration

- Oil water separation technology shall be applied as pre-waste treatment if it is applicable

- Stabilization and minimization treatment by incineration or similar method can be applied, if more than two kinds of designated wastes are in mixture state and it is impractical to separate them

B. Special precautions for disposal

- Anyone with business license number who generates industrial wastes shall treat the waste by him/herself or by entrusting to the legal entities who treat the wastes, recycle the wastes of others or install and operate the waste treatment facilities according to the Wastes Control Act

- Dispose of waste in accordance with all applicable laws and regulations.

14. TRANSPORT INFORMATION

A. UN No. (IMDG CODE/IATA DGR)

- 1993

B. Proper shipping name

- FLAMMABLE LIQUID, N.O.S.(Titanium dioxide,5.45181%)

C. Hazard Class

- 3

D. IMDG CODE/IATA DGR Packing group

- III

E. Marine pollutant

- Not applicable

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

- Air transport(IATA): Not subject to IATA regulations.
- Local transport follows in accordance with Dangerous goods Safety Management Law.
- Package and transport follow in accordance with Department of Transportation (DOT) and other regulatory agency requirements.
- EmS FIRE SCHEDULE : F-E (Non-water-reactive flammable liquids)
- EmS SPILLAGE SCHEDULE : S-E (Flammable liquids, floating on water)

15. REGULATORY INFORMATION

A. National and/or international regulatory information

○ POPs Management Law

- [수소탈황된 중질 나프타 (석유)] : Not applicable
- [지방 산, 식물성-기름(FATTY ACIDS, VEGETABLE-OIL)] : Not applicable
- [프탈 무수물] : Not applicable
- [펜타에리스리톨] : Not applicable
- [크실렌] : Not applicable
- [이산화 티타늄] : Not applicable
- [황산 바륨] : Not applicable
- [탄산 다이메틸] : Not applicable
- [뷰탄아마이드, 2,2'-[(3,3'-다이클로로[1,1'-바이페닐]-4,4'-다이일)비스(2,1-다이아젠다이일)]비스[N-(4-클로로-2,5-다이메톡시페닐)-3-옥소-] : Not applicable
- [영업비밀] : Not applicable
- [1,2-에테인다이올] : Not applicable
- [산화 비스무트 바나듐 (바이오4V)(BISMUTH VANADIUM OXIDE (BIO4V))] : Not applicable
- [2,2'-[(2,2',5,5'-Tetrachloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(2,4-dimethylphenyl)-3-oxobutyramide] (C.I. 염료 황색 81)] : Not applicable
- [뷰틸 아세테이트] : Not applicable
- [다이아이소뷰틸케톤] : Not applicable
- [솔벤트 나프타 (석유), 중질 지방족화합물] : Not applicable
- [(E,E)-9,11-Octadecadienoic acid; Isolinoleic acid] : Not applicable
- [쿠멘] : Not applicable

○ Information of EU Classification

* Classification

- [수소탈황된 중질 나프타 (석유)] : H304,H340,H350,H372
- [프탈 무수물] : H302,H315,H317,H317,H318,H334,H334,H335
- [크실렌] : H226,H312,H315,H332
- [탄산 다이메틸] : H225
- [1,2-에테인다이올] : H302
- [뷰틸 아세테이트] : H226,H336
- [다이아이소뷰틸케톤] : H226,H335
- [솔벤트 나프타 (석유), 중질 지방족화합물] : H304
- [쿠멘] : H226,H304,H335,H350,H411

○ U.S. Federal regulations

* OSHA PROCESS SAFETY (29CFR1910.119)

- Not applicable

* CERCLA Section 103 (40CFR302.4)

- [프탈 무수물] : 2267.995 kg 5000 lb
- [크실렌] : 45.3599 kg 100 lb
- [1,2-에테인다이올] : 2267.995 kg 5000 lb
- [뷰틸 아세테이트] : 2267.995 kg 5000 lb
- [쿠멘] : 2267.995 kg 5000 lb

* EPCRA Section 302 (40CFR355.30)

- Not applicable

* EPCRA Section 304 (40CFR355.40)

- Not applicable

* EPCRA Section 313 (40CFR372.65)

- [프탈 무수물] : Applicable
- [크실렌] : Applicable
- [1,2-에테인다이올] : Applicable
- [쿠멘] : Applicable

○ Rotterdam Convention listed ingredients

- Not applicable

○ Stockholm Convention listed ingredients

- Not applicable

○ Montreal Protocol listed ingredients

- Not applicable

16. OTHER INFORMATION

A. Reference

- The information contained herein is believed to be accurate. It is provided independently of any sale of the product for purpose of hazard communication. It is not intended to constitute performance information concerning the product. No express warranty, or implied warranty of merchantability or fitness for a particular purpose is made with respect to the product or the information contained herein.
- This Safety Data Sheet was compiled with data and information from the following sources: KOSHA, NITE, ESIS, NLM, SIDS, IPCS

B. Issue date

- 2025-09-26

C. Revision number and Last date revised

- 6 times, 2026-09-08

D. Other

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