



Product Name: Wannate MDI-50
Revision: November 12, 2009

SAFETY DATA SHEET

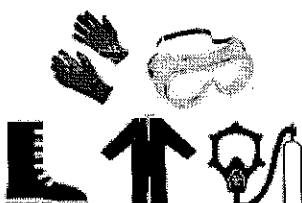
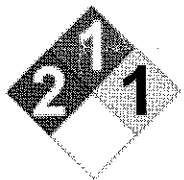



according to Regulation (EC) No 1907/2006

Section 1: Product and Company Information

Product Name: Wannate MDI-50
Product Use: Component for the manufacture of polyurethane polymers
Chemical family: Aromatic isocyanate
Manufacturer: Yantai Wanhua Polyurethanes Co., Ltd.
 No. 7 South Xingfu Road,
 Yantai, Shandong Province, 264002
 China
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Section 2: Hazards Identification

Personal Protective Equipment	NFPA Rating (USA)	European Classification	WHMIS (Canada)	GHS Pictogram
		 Harmful	 D2A	

Emergency Overview:

Danger.
 Harmful if inhaled. Causes serious eye irritation. May cause respiratory irritation. Causes skin irritation. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause an allergic skin reaction.

Toxic fumes may be released in fire situations. Can decompose at high temperatures forming toxic gases.
 Closed containers may develop pressure and rupture on prolonged exposure to heat or if contaminated with water.

Appearance, Color and Odor: Liquid, white to pale yellow, slight musty odor.

USA: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Canada: This is a controlled product under WHMIS.

European Union (EU): This substance is considered dangerous. Classifications: Harmful, Irritant.

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Section 2: Hazards Identification, continued

Potential Health Effects

ACUTE (short term):

Relevant Route(s) of Exposure: Inhalation, Ingestion, Skin contact, Eye contact.

- Inhalation:** Airborne exposures are unlikely to occur unless product is heated or forms an aerosol or mist during pouring, frothing or spraying operations. Short-term inhalation exposure to isocyanates can cause respiratory and mucous membrane irritation. Symptoms include eye and nose irritation, dry or sore throat, runny nose, shortness of breath, wheezing and laryngitis. Coughing with chest pain or tightness may also occur, frequently at night. These symptoms may occur during exposure or may be delayed several hours. Some people may become sensitized to MDI. High aerosol concentrations could cause inflammation of the lung tissue (chemical pneumonitis), chemical bronchitis with severe asthma-like wheezing, severe coughing spasms and accumulation of fluid in the lungs (pulmonary edema), which could prove fatal. Symptoms of pulmonary edema may not appear until several hours after exposure and are aggravated by physical exertion.
- Ingestion:** Ingestion is not expected with normal, occupational use of this product. Animal studies indicate that ingested MDI has low toxicity. Swallowing may result in irritation and corrosion of the mouth, throat and digestive tract.
- Skin:** MDI can cause mild irritation. Isocyanates, in general, can cause skin discoloration (staining) and hardening of the skin after repeated exposures. Skin sensitization, resulting in dermatitis, may occur in some individuals.
- Eye:** Contact with MDI liquid, mist and aerosols may cause mild irritation with tearing and discomfort.

CHRONIC (long term): see Section 11 for additional toxicological data

Inhalation: MDI is a severe respiratory irritant. Long-term, low-level exposure could cause severe, permanent respiratory impairment. Respiratory sensitization can develop in people working with MDI. Sensitized individuals react to very low levels of MDI (as low as 0.0014 ppm) that have no effect on unsensitized people. Symptoms may initially appear to be a cold or mild hay fever; severe asthmatic symptoms can develop and include wheezing, chest tightness, shortness of breath, difficulty breathing and/or coughing. Fever, chills, general feelings of discomfort, headache and fatigue can also occur. Symptoms may occur immediately upon exposure or may be delayed. Sensitized people who continue to work with MDI may develop symptoms sooner after each exposure. The number and severity of symptoms may increase. MDI and other isocyanates may also cause hypersensitivity pneumonitis, another allergic lung disease, which is characterized by symptoms such as shortness of breath, fever, tiredness, non-productive cough, and chills.

Skin: Isocyanates are contact sensitizers. Repeated skin contact with MDI may cause skin sensitization in humans. Further skin contact may result in inflammation, rash, itching and staining.

Carcinogenicity: The International Agency for Research on Cancer (IARC) has concluded that this substance is not classifiable as to its carcinogenicity to humans (Group 3).

Medical Conditions Aggravated by Exposure:

Skin exposure may aggravate existing dermatitis conditions.

Interactions With Other Chemicals:

Reactive with water and other chemicals. Closed containers may rupture if contaminated with water and other chemicals.

Potential Environmental Effects:

Not available

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Section 3: Composition and Ingredient Information

<u>Common Name</u>	<u>Chemical Name</u>	<u>CAS No.</u>	<u>Wt.%</u>	<u>EINECS / ELINCS</u>	<u>Symbol</u>	<u>Risk Phrases</u>
Methylene diphenyl diisocyanate (MDI)	2,4'-methylenediphenyl diisocyanate	5873-54-1	50 - 60	227-534-9	Xn; Xi	R20; R36/37/38; R42/43
Methylene diphenyl diisocyanate (MDI)	4,4'-methylenediphenyl diisocyanate	101-68-8	40 - 50	202-966-0	Xn; Xi	R20; R36/37/38; R42/43

Note: See Section 16 for the full text of the R-phrases above.

Section 4: First Aid Measures

- Precautions:** First aid providers should avoid direct contact with this chemical. Wear chemical protective gloves, if necessary. Take proper precautions to ensure your own safety before attempting rescue, (e.g. wear appropriate protective equipment).
- Inhalation:** Symptoms: Irritation of the respiratory tract or asthmatic reaction.
Remove source of contamination or move victim to fresh air. If breathing is difficult, oxygen may be beneficial if administered by trained personnel, preferably on a doctor's advice. DO NOT allow victim to move about unnecessarily. Symptoms of pulmonary edema can be delayed up to 48 hours after exposure. Immediately obtain medical advice and transport victim to an emergency care facility.
- Eye Contact:** Symptoms: Irritation of the eye tissue.
Gently blot or brush away excess chemical quickly.
If product is a solid in the eye: Do not allow victim to rub eye(s). Let the eye(s) water naturally for a few minutes. Have victim look right and left, and then up and down. If particle/dust does not dislodge, flush with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding the eyelid(s) open. If irritation persists, obtain medical attention. DO NOT attempt to manually remove anything stuck to eye(s).
If product is a liquid: Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 5 minutes, or until the chemical is removed, while holding the eyelid(s) open. If irritation persists, repeat flushing. Obtain medical attention immediately.
- Skin Contact:** Symptoms: Tingling, irritation or redness of the skin.
As quickly as possible, remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Quickly and gently blot or brush away excess chemical. Immediately wash with lukewarm, gently flowing water and non-abrasive soap for 15-20 minutes. Immediately obtain medical attention. Completely decontaminate clothing, shoes and leather goods before reuse or discard.
- Ingestion:** Symptoms: Burning sensation in the mouth, abdominal pain and vomiting.
Never give anything by mouth if victim is rapidly losing consciousness or is unconscious or convulsing. Do not induce vomiting. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Immediately obtain medical attention.

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Section 5: Fire Fighting Measures

- Flammable Properties:** This material can burn if heated. Flashpoint = 230°C
- Suitable extinguishing Media:** Carbon dioxide, dry chemical powder, foam, water fog or fine spray. Alcohol resistant foams are preferred for large fires. Use water spray to cool fire-exposed containers.
- Unsuitable extinguishing Media:** Exercise caution when using water; water contamination of product will generate CO₂ gas.
- Explosion Data**
- Sensitivity to Mechanical Impact:** Not applicable
- Sensitivity to Static Discharge:** Not available
- Specific Hazards arising from the Chemical:** During a fire products of combustion may include carbon monoxide, carbon dioxide, hydrogen cyanide, nitrogen oxides, dense smoke and irritating or toxic fumes. Reacts vigorously with water above 50°C. Closed containers may rupture violently when heated. MDI decomposes above 230°C.
- Protective Equipment and precautions for firefighters:** Firefighters should wear full protective gear including self-contained breathing apparatus when fighting chemical fires. Fight fire from a protected location or a safe distance. When using water care must be taken since the reaction between water and hot MDI can be vigorous.

Section 6: Accidental Release Measures

- Personal Precautions:** Wear adequate personal protective equipment as indicated in Section 8. Isolate spill area, preventing entry by unauthorized persons. Ventilate area of spill. Extinguish or remove all ignition sources. Spilled product presents a slipping hazard. Do not touch spilled material.
- Environmental Precautions:** Prevent the material from entering sewers, drainage systems, groundwater and surface water.
- Methods for Containment:** Immediately shut off the leak if it is safe to do so. Contain the spill with earth, sand, sawdust or suitable absorbent. If control of isocyanate vapor is required, cover the spilled material with protein foam. Shovel into open-top drums or plastic bags for further decontamination, if necessary. Do not seal drums or containers. Neutralize small spills with decontaminant.
- Methods for Clean-up:** Wash area with Decontamination solution of 0.2-0.5% liquid detergent and 3-8% concentrated ammonium hydroxide in water (5-10% sodium carbonate may be substituted for the ammonium hydroxide). Allow material to stand for 48 hours to let carbon dioxide gas escape.



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Section 7: Handling and Storage

Handling:

Do not breathe fumes, vapors or spray mist from this material. Avoid contact with skin and eyes. Provide adequate ventilation in the workplace. If MDI is released, leave the area until the severity of the release is determined. Immediately report leaks, spills or ventilation failures.
Do not use with incompatible materials such as amines, alcohols, acids, bases, metal compounds, surfactants and water which may react vigorously and/or violently.
Do not use near welding operations, flames or hot surfaces because of the risk of formation of toxic hydrogen cyanide and nitrogen oxides.
Avoid generating mist. Prevent the release of aerosol into workplace air. Do not reseal containers if contamination of MDI is suspected.
Keep containers closed when not in use. Assume that empty containers contain residues which are hazardous.

Storage:

Store in a dry, well-ventilated area, out of direct sunlight and away from heat, sources of ignition and incompatible materials. Keep contents away from moisture; MDI reacts with water producing CO₂ gas, a hazardous build-up of pressure could result if contaminated containers are re-sealed. Do not re-seal contaminated containers. Nitrogen blanketing open containers of Wannate MDI-50 is recommended to minimize oxidation and keep out moisture.
Store product in its original container.
Store and ship at temperatures 25 to 35°C (77 to 95°F). Product should not be allowed to freeze.

Section 8: Exposure Controls and Personal Protection

Exposure Guidelines

Consult local authorities for acceptable exposure limits.

<u>Ingredient</u>	<u>ACGIH TLV</u> <u>(8-hr. TWA)</u> <u>(mg/m³)</u>	<u>U.S. OSHA PEL</u> <u>(8-hr. TWA)</u> <u>(mg/m³)</u>	<u>Alberta (Canada) TWA</u> <u>(mg/m³)</u>	<u>UK OEL</u> <u>(8-hr. TWA)</u> <u>(mg/m³)</u>
Methylene diphenyl diisocyanate (MDI)	0.051 (0.005 ppm)	0.2 (0.02 ppm)	0.005 ppm Designated Substance	0.02 0.07 STEL

Engineering Controls:

Local exhaust ventilation may be necessary when operations generate airborne concentrations of this material (e.g. molding and curing of polyurethane products, especially if heating or spraying is involved). If engineering controls and work practices are not effective in controlling exposure to this material, then wear suitable personal protective equipment including approved respiratory protection. Have appropriate equipment available for use in emergencies such as spills or fire.

Personal Protection

Eye/Face Protection: Wear safety goggles. Wear a face-shield when necessary to prevent contact with skin and eyes.

Skin Protection: Wear chemical protective gloves, coveralls, boots and/or other resistant protective clothing to prevent skin exposure. Protective gloves are those made from butyl rubber, nitrile rubber and polyvinyl alcohol. Evaluate resistance under conditions of use and maintain protective clothing carefully.



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Section 8: Exposure Controls and Personal Protection, continued

Respiratory Protection: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 529 or Canadian Standards Association (CSA) Standard Z94.4-2002 must be followed whenever workplace conditions warrant a respirator's use.

NIOSH Recommendations for MDI concentrations in air:
Up to 0.5 mg/m³:
 (APF = 10) Any supplied-air respirator
Up to 1.25 mg/m³:
 (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 2.5 mg/m³:
 (APF = 50) Any self-contained breathing apparatus with a full facepiece
 (APF = 50) Any supplied-air respirator with a full facepiece
Up to 75 mg/m³:
 (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions:
 (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
 (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
 (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter.

Other Protective Equipment: Have a safety shower and eye-wash fountain readily available in the immediate work area.

Work/Hygienic Practices: Workers whose clothing has been contaminated by product should change into clean clothing promptly. Discard all contaminated leather clothing articles (e.g. belts, watchbands, shoes). Do not eat, smoke or drink in workplaces where this product is processed by machining operations. Wash hands carefully before eating, drinking, smoking or using the toilet.

Section 9: Physical and Chemical Properties

Physical State:	Liquid	Flash Point & method:	213°C (415°F)
Appearance, Color and Odor:	Liquid at room temperature, white to pale yellow. Slight musty odor.	Autoignition Temperature:	>600°C (1 112°F)
Odour Threshold:	Not available	Flammability Limits in Air:	Not available
pH:	Not applicable	Vapor Pressure:	<10 ⁻⁴ mmHg @ 40°C
Relative density: (water = 1)	1.19 @ 25°C (77°F)	Vapor Density: (Air = 1)	8.5
Partition coefficient: (n-octanol/water)	Not applicable	Evaporation Rate: (n-Butyl Acetate = 1)	Not available
Solubility:	Insoluble in water.	Boiling Point/Range:	171°C @ 1 mmHg 200°C @ 5 mmHg
Viscosity:	10 cPs	Melting Point:	37 – 41°C (98.6 – 105.8°F)
Decomposition Temperature:	>230°C		

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Section 10: Stability and Reactivity

- Chemical Stability:** Stable under normal conditions.
Isocyanates are very reactive compounds and are especially highly reactive toward a large number of compounds with active hydrogens, particularly at high temperatures and in the presence of catalysts. May attack and make brittle many plastic and rubber materials.
- Conditions to Avoid:** Avoid conditions of heat, moisture and direct sunlight.
- Incompatible Materials:** Water - Reacts slowly, forming carbon dioxide and inert material comprised of polyureas which could rupture closed containers. 4,4'-methylene dianiline is formed as an intermediate product in this reaction. Above 50°C (122°F), the reaction becomes progressively more vigorous.
Amines, Alcohols, Acids, Bases - May react violently with generation of heat.
Metal compounds (e.g. organotin catalysts) - May polymerize with the generation of heat and pressure.
Amides, phenols, mercaptans, urethanes, ureas and surface active compounds (surfactants, non-ionic detergents) - May react vigorously or violently with the generation of heat.
- Hazardous Decomposition Products:** By thermal decomposition and combustion, product may generate carbon monoxide, carbon dioxide, oxides of nitrogen, hydrogen cyanide, dense smoke and irritating or toxic fumes.
4,4'-Methylene dianiline can be formed by reaction of MDI with water.
- Possibility of Hazardous Reactions:** MDI may undergo uncontrolled exothermic polymerization upon contact with incompatible materials or if heated above 175-204°C. The resulting pressure build-up could rupture closed containers.
May cause some corrosion to copper alloys and aluminum.

Section 11: Toxicological Information

Acute Toxicity Data

Product	LD ₅₀ Oral (mg/kg)	LD ₅₀ Dermal (mg/kg)	LC ₅₀ Inhalation (4 hrs.)
Methylene diphenyl diisocyanate (MDI)	2 200 (mouse)	>10 000 (rabbit)	370 (rat) Aerosol

Other Toxicity Data

- Irritation:** Inhalation: MDI has a very low vapor pressure and it is difficult to achieve vapor concentrations necessary for inhalation toxicity testing. Mice exposed to MDI aerosols varying from 7 to 59 mg/m³ for 4 hours demonstrated a decline in respiratory rate which was determined to be due mainly to MDI's action as a pulmonary irritant. The RD₅₀ (concentration to reduce the respiratory rate by 50%) was 32 mg/m³.
Eyes: MDI caused moderate to severe eye irritation and corneal lesions in rabbits, which healed after 10-14 days.
Skin: Application of single doses of 2.5, 3.9, 6.0 and 9.4 mg/kg MDI to abraded skin of rabbits, under a cover for 24 hours, caused slight to moderate skin irritation.
- Corrosivity:** Not available
- Sensitization:** May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause an allergic skin reaction. Isocyanates are known to cause skin and respiratory sensitization in humans. Animal tests have indicated that respiratory sensitization can result from skin contact with diisocyanates.
- Neurological Effects:** Not available
- Genetic Effects:** Not available
- Reproductive Effects:** Not available
- Developmental Effects:** Not available
- Target Organ Effects:** Experiments with rats, given daily doses of 4.3 to 5 g/kg for 5 days, demonstrated a slight enlargement of the spleen in 2 of 5 rats.
- Carcinogenicity:** This product does not contain any component that is considered a human carcinogen by IARC (International Agency for Research on Cancer), ACGIH (American Conference of Governmental Industrial Hygienists, OSHA or NTP (National Toxicology Program).



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Section 12: Ecological Information

Ecotoxicity: Not available

Persistence/Degradability: Product is not readily biodegradable.

Bioaccumulation/Accumulation: MDI hydrolyzes rapidly in aqueous solution therefore, bioconcentration will not be environmentally important. Exposure of carp to 0.00001% MDI for an eight week period resulted in no accumulations of isocyanates.

Mobility: Liquid MDI will solidify on contact with soil. Reacts with water to form solid polyureas which are insoluble in water.

Section 13: Disposal Considerations

Waste Disposal Method: Do NOT dump into any sewers, on the ground or into any body of water. Store material for disposal as indicated in Section 7 Handling and Storage.

USA: Dispose of in accordance with local, state and federal laws and regulations.

Canada: Dispose of in accordance with local, provincial and federal laws and regulations.

EU: Waste must be disposed of in accordance with relevant EU Directives and national, regional and local environmental control regulations. For disposal within the EU, the appropriate code according to the European Waste Catalogue (EWC) should be used.

Section 14: Transport Information

U.S. Hazardous Materials Regulation (DOT 49CFR): Bulk containers (>5 000 lbs/2 270 kg) must be transported as: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S. (Methylene Diphenyl Diisocyanate), Class 9, UN3082, PGIII, RQ.

Canadian Transportation of Dangerous Goods (TDG): Not regulated

ADR/RID: ADN regulated substance
ID No. 9004, 4,4' DIPHENYLMETHANE DIISOCYANATE, Class 9

IMO Classification: Not regulated

ICAO/IATA Classification: Not regulated

Section 15: Regulatory Information

USA

TSCA Status: All component substances of this mixture are listed on the TSCA inventory.

SARA Title III:

Sec. 313: Methylene diphenyl diisocyanate (MDI), 1% de minimis
CERCLA RQ Methylene diphenyl diisocyanate (MDI) 5 000 lbs (2 270 kg)

California Proposition 65: The component substances are not listed.

Canada

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the MSDS contains all the information required by the *Controlled Products Regulations*.

WHMIS Classification: D2A: Material causing other toxic effects (due to respiratory sensitization).

NSNR Status: All substances in this preparation are listed on the DSL.

NPRI Substances: Methylene diphenyl diisocyanate (MDI) is a NPRI reportable substance (Part I, Group I).



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Section 15: Regulatory Information, continued

EU Classification for the Preparation

Symbol:



Harmful

Risk Phrases: R20: Harmful by inhalation.
R36/37/38: Irritating to eyes, respiratory system and skin.
R42/43: May cause sensitization by inhalation and skin contact.

Safety Phrases: S23: Do not breathe vapour/spray.
S36/37: Wear suitable protective clothing and gloves.
S45: In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

European Inventories: MDI is listed in EINECS.
MDI listed as a pre-registered substance under REACH.

Other International Inventories:

- Australia:** MDI is present on the Inventory of Chemical Substances (AICS).
- China:** MDI is present on the Chemical Inventory.
- Japan:** MDI is present on the inventory - Existing and New Chemical Substances (ENCS).
Methylene diphenyl diisocyanate 4-118.
- Korea:** MDI is present on the inventory - Existing and Evaluated Chemical Substances.
Methylene diphenyl diisocyanate KE-21471, KE-23829.
- New Zealand:** MDI is present on the Chemical Inventory.
- Philippines:** MDI is present on the inventory of Chemicals and Chemical Substances (PICCS).

Section 16: Other Information

Full Text of R-phrases appearing in Section 3: R20: Harmful by inhalation.
R36/37/38: Irritating to eyes, respiratory system and skin.
R42/43: May cause sensitization by inhalation and skin contact.

NFPA Hazard Rating (estimated):



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Disclaimer: While LEHDER Environmental Services Limited believes that the data set forth herein is accurate, as of the date hereof, LEHDER makes no warranty with respect thereto and expressly disclaims all liability for reliance thereon. Such data is offered solely for your consideration, investigation and verification.

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