

Material Safety Data Sheet(MSDS)

1. Substance/preparations and company identification

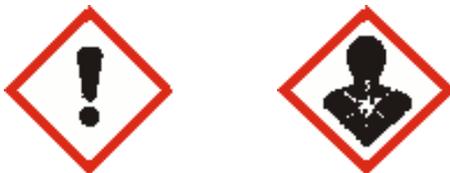
- A. Product name : COSMONATE PH
- B. Relevant identified uses of the substance or mixture and uses advised against
- Component in manufacturing of polyurethane compounds(eg for spandex, shoe sole, synthetic leather, and industrial chemicals)
- C. Details of the supplier of the safety data sheet.
- Company name : KUMHO MITSUI CHEMICALS INC,
 - Head office) East wing 11F, Signature Towers Seoul, 100 Cheonggyecheon-ro, Jung-gu, Seoul, Korea Plant) 305, Yeosusandan2-ro, Yeosu-si Jeonnam 555-290, korea
- D. Emergency telephone number.
- Tel) 82-61-688-5000 (9:00 am to 5:00 pm, Mon to Fri, Korean time)

2. Hazard identification

- A. Classification of substance
- Acute Toxicity.(inhalation dust, mist): Cat.4
 - Skin Corrosion/Irritation: Cat.2
 - Serious Eye Damage/Eye Irritation: Cat.2
 - Respiratory Sensitization: Cat.1
 - Carcinogenicity: Cat.2
 - Skin Sensitization: Cat.1
 - Specific Target Organ Toxicity-Single: Cat.3
 - Specific Target Organ Toxicity-Repeated: Cat.2

B. Label elements and hazard statement

- Pictogram



- Signal Word : Danger
- Hazard statements
 - H315 : Causes skin irritation.
 - H317 : May cause an allergic skin reaction.
 - H319 : Causes serious eye irritation.
 - H332 : Harmful if inhaled.
 - H334 : May cause allergy or asthma symptoms or breathing difficulties if inhaled.

H335 : May cause respiratory irritation.
H351 : Suspected of causing cancer.
H373 : May cause damage to organs through prolonged or repeated exposure.

• Precautionary statements(Prevention)

P201 : Obtain special instructions before use.
P202 : Do not handle until all safety precautions have been read and understood.
P260 : Do not breathe dust/fume/gas/mist/vapors/spray.
P261 : Avoid breathing dust/fume/gas/mist/vapours/spray.
P264 : Wash ... thoroughly after handling.(cont'd)
P271 : Use only outdoors or in a well-ventilated area.
P272 : Contaminated work clothing should not be allowed out of workplace.
P280 : Wear protective gloves/protective clothing/eye protection/face protection.
P281 : Use personal protective equipment as required.
P285 : In case of inadequate ventilation wear respiratory protection.

• Precautionary statements(Response)

P312 : Call a POISON CENTER or doctor/physician if you feel unwell.
P314 : Get medical advice/attention if you feel unwell.
P321 : Specific treatment.
P362 : Take off contaminated clothing and wash before reuse.
P363 : Wash contaminated clothing before reuse.
P302+P352 : IF ON SKIN: Wash with plenty of soap and water.
P304+P340 : IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P304+P341 : IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305+P351+P338 : IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P332+P313 : If skin irritation or rash occurs: Get medical advice/attention.
P333+P313 : If skin irritation or rash occurs: Get medical advice/attention.
P337+P313 : If eye irritation persists: Get medical advice/attention.
P342+P311 : If experiencing respiratory symptoms: Call a poison center or doctor.
P308+P313 : If exposed or concerned get medical advice/attention.

• Precautionary statements(Storage)

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

• Precautionary statements(Disposal)

P501 : Dispose of contents/container to ...

C. Other hazard

Ingredient	NFPA Ratings		
	Health	Fire	Reactivity
4,4'-Methylene diphenyl diisocyanate	3	1	1

3. Composition/information on ingredients

Component	CAS Number	Content(w/w %)
4,4'-Methylene diphenyl diisocyanate	101-68-8	100

4. First-Aid Measures

- A. Eye contact
- If in eyes, rinse cautiously with room-temperature water for several minutes.
 - Remove contact lenses if present and easy to do.
 - If eye irritation persists, get medical attention.
- B. Skin contact
- Remove contaminated clothing and wash affected area with soap and plenty of water
 - Get medical attention if irritation or rash occurs.
- C. Inhalation
- If inhaled, remove victim to fresh air and keep at rest in a position comfortable for breathing.
 - If symptoms persist, get medical attention.
- D. Ingestion
- If swallowed, wash out mouth thoroughly and give water to drink.
 - Get prompt medical attention.
 - Do not induce vomiting, unless instructed by medical personnel.
- E. Most important symptoms and effects, both acute and delayed
- If inhaled, the product may cause harmful effects, respiratory irritation, and difficulty in breathing.
- F. Indication of any immediate medical attention and special treatment needed
- Treat symptoms as they occur.
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5. Fire-Fighting Measures

- A. Extinguishing media
- Dry chemical powder, carbon dioxide, water spray or regular foam.
 - For larger fires, use water spray, fog or regular foam.
- B. Hazardous combustion products
- The product is not flammable, but may decompose if involved in a fire, producing smoke, and toxic vapours and gases (including hydrogen cyanide).
- C. Fire fighting
- Move container from fire area if you can do it without risk.
 - Leave a maximum space when fight a fire.
 - Stay away from ends of tanks.
 - Do not scatter spilled material with high-pressure water streams.
 - Dike fire-control water for later disposal.
 - Use agents suitable for type of surrounding fire.
 - Avoid inhalation noxious vapor, keep with one's own back to the wind.

6. Accidental Release Measures

- A. Personal precautions
- Do not touch spilled material.
 - Ensure adequate ventilation.
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- For large-scale spills, ensure full personal protection is worn.
 - Evacuate unauthorized personnel from spillage area.
- B. Environmental precautions.
- Prevent product from entering water courses or drainage system by using bunding or absorption with inert material.
- C. Methods for cleaning up or taking up
- For large spills, recover by taking up mechanically or with an inert absorbent material such as waster cloth, dry sand, or earth.
 - For small spills, wipe off with cloth or paper.
 - Collect spill and place in a container for disposal. Wash contaminated surfaces with suitable absorbent material in accordance with regulations.

7. Handling and Storage

- A. Precautions for safe handling
- Observe all federal, state and local regulations when storing this substance.
 - Should be handled in a ventilated area.
 - The residue of the empty containers mixed with other substances may explode or cause harmful gas. Therefore, don't use for keeping substances such as food, and don't work such as welding.
- B. Conditions for safe storage, including any incompatibilities
- Use disposable containers and tools where possible.
 - Store at -20 °C or below.
 - Internal pressure increase in the container can cause break due to high heat and carbon dioxide after reacting water(or alcohols, amines), so keep it tightly closed when not in use.

8. Exposure controls and personal protection

A. Exposure limits

Component	Korean Regulation	ACGIH Regulation	Biological Exposure limit
4,4'-Methylene diphenyl diisocyanate	TWA-0.005ppm 0.055mg/m ³	TLV-TWA-0.005ppm	No data

※ Note. TWA : time-weighted average
STEL: short term exposure limit

B. Exposure controls

- Engineering controls
 - Local exhaust ventilation or use in a closed system is recommended.
- Personal protective equipment
 - The need for personal protective equipment should be based on a workplace risk assessment for the particular use.
 - Avoid skin and eye contact by wearing chemical resistant gloves (eg nitrile rubber, Viton) and eye protection/face shield(Where more extensive contact may occur, wear protective clothing (eg apron, overalls). Wear respiratory protective equipment (eg vapour mask) if exposure to vapours is possible.
 - Facilities for eye washing and showering are recommended within the immediate work area.

9. Physical and Chemical Properties

- A. Description: Crystals or white solid.
- B. Odor: without corresponding
- C. Odor threshold value: No data
- D. pH: Without corresponding
- E. Melting point/freezing point : 37°C (99°F)
- F. Initial boiling point & boiling point range: 314 °C (597°F)
- G. Flashing point: >200 °C
- H. Vaporization velocity: No data.
- I. Flammability (solid, gas): No data
- J. Ignition or explosion range maximum/minimum: Without corresponding
- K. Vapor pressure: 1*10⁻⁴hpa(at 25 °C)
- L. Solubility: Reacts with water
- M. Vapor density: 8.6
- N. Specific gravity: 1.2
- O. N-octanol/water division coefficient: Without corresponding
- P. Spontaneous combustion temp.: > 600 °C
- Q. Decomposition temp.: No data
- R. Viscosity: No data
- S. Molecular weight: 250.27

10. Stability and Reactivity

- A. Reactivity
 - Reacts slowly and exothermically on contact with water, generating sufficient heat and pressure to rupture the container in a closed system.
- B. Conditions to avoid
 - High temperatures, flame, and moisture.
- C. Incompatibilities
 - Reacts with water. The following materials may react violently, producing heat: acid, alcohol, aluminium Amine, and base. Oxidising agents may produce a fire or explosion hazard.
- D. Hazardous decomposition products
 - Thermal decomposition products may include highly toxic fumes of hydrogen cyanide and toxic oxides of carbon and nitrogen.

11. Toxicological information

- A. HEALTH EFFECTS
 - SKIN CONTACT
 - The product is expected to cause respiratory and skin sensitisation.
 - Isocyanate products are associated with asthma and other respiratory disorders, and skin allergies such as eczema.
 - Carcinogenicity
 - Suspected of causing cancer. There is limited evidence of carcinogenicity in humans and from animal studies.
 - EYE CONTACT
 - May cause irritation with redness, pain, and blurred vision
 - Repeated and prolonged contact with irritants may cause conjunctivitis.

- Germ cell mutagenicity
 - Not classified due to lack of data.
 - Reproductive toxicity
 - Not classified due to lack of data.
 - STOT-single exposure
 - The product may cause respiratory irritation if inhaled.
 - STOT-repeated exposure
 - May cause damage to the respiratory system through prolonged or repeated exposure.
 - Aspiration hazard
 - Not expected to meet the criteria for classification.
 - Acute toxicity
 - The product is classified as toxic by inhalation route. May cause irritation of the respiratory system, chest pain, breathing difficulty, and impaired lung function. Toxicity by the oral and dermal routes is not known
 - Acute Tox. : LD50 rat(oral): >7,616mg/kg(does not meet criteria for classification)
 - Acute Tox. : LD50 rabbit(dermal): >9400mg/kg(does not meet criteria for classification)
 - Acute Tox.(Inhalation: vapor) : Category 4
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12. Ecological information

- A. Environmental impact rating
 - No data available
 - B. Acute aquatic toxicity
 - 4,4'-MDI: virtually unavailable in aqueous solution, so that no bioaccumulation is expected. May hydrolyse to the known substance, 4,4'-methylenedianiline, which also has a low bioaccumulation potential.
 - C. Degradability
 - Biodegradability is expected to be low, so that the product or its degradation products may persist in the Environment.
 - D. Log bioconcentration factor
 - No data available
 - E. Log octanol/water partition coefficient
 - No data available
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13. Disposal Considerations

- A. Disposal method
 - The recommended method of disposal is incineration. Disposal via the drains or landfill is not recommended. Use a licensed waste disposal contractor. Disposal must be in accordance with current national and local regulations. Chemical residues generally count as special waste. General EU requirements are given in Directive 2008/98/EC. Product or wastes may be neutralized with an aqueous solution of 3~8% concentrated ammonia and 2% detergent. Do not seal treated product in the container as internal pressure would be created due to evolution of carbon dioxide.
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14. Transport Information

- A. UN number
 - Not classified as dangerous goods for transport.
 - B. UN proper shipping name
 - Not applicable
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- C. Dangerousness grade of transportation
 - Not applicable
- D. Container grade
 - Not applicable
- E. Substance of sea pollution
 - Not marine pollutant/environmentally hazardous.
- F. Safety countermeasure
 - Not available

15. Regulatory Information

- A. Safety, health and environmental regulations/legislation specific for the substance or mixture.
 - UK: Control of Substances Hazardous to Health Regulations 2002(COSHH), as amended
 - Workplace Exposure Limits EH40/2005 (Second edition published 2011), Health and Safety Executive.
- B. Chemical safety assessment
 - Not available

16. Other Information

- A. Reference
 - EU : http://ec.europa.eu/enterprise/reach/docs/ghs/ghs_prop_vol_iiia_en.pdf
 - KOREA : <http://www.kosha.net>
 - UN GHS File
 - ECHA: <http://clp-inventory.echa.europa.eu/>
 - <http://kischem.nier.go.kr/kischem2/wsp/main/main.jsp>
- B. Creation date : 1997. 04. 10
- C. Revision date
 - 1st revision : 2002. 09. 24
 - 2nd revision : 2010. 03. 02
 - 3rd revision : 2011. 12. 01
- D. The others : -