

MATERIAL SAFETY DATA SHEETMSDS No. EW900012
Revised Date: 2002/09/11

CODE: 900-00138, 901-00129, 907-00126, 909-00147

IDENTITY TAB-CL**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

PRODUCT NAME : TAB-CL
MANUFACTURER : Wako Chemicals USA, Inc.
SUPPLIER : SUPPLIER(In JAPAN) : Wako Pure Chemical Industries, Ltd.
ADDRESS : 1-2, Doshomachi 3-chome, Chuo-ku, Osaka, 540-8605, Japan
TELEPHONE NUMBER & EMERGENCY TELEPHONE NUMBER: (06)6203-3741

SUPPLIER(In U.S.A.) : Wako Chemicals USA, Inc.
ADDRESS : 1600 Bellwood Road, Richmond, VA 23237, U.S.A.
TELEPHONE NUMBER : (804)271-7677
EMERGENCY TELEPHONE NUMBER : (800)424-9300 (CHEMTREC)

SUPPLIER(In EUROPE) : Wako Chemicals GmbH, Germany
ADDRESS : Nissanstrasse 2,D-41468 Neuss, GERMANY
TELEPHONE NUMBER & EMERGENCY TELEPHONE NUMBER : (02131)311-0

2. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAME : 2-(2,4-Di-tert-pentylphenoxy)butyryl chloride
SYNONYMS : 2,4-Di-tert-amylphenoxyethylacetyl chloride; 2-[2,4-Bis(1,1-dimethylpropyl)phenoxy]butanoyl chloride
FORMULA : C₂₀H₃₁ClO₂
MOLECULAR WEIGHT : 338.93
CAS NUMBER : 40567-16-6
TSCA INVENTORY : Listed
EINECS No. : 254-978-0
IDENTIFICATION OF DANGER ;
SYMBOL : -----
R-phrases : -----

3. HAZARDS IDENTIFICATION

May be harmful if inhaled and ingested.
May cause eye and skin irritation.

HMIS : HR= health-1, flam.-1, react.-1

4. FIRST AID MEASURES

GENERAL ADVICE : Wash off immediately with soap and plenty of water. In the case of respirable dust and/or fumes, use self-contained breathing apparatus and dust impervious protective suit. Use personal protective equipment.

INHALATION : Move victim to fresh air. If breathing is difficult, give oxygen. If irritation persists, consult a physician.
SKIN Remove contaminated clothes and shoes, rinse skin with plenty of water or shower. Use soap to help assure removal. If
CONTACT : irritation persists, consult a physician.
EYE CONTACT : Remove any contact lenses at once. Flush eyes well with flooding amounts of running water for at least 15 minutes.
Assure adequate flushing by separating the eyelids with sterile fingers. If irritation persists, consult a physician.
INGESTION : Rinse mouth, give plenty of water to dilute the substance. Never give anything by mouth to an unconscious person.
Consult a physician.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA :	Carbon dioxide, dry chemical powder, foam, water
FIRE & EXPLOSION HAZARDS :	Toxic, irritating fumes, gas(chlorine gas) or smoke may be emitted.
SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS :	Firemen should wear normal protective equipment(full bunker gear)and positive-pressure self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :	Remove ignition sources and ventilate area. In case of insufficient ventilation, wear suitable respiratory equipment. Avoid contact with skin and eyes.
ENVIRONMENTAL PRECAUTIONS :	Prevent spills from entering sewers, watercourses or low areas.
METHODS FOR CLEAN UP :	Do not touch spilled material without suitable protection(See section 8). Take up spilled material with ashes or other absorbents. After material is completely picked up, wash the spill site with soap and water and ventilate the area. Put all wastes in a plastic bag for disposal and seal it tightly. Remove, clean, or dispose of contaminated clothing.

7. HANDLING AND STORAGE

HANDLING :	Avoid contact with eyes, skin and clothing. Avoid prolonged or repeated exposure. Handle material with suitable protection away from source of heat or ignition and use non-sparking type tools.
STORAGE :	Store away from sunlight in well-ventilated dry place at room temperature (preferably cool place). Keep container tightly closed.
INCOMPATIBLE PRODUCTS :	Strong oxidizers, strong alkalis, alcohols, water

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING MEASURES :	Use exhaust ventilation to keep airborne concentrations below exposure limits. Use only with adequate ventilation.
VENTILATION :	Local Exhaust ; Necessary, Mechanical(General) ; Recommended
CONTROL PARAMETER :	
OSHA Final Limits :	None established
ACGIH TLV(s) :	None established
PERSONAL PROTECTION ;	
Respiratory protection :	NIOSH/MSHA approved respirator
Hand protection :	Chemical resistant gloves

Eye protection : Safety glasses(goggles)
Skin protection : Protective clothing

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE :	Yellowish brown viscous liquid
ODOR :	Not available
pH :	Not available
BOILING POINT :	Not available
MELTING POINT :	Not available
FLASH POINT :	124.0 °C= 255 °F(COC)
FLAMMABILITY (solid, gas) :	-----
DECOMPOSITION TEMPERATURE :	Not available
EXPLOSIVE LIMITS :	Not available
VAPOR PRESSURE :	Not available
SPECIFIC GRAVITY :	Not available
SOLUBILITY IN ;	
WATER :	Decomposition
BENZENE, TOLUENE, CARBON	Soluble
TETRACHLORIDE :	
log Po/w :	Not available

10. STABILITY AND REACTIVITY

CONDITION TO AVOID :	Sunlight, heat, moisture, open flames, high temperature, sparks, static electrical charge, other ignition sources
INCOMPATIBILITY(MATERIAL TO AVOID) :	Strong oxidizers, strong alkalis, alcohols, water
HAZARDOUS DECOMPOSITION	Carbon monoxide and chlorine gas may be formed.
PRODUCTS :	
HAZARDOUS POLYMERIZATION :	Will not occur.

11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY DATA :	LD50(ori, rat): >5,000mg/kg
IRRITATION DATA :	Not available
MUTATION DATA :	Ames test; Negative
REPRODUCTIVE EFFECTS	Not available
DATA :	
TUMORIGENIC DATA :	Not available
ADDITIONAL INFORMATION ;	
NTP :	Not listed
IARC :	Not listed
OSHA :	Not listed
ACGIH :	Not listed

12. ECOLOGICAL INFORMATION

BIODEGRADABILITY :	Not available
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BIOACCUMULATION	Not available
POTENTIAL :	
AQUATIC TOXICITY :	Not available
OTHER INFORMATION :	Not available

13. DISPOSAL CONSIDERATION

Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber in accordance with all applicable regulations. Any disposal practice must be in compliance with country, local, state, and federal laws and regulations (contact country, local or state environmental agency for specific rules).

14. TRANSPORT INFORMATION

IATA :	Not Restricted.
DOT(Department of Transportation) :	Not a Hazardous Material for DOT shipping.

15. REGULATORY INFORMATION

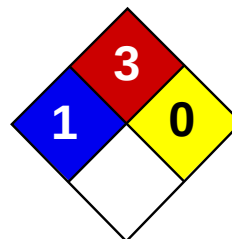
US REGULATIONS ;
EPA : CERCLA RQ= Not listed
EPCRA TPQ= Not listed
OSHA :TQ= Not listed

EU REGULATIONS ;
SYMBOL : ----
R-phrases : ----
S-phrases : ----
EC index Not listed
No. :

16. OTHER INFORMATION

No specific notes

The above information is believed to be correct to be the best of our knowledge and information but does not purport to be all inclusive and shall be used only as a guide. This product is intended to be used by expert persons having chemical knowledge and skill, at their own discretion and risk and Wako shall not be held liable for any damage resulting from handling or from contact with the above material.



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet

Methyl alcohol MSDS

Section 1: Chemical Product and Company Identification

Product Name: Methyl alcohol

Catalog Codes: SLM3064, SLM3952

CAS#: 67-56-1

RTECS: PC1400000

TSCA: TSCA 8(b) inventory: Methyl alcohol

CI#: Not applicable.

Synonym: Wood alcohol, Methanol; Methylol; Wood Spirit; Carbinol

Chemical Name: Methanol

Chemical Formula: CH₃OH

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Methyl alcohol	67-56-1	100

Toxicological Data on Ingredients: Methyl alcohol: ORAL (LD₅₀): Acute: 5628 mg/kg [Rat]. DERMAL (LD₅₀): Acute: 15800 mg/kg [Rabbit]. VAPOR (LC₅₀): Acute: 64000 ppm 4 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (sensitizer). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified POSSIBLE for human. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to eyes. The substance may be toxic to blood, kidneys, liver, brain, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS), optic nerve. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 464°C (867.2°F)

Flash Points: CLOSED CUP: 12°C (53.6°F). OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 6% UPPER: 36.5%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances:

Highly flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. **SMALL FIRE:** Use DRY chemical powder. **LARGE FIRE:** Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:

Explosive in the form of vapor when exposed to heat or flame. Vapor may travel considerable distance to source of ignition and flash back. When heated to decomposition, it emits acrid smoke and irritating fumes. **CAUTION: MAY BURN WITH NEAR INVISIBLE FLAME**

Special Remarks on Explosion Hazards:

Forms an explosive mixture with air due to its low flash point. Explosive when mixed with Chloroform + sodium methoxide and diethyl zinc. It boils violently and explodes.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:

Flammable liquid. Poisonous liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, metals, acids.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 200 from OSHA (PEL) [United States] TWA: 200 STEL: 250 (ppm) from ACGIH (TLV) [United States] [1999] STEL: 250 from NIOSH [United States] TWA: 200 STEL: 250 (ppm) from NIOSH SKIN TWA: 200 STEL: 250 (ppm) [Canada] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Alcohol like. Pungent when crude.

Taste: Not available.

Molecular Weight: 32.04 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 64.5°C (148.1°F)

Melting Point: -97.8°C (-144°F)

Critical Temperature: 240°C (464°F)

Specific Gravity: 0.7915 (Water = 1)

Vapor Pressure: 12.3 kPa (@ 20°C)

Vapor Density: 1.11 (Air = 1)

Volatility: Not available.

Odor Threshold: 100 ppm

Water/Oil Dist. Coeff.: The product is more soluble in water; log(oil/water) = -0.8

Ionicity (in Water): Non-ionic.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Can react vigorously with oxidizers. Violent reaction with alkyl aluminum salts, acetyl bromide, chloroform + sodium methoxide, chromic anhydride, cyanuric chloride, lead perchlorate, phosphorous trioxide, nitric acid. Exothermic reaction with sodium hydroxide + chloroform. Incompatible with beryllium dihydride, metals (potassium and magnesium), oxidants (barium perchlorate, bromine, sodium hypochlorite, chlorine, hydrogen peroxide), potassium tert-butoxide, carbon tetrachloride, alkali metals, metals (aluminum, potassium magnesium, zinc), and dichloromethane. Rapid autocatalytic dissolution of aluminum, magnesium or zinc in 9:1 methanol + carbon tetrachloride - sufficiently vigorous to be rated as potentially hazardous. May attack some plastics, rubber, and coatings.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 5628 mg/kg [Rat]. Acute dermal toxicity (LD50): 15800 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 64000 4 hours [Rat].

Chronic Effects on Humans:

MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified POSSIBLE for human. Causes damage to the following organs: eyes. May cause damage to the following organs: blood, kidneys, liver, brain, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS), optic nerve.

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

Passes through the placental barrier. May affect genetic material. May cause birth defects and adverse reproductive effects (paternal and maternal effects and fetotoxicity) based on animal studies.

Special Remarks on other Toxic Effects on Humans:

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 29400 mg/l 96 hours [Fathead Minnow].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation:

Methanol in water is rapidly biodegraded and volatilized. Aquatic hydrolysis, oxidation, photolysis, adsorption to sediment, and bioconcentration are not significant fate processes. The half-life of methanol in surface water ranges from 24 hrs. to 168 hrs. Based on its vapor pressure, methanol exists almost entirely in the vapor phase in the ambient atmosphere. It is degraded by reaction with photochemically produced hydroxyl radicals and has an estimated half-life of 17.8 days. Methanol is physically removed from air by rain due to its solubility. Methanol can react with NO₂ in polluted air to form methyl nitrate. The half-life of methanol in air ranges from 71 hrs. (3 days) to 713 hrs. (29.7 days) based on photooxidation half-life in air.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Methyl alcohol UNNA: 1230 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Methyl alcohol Illinois toxic substances disclosure to employee act: Methyl alcohol Illinois chemical safety act: Methyl alcohol New York release reporting list: Methyl alcohol Rhode Island RTK hazardous substances: Methyl alcohol Pennsylvania RTK: Methyl alcohol Minnesota: Methyl alcohol Massachusetts RTK: Methyl alcohol Massachusetts spill list: Methyl alcohol New Jersey: Methyl alcohol New Jersey spill list: Methyl alcohol Louisiana spill reporting: Methyl alcohol California Directors List of Hazardous Substances (8CCR 339): Methyl alcohol Tennessee Hazardous Right to Know : Methyl alcohol TSCA 8(b) inventory: Methyl alcohol SARA 313 toxic chemical notification and release reporting: Methyl alcohol CERCLA: Hazardous substances.: Methyl alcohol: 5000 lbs. (2268 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). Class D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):

R11- Highly flammable. R23/24/25- Toxic by inhalation, in contact with skin and if swallowed. R39- Danger of very serious irreversible effects. R39/23/24/25- Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed. S7- Keep container tightly closed. S16- Keep away from sources of ignition - No smoking. 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).

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information**References:**

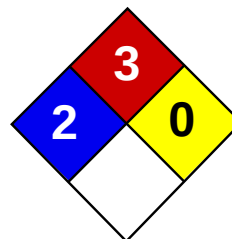
-SAX, N.I. Dangerous Properties of Industrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. LOLI, HSDB, RTECS, HAZARDTEXT, REPROTOX databases

Other Special Considerations: Not available.

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Last Updated: 06/09/2012 12:00 PM

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet

Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene

Catalog Codes: SLT2857, SLT3277

CAS#: 108-88-3

RTECS: XS5250000

TSCA: TSCA 8(b) inventory: Toluene

CI#: Not available.

Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol

Chemical Name: Toluene

Chemical Formula: C₆H₅-CH₃ or C₇H₈

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances:

Flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:

Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide; concentrated nitric acid, sulfuric acid + nitric acid; N₂O₄; AgClO₄; BrF₃; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Toxic flammable liquid, insoluble or very slightly soluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage**Precautions:**

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection**Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States] TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States] TWA: 375 STEL: 560 (mg/m³) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.7

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:

Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l @ 25 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride. Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C. Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 636 mg/kg [Rat]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals:

Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

Special Remarks on Chronic Effects on Humans:

Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin. Eyes: Causes mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abrasions. This usually resolves in 2 days. Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia,), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite. Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation. Chronic Potential Health Effects: Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophosphatemia), severe, muscle weakness and Rhabdomyolysis. Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

Section 12: Ecological Information

Ecotoxicity:

Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene California prop. 65 (no significant risk level): Toluene: 7 mg/day (value) California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene Connecticut hazardous material survey.: Toluene Illinois

toxic substances disclosure to employee act: Toluene Illinois chemical safety act: Toluene New York release reporting list: Toluene Rhode Island RTK hazardous substances: Toluene Pennsylvania RTK: Toluene Florida: Toluene Minnesota: Toluene Michigan critical material: Toluene Massachusetts RTK: Toluene Massachusetts spill list: Toluene New Jersey: Toluene New Jersey spill list: Toluene Louisiana spill reporting: Toluene California Director's List of Hazardous Substances.: Toluene TSCA 8(b) inventory: Toluene TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92 SARA 313 toxic chemical notification and release reporting: Toluene CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. S29- Do not empty into drains. S33- Take precautionary measures against static discharges.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:30 PM

Last Updated: 06/09/2012 12:00 PM

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MATERIAL SAFETY DATA SHEET

MSDS No. EW021395
Revised Date: 2010/03/25

CODE: 024-13952

IDENTITY TMC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : TMC

MANUFACTURER: Wako Chemicals USA, Inc

SUPPLIER : SUPPLIER(In JAPAN) : Wako Pure Chemical Industries, Ltd.

ADDRESS : 1-2, Doshomachi 3-chome, Chuo-ku, Osaka, 540-8605, Japan

TELEPHONE NUMBER & EMERGENCY TELEPHONE NUMBER: (06)6203-3741

SUPPLIER(In U.S.A.) : Wako Chemicals USA, Inc.

ADDRESS : 1600 Bellwood Road, Richmond, VA 23237, U.S.A.

TELEPHONE NUMBER : (804)271-7677

EMERGENCY TELEPHONE NUMBER : (800)424-9300 (CHEMTREC)

SUPPLIER(In EUROPE) : Wako Chemicals GmbH, Germany

ADDRESS : Nissanstrasse 2,D-41468 Neuss, GERMANY

TELEPHONE NUMBER & EMERGENCY TELEPHONE NUMBER : (02131)311-0

2. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAME : 1,3,5-Benzenetricarbonyl trichloride

SYNONYMS : 1,3,5-Benzenetricarbonyl chloride; Trimesoyl chloride; Trimesic acid trichloride

FORMULA : $C_6H_3(COCl)_3$

MOLECULAR WEIGHT : 265.48

CAS NUMBER : 4422-95-1

TSCA INVENTORY : Listed

EINECS No. : 224-594-8

IDENTIFICATION OF DANGER ;

SYMBOL : C

R-phrases : 34

3. HAZARDS IDENTIFICATION

Causes burns.

Lachrymator

Harmful if inhaled and ingested

4. FIRST AID MEASURES

GENERAL ADVICE : Wash off immediately with soap and plenty of water. In the case of respirable dust and/or fumes, use self-contained breathing apparatus and dust impervious protective suit. Use personal protective equipment.

INHALATION : Move victim to fresh air. If breathing is difficult, give oxygen. If breathing has stopped, administer artificial respiration. Maintain normal body temperature with a blanket. If irritation persists, transport to a hospital immediately.

SKIN CONTACT : Remove contaminated clothes and shoes, rinse skin with plenty of water or shower. Use soap to help assure removal. If irritation persists, transport to a hospital immediately.

EYE CONTACT : Remove any contact lenses at once. Flush eyes well with flooding amounts of running water for at least 15 minutes. Assure adequate flushing by separating the eyelids with sterile fingers. If irritation persists, transport to a hospital immediately.

INGESTION : Rinse mouth, give plenty of water to dilute the substance. Never give anything by mouth to an unconscious person. Transport to a hospital immediately.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA :

Carbon dioxide, dry chemical powder, foam, water spray(Do not use water directly on fire.) Toxic, irritating dust or smoke may be emitted.

FIRE & EXPLOSION HAZARDS :

SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS :

Firemen should wear normal protective equipment(full bunker gear)and positive-pressure self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :

Remove ignition sources and ventilate the area. In case of insufficient ventilation, wear suitable respiratory equipment. Avoid raising dust and avoid contact with skin and eyes.

ENVIRONMENTAL PRECAUTIONS : Prevent spills from entering sewers, watercourses or low areas.

METHODS FOR CLEAN UP :

Do not touch spilled material without suitable personnel protection (See section 8). After material is completely picked up, wash the spill site with soap and water and ventilate the area. Put all wastes in a plastic bag for disposal and seal it tightly. Remove, clean, or dispose of contaminated clothing.

7. HANDLING AND STORAGE

Research use only.

HANDLING :

Avoid contact with eyes, skin and clothing. Avoid prolonged or repeated exposure. Handle material with suitable protection. This material is hygroscopic.

STORAGE :

Store away from sunlight in a cold(-15°C= 5°F) well-ventilated dry place. Keep container tightly closed, store under inert gas.

INCOMPATIBLE PRODUCTS : Oxidizers, alkalis

CAUTION : The internal pressure of the container may become higher due to hydrogen chloride generated by the hydrolysis. Cool the container before you open the cap.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING MEASURES : Use exhaust ventilation to keep airborne concentrations below exposure limits.

Use only with adequate ventilation.

VENTILATION :

Local Exhaust ; Necessary, Mechanical(General) ; Necessary Special; Closed system is recommended.

PERSONAL PROTECTION ;

Respiratory protection : Use a NIOSH/MSHA or European Standard EN149 approved respirator.

Hand protection : Impervious gloves.

Eye protection : Safety glasses(goggles).

Skin protection : Protective clothing.

CONTROL PARAMETER :

OSHA Final Limits : None established.

ACGIH TLV(s) : None established.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE :

White - pale yellow, crystals - powder and mass.

ODOR :

Characteristic odor.

pH :

Not available.

BOILING POINT :

180°C= 356° F/2.1kPa

MELTING POINT :

35°C= 95°F

FLASH POINT :

Not available.

FLAMMABILITY (solid, gas) :

Not available.

DECOMPOSITION TEMPERATURE :

Not available.

EXPLOSIVE LIMITS :

Not available.

VAPOR PRESSURE :

Not available.

SPECIFIC GRAVITY:

Not available.

SOLUBILITY IN ;	
WATER :	Decomposition
BENZENE, TOLUENE, CARBON TETRACHLORIDE :	Soluble
log Po/w :	Not available.

10. STABILITY AND REACTIVITY

CONDITION TO AVOID :	Sunlight, heat, moisture.
INCOMPATIBILITY(MATERIAL TO AVOID) :	Oxidizers, alkalis.
HAZARDOUS DECOMPOSITION PRODUCTS :	Carbon monoxide and hydrogen chloride may be formed.
HAZARDOUS POLYMERIZATION :	Will not occur.

11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY DATA :	Not available.
IRRITATION DATA :	Not available.
MUTATION DATA :	Ames test; Negative.
REPRODUCTIVE EFFECTS DATA :	Not available.
TUMORIGENIC DATA :	Not available.
ADDITIONAL INFORMATION ;	
NTP :	Not listed.
IARC :	Not listed.
OSHA :	Not listed.
ACGIH :	Not listed.

12. ECOLOGICAL INFORMATION

BIODEGRADABILITY :	Not available.
BIOACCUMULATION POTENTIAL :	Not available.
AQUATIC TOXICITY :	Not available.
OTHER INFORMATION :	Not available.

13. DISPOSAL CONSIDERATION

Burn in small portion in a chemical incinerator equipped with an afterburner and scrubber in accordance with all applicable regulations. Any disposal practice must be in compliance with country, local, state, and federal laws and regulations (contact country, local or state environmental agency for specific rules).

14. TRANSPORT INFORMATION

IATA :	
PROPER SHIPPING NAME :	Corrosive solid, acidic, organic, n.o.s.(1,3,5-Benzenetricarbonyl trichloride)
CLASS or DIVISION :	Corrosives.(Class 8), (P.G. III)
UN or ID No. :	UN3261
DOT(Department of Transportation) :	
PROPER SHIPPING NAME :	Corrosive solid, acidic, organic, n.o.s.
HAZARD CLASS :	Corrosive material (Class 8)
IDENTIFICATION NUMBER :	UN3261

15. REGULATORY INFORMATION

US REGULATIONS ;

EPA :	CERCLA RQ= Not listed
	EPCRA TPQ= Not listed
OSHA :	TQ= Not listed

EU REGULATIONS ;

SYMBOL :	C
R-phrases :	34
	Causes burns.
S-phrases :	26-36/37/39-45
	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
	Wear suitable protective clothing, gloves and eye/face protection.
	In case of accident or if you feel unwell, seek medical advice immediately.
EC index No. :	Not listed

16. OTHER INFORMATION

No specific notes

The above information is believed to be correct to be the best of our knowledge and information but does not purport to be all inclusive and shall be used only as a guide. This product is intended to be used by expert persons having chemical knowledge and skill, at their own discretion and risk and Wako shall not be held liable for any damage resulting from handling or from contact with the above material.

MATERIAL SAFETY DATA SHEET

MSDS No. EW921065

Revised Date: 2011/03/25

CODE: 923-10674

IDENTITY V-50

1. IDENTIFICATION OF THE SUBSTANCE OR MIXTURE AND OF THE SUPPLIER

PRODUCT IDENTIFIER :V-50

MANUFACTURER : Wako Chemicals USA, Inc.

SUPPLIER : SUPPLIER(In JAPAN) : Wako Pure Chemical Industries, Ltd.

ADDRESS : Takeda Honchou Bldg. 1-7 Nihonbashi-Honchou, 2-chome Chuo-ku,
Tokyo 103-0023, Japan

Specialty Chemicals Department: TEL: (03)3244-0307 FAX: (03)5255-6157

Emergency Tel.(Office Hours in Japan): Marketing Department (03)3244-0305

SUPPLIER(In U.S.A.) : Wako Chemicals USA, Inc.

ADDRESS : 1600 Bellwood Road, Richmond, VA 23237, U.S.A.

TELEPHONE NUMBER : (804)271-7677

EMERGENCY TELEPHONE NUMBER : (800)424-9300 (CHEMTREC)

SUPPLIER(In EUROPE) : Wako Chemicals GmbH, Germany

ADDRESS : Fuggerstrasse 12 ,D-41468 Neuss, GERMANY

TELEPHONE NUMBER & EMERGENCY TELEPHONE NUMBER : (02131)311-0

2. HAZARDS IDENTIFICATION

GHS CLASSIFICATION : Self-heating substance: Category 2

Skin corrosion/irritation: Category 3

Acute toxicity-Oral: Category 4

Sensitization-skin: Category 1

HAZARD SYMBOL :



WARNING

HAZARD STATEMENTS : H252: Self-heating in large quantities; may catch fire

H302: Harmful if swallowed

H316: Causes mild skin irritation

H317: May cause an allergic skin reaction

PRECAUTIONARY (Prevention)

STATEMENTS : P235+P410: Keep cool. Protect from sunlight.

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.

P272: Contaminated work clothing should not be allowed out of the workplace.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

(Response)

P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.

P302+P352: IF ON SKIN: Wash with plenty of soap and water.

P330: Rinse mouth.

P333+P313: If skin irritation or rash occurs: Get medical advice/attention.

P363: Wash contaminated clothing before reuse.

(Storage)

P407: Maintain air gap between stacks/pallets.

P413: Store at temperature not exceeding 40°C.

P420: Store away from other materials.

(Disposal)

Dispose of contents/container in accordance with regulations.

EU CLASSIFICATION:

HAZARD SYMBOLS: Xn Harmful

Risk Phrases: R5: Heating may cause an explosion.

R22; Harmful if swallowed.

R43; May cause sensitization by skin contact.

Safety Phrases: S24; Avoid contact with skin.

S37; Wear suitable gloves.

S47; Keep at temperature not exceeding 40°C=104°F

3. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL IDENTITY : 2,2'-Azobis(2-methylpropionamide) dihydrochloride

SYNONYMS : 2,2'-Azobis(2-amidinopropane) dihydrochloride,

FORMULA : C₈H₁₈N₆·2HCl

MOLECULAR WEIGHT : 271.19

CAS NUMBER : 2997-92-4

TSCA INVENTORY : Listed

EINECS No. : 221-070-0

EC INDEX NUMBER : 611-053-00-X

CONTENT: more than 97%

4. FIRST AID MEASURES

INHALATION : Move victim to fresh air. Try to keep a person at rest and warm. If breathing is

difficult, give oxygen. If breathing has stopped, give artificial respiration. If no recovery from symptoms, consult a physician immediately.

SKIN CONTACT : Remove contaminated clothes and shoes, rinse skin with plenty of water and soap. If irritation persists, consult a physician.

EYE CONTACT : Remove any contact lenses at once if easy to do. Flush eyes well with large amounts of running water for at least 15 minutes. Rinse the reverse side of eyelids. Consult a physician immediately.

INGESTION : Rinse mouth, give plenty of water to dilute the substance and try to get a person to vomit. Consult a physician immediately.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA : Carbon dioxide, dry chemical powder, foam, water

FIRE & EXPLOSION HAZARDS : Toxic, irritating dust or smoke may be emitted.

SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS : Firemen should wear normal protective equipment (full bunker gear) and positive-pressure self-contained breathing apparatus.

CAUTION : Fight fire from maximum distance. Use extreme caution, as heat may decompose material and rupture containers.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS : Remove ignition sources and ventilate the area. In case of insufficient ventilation, wear suitable respiratory equipment. Avoid raising dust and avoid contact with skin and eyes.

ENVIRONMENTAL PRECAUTIONS : Prevent spills from entering sewers, watercourses or low areas.

METHODS FOR CLEANING UP : Do not touch spilled material without suitable protection (See section 8). After material is completely picked up, wash the spill site with soap and water and ventilate the area. Put all wastes in a plastic bag for eventual disposal (do not seal it tightly). Remove, clean, or dispose of contaminated clothing.

7. HANDLING AND STORAGE

PRECAUTION FOR SAFE HANDLING : Avoid contact with eyes, skin and clothing. Avoid prolonged or repeated exposure. Handle material with suitable protection away from source of heat or ignition and use non-sparking type tools.

CONDITIONS FOR SAFE STORAGE : This material is unstable at elevated temperature and causes exothermal decomposition. Store away from sunlight in a cool

(<40°C= 104°F) well-ventilated dry place. (SADT=110°C). Because thermal decomposition release nitrogen gas and the causes the increase of the internal pressure in a closed container, the container should not be sealed tightly.

See also the indication described on label for handling.

INCOMPATIBILITIES : Strong oxidizers, strong acids, strong alkalis, persulfates

CAUTION :V-50 and persulfates form a water insoluble precipitate, which is shock and friction sensitive.

Precautions should be taken to prevent contact of V-50 and persulfates outsides of the polymerization environment. If the precipitate is accidentally formed, do not attempt to dry them.

The precipitate should be dissolved with a diluted sodium carbonate or sodium hydroxide aqueous solution and disposed properly.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING MEASURES :Use exhaust ventilation to keep airborne concentrations below exposure limits. Use only with adequate ventilation.

VENTILATION : Local Exhaust; Necessary, Mechanical (General); Necessary
Special; Closed system is recommended.

INDIVIDUAL PROTECTION MEASURES ;

Respiratory protection :NIOSH/MSHA or European Standard EN149 approved respirator

Hand protection : Impervious gloves

Eye protection : Safety glasses(goggles)

Skin protection : Protective clothing

CONTROL PARAMETER :

OSHA Final Limits :None established

ACGIH TLV(s) : None established

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE :	Nearly white powder or granules
ODOUR :	Almost odorless
pH :	Not available
MELTING POINT :	160-169 °C= 320-336°F (Decomposition)
INITIAL BOILING POINT :	Not available
FLASH POINT :	Not available
FLAMMABILITY (solid, gas) :	Not available
EXPLOSIVE LIMITS :	Minimum Explosive Concentration of a dust ; 125mg/l
VAPOR PRESSURE :	Not available
SPECIFIC GRAVITY :	Not available
SOLUBILITY IN ;	

WATER :	Freely soluble(23.2g/100g, at 20°C= 68°F)
METHANOL, ETHANOL, ACETONE, DMF, DIOXANE :	Sparingly soluble
BENZENE, n-HEXANE, PETROLEUM ETHER, TOLUENE :	Insoluble
PARTITION COEFFICIENT :	Not available
DECOMPOSITION TEMPERATURE :	110 °C= 230 °F(SADT)

10. STABILITY AND REACTIVITY

- | | |
|-------------------------------|---|
| (1).CHEMICAL STABILITY : | (1).Stable under recommended storage conditions. |
| (2).CONDITIONS TO AVOID : | (2).Sunlight & heat(SADT=110°C), pressure, flames, high temperature, friction, static electrical charge, sparks |
| (3).INCOMPATIBLE MATERIALS : | (3).Strong oxidizers, strong acids, strong alkalis, persulfates |
| (4).HAZARDOUS DECOMPOSITION : | (4).Carbon monoxide, nitrogen oxides, nitrogen gas, ammonium gas |
| PRODUCTS : | and hydrogen chloride may be formed. |

11. TOXICOLOGICAL INFORMATION

- ACUTE TOXICITY(oral/dermal/inhalation) : LD50(oral,rat): 410mg/kg(EPASR* 8EHQ-0282-0427S)
LD50(oral,mouse): 0.8g/kg
LD50(skin,rat): >5.9g/kg
- SKIN CORROSION/IRRITATION : Skin; rabbit; 500mg; Mild(EPASR* 8EHQ-0282-0427S)
- EYE DAMAGE/EYE IRRITATION : Not available
- RESPIRATORY OR SKIN SENSITIZATION :Not available
- GERM CELL MUTAGENICITY : Ames test (by Salmonella): Negative
- TOXIC TO REPRODUCTION : Not available
- STOST-SINGLE EXPOSURE : Not available
- STOST-REPEATED EXPOSURE : Not available
- ASPIRATION TOXICITY : Not available
- CARCINOGENICITY : Not available
- ADDITIONAL INFORMATION ;
- NTP : Not listed
- IARC : Not listed
- OSHA : Not listed
- ACGIH :Not listed

12. ECOLOGICAL INFORMATION

- ECOTOXICITY :
- EC10(Bacteria): >10000mg/l/96hr
- EC50(Bacteria): >10000mg/l/96hr
- LC50(Golden orfe): 570mg/l/96hr
- 95% Confidence limits(Golden orfe): 470-680mg/l
- No Observed Effect Concentration(NOEC)(Golden orfe): 320mg/l
- PERSISTENCE AND DEGRADABILITY :V-50 attained 11% degradation after 28 days and therefore can

not be considered to be readily biodegradable under the strict terms conditions of OECD Guideline No.301E.

BIOACCUMULATION POTENTIAL : Not available
MOBILITY IN SOIL : Not available
OTHER ADVERSE EFFECTS : WGK; 1

13. DISPOSAL CONSIDERATION (INCLUDING CONTAINER)

Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber in accordance with all applicable regulations. Any disposal practice must be in compliance with country, local, state, and federal laws and regulations (contact country, local or state environmental agency for specific rules).

After contents are completely removed, dispose of its container in accordance with local/regional/national/international regulation.

14. TRANSPORT INFORMATION

IATA :

UN NUMBER : UN3088
Packing Group II
UN PROPER SHIPPING NAME : Self-heating solid, organic, n.o.s
(2,2'-Azobis(2-amidinopropane)dihydrochloride)
CLASS or DIVISION : Substances liable to spontaneous combustion.(Division 4.2)
MARINE POLLUTANT : No

DOT(Department of Transportation) :

IDENTIFICATION NUMBER : UN3088
Packing Group II
PROPER SHIPPING NAME : Self-heating, solid, organic, n.o.s
HAZARD CLASS : Spontaneously combustible material (Class 4.2)

15. REGULATORY INFORMATION

US REGULATIONS ;

EPA : CERCLA RQ= Not listed

EPCRA TPQ= Not listed

OSHA :TQ= Not listed

NFPA : HR= health-2, flam.-1, react.-2

HMIS : HR= health-2, flam.-1, react.-2

16. OTHER INFORMATION

No specific notes

The above information is believed to be correct to be the best of our knowledge and information but does not purport to be all inclusive and shall be used only as a guide. This product is intended to be used by expert persons having chemical knowledge and skill, at their own discretion and risk and Wako shall not be held liable for any damage resulting from handling or from contact with the above material.

MATERIAL SAFETY DATA SHEET

MSDS No. EW921147

Revised Date: 2011/03/04

CODE: 920-11360, 920-11365, 921-11312, 922-11364, 922-11369, 925-11310

IDENTITY VA-044

1. IDENTIFICATION OF THE SUBSTANCE OR MIXTURE AND OF THE SUPPLIER

PRODUCT IDENTIFIER :VA-044

MANUFACTURER : Wako Pure Chemical Industries, Ltd.

SUPPLIER : SUPPLIER(In JAPAN) : Wako Pure Chemical Industries, Ltd.

ADDRESS : Takeda Honchou Bldg. 1-7 Nihonbashi-Honchou, 2-chome
Chuo-ku, Tokyo 103-0023, Japan

Specialty Chemicals Department: TEL: (03)3244-0307 FAX: (03)5355-6157

Emergency Tel.(Office Hours in Japan): Marketing Department (03)3244-0305

SUPPLIER(In U.S.A.) : Wako Chemicals USA, Inc.

ADDRESS : 1600 Bellwood Road, Richmond, VA 23237, U.S.A.

TELEPHONE NUMBER : (804)271-7677

EMERGENCY TELEPHONE NUMBER : (800)424-9300 (CHEMTREC)

SUPPLIER(In EUROPE) : Wako Chemicals GmbH, Germany

ADDRESS : Fuggerstrasse 12 ,D-41468 Neuss, GERMANY

TELEPHONE NUMBER & EMERGENCY TELEPHONE NUMBER : (02131)311-0

2. HAZARDS IDENTIFICATION

GHS CLASSIFICATION : Acute toxicity-Oral: Category 5

HAZARD SYMBOL : **WARNING**

HAZARD STATEMENTS : H303: May be harmful if swallowed

PRECAUTIONARY STATEMENTS :P312: Call a POISON CENTER/doctor/physician if you feel unwell.

3. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMILCAL IDENTITY :2,2'-Azobis[2-(2-imidazolin-2-yl)propane]dihydrochloride

SYNONYMS : 2,2'-Azobis(N,N'-dimethyleneisobutylamidine)dihydrochloride

FORMULA : C₁₂H₂₂N₆·2HCl

MOLECULAR WEIGHT :323.26

CAS NUMBER : 27776-21-2

TSCA INVENTORY : Listed

EINECS No. : 248-655-3

4. FIRST AID MEASURES

INHALATION :	Move victim to fresh air. Try to keep a person at rest and warm. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration. If no recovery from symptoms, consult a physician immediately.
SKIN CONTACT :	Remove contaminated clothes and shoes, rinse skin with plenty of water and soap. If irritation persists, consult a physician.
EYE CONTACT :	Remove any contact lenses at once if easy to do. Flush eyes well with large amounts of running water for at least 15 minutes. Rinse the reverse side of eyelids. Consult a physician immediately.
INGESTION :	Rinse mouth, give plenty of water to dilute the substance and try to get a person to vomit. Never give anything by mouth to an unconscious person. Consult a physician immediately.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA :	Carbon dioxide, dry chemical powder, foam, water
FIRE & EXPLOSION HAZARDS :	Hazardous, toxic and irritating dust or smoke may be emitted.
SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS :	Firemen should wear normal protective equipment (full bunker gear) and positive-pressure self-contained breathing apparatus.
CAUTION :	Fight fire from maximum distance. Use extreme caution, as heat may decompose material and rupture containers.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :	Remove ignition sources and ventilate the area. In case of insufficient ventilation, wear suitable respiratory equipment. Avoid raising dust and avoid contact with skin and eyes.
ENVIRONMENTAL PRECAUTIONS :	Prevent spills from entering sewers, watercourses or low areas.
METHODS FOR CLEANING UP :	Do not touch spilled material without suitable protection (See section 8). After material is completely picked up, wash the spill site with soap and water and ventilate the area. Put all wastes in a plastic bag for eventual disposal (do not seal it tightly). Remove, clean, or dispose of contaminated clothing.

7. HANDLING AND STORAGE

PRECAUTION FOR SAFE HANDLING :	Avoid contact with eyes, skin and clothing. Avoid prolonged or repeated exposure. Handle material with suitable protection away from source of heat or ignition and use non-sparking type tools.
CONDITIONS FOR SAFE STORAGE :	This material is unstable at elevated temperature and causes exothermal decomposition. Store in a cool place preferably and dark place. (Transportation at room temperature.) Because thermal decomposition release nitrogen gas and the causes the increase of the internal pressure in a

closed container, the container should not be sealed tightly.

See also the indication described on label for handling.

INCOMPATIBILITIES : Oxidizers, strong acids, persulfates

CAUTION : VA-044 and persulfates form a water insoluble precipitate, which is shock and friction sensitive. Precautions should be taken to prevent contact of VA-044 and persulfates outside of the polymerization environment. If the precipitate is accidentally formed, do not attempt to dry them. The precipitate should be dissolved with a diluted sodium carbonate or sodium hydroxide aqueous solution and disposed properly.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING MEASURES : Use exhaust ventilation to keep airborne concentrations below exposure limits. Use only with adequate ventilation.

VENTILATION : Local Exhaust ; Necessary, Mechanical(General) ; Recommended

INDIVIDUAL PROTECTION MEASURES ;

Respiratory protection : NIOSH/MSHA approved respirator

Hand protection : Chemical resistant gloves

Eye protection : Safety glasses(goggles)

Skin protection : Protective clothing

CONTROL PARAMETER :

OSHA (PEL) : None established

ACGIH TLV(s) : None established

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE :	White - pale yellow crystals - crystalline powder
ODOUR :	Slightly characteristic odor
pH :	Not available
MELTING POINT :	188 - 193 °C (Decomposition)
INITIAL BOILING POINT :	Not available
FLASH POINT :	Not available
FLAMMABILITY (solid, gas) :	Not available
EXPLOSIVE LIMITS :	Minimum Explosive Concentration of a dust; 100mg/L
VAPOR PRESSURE :	Not available
SPECIFIC GRAVITY :	Not available
SOLUBILITY IN ;	
WATER :	Freely soluble (34.7g/100g at 20°C= 68°F)
METHANOL :	Sparingly soluble (1.7g/100g)
ETHANOL :	Very slightly soluble (0.05g/100g)
ACETONE, BENZENE, TOLUENE, DMF,	Insoluble
DMSO :	

PARTITION COEFFICIENT :	Not available
DECOMPOSITION TEMPERATURE :	140°C= 284°F(SADT)
OTHER NATURE	Hygroscopic

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY :	Stable under recommended storage conditions.
CONDITIONS TO AVOID :	Sunlight, heat, pressure, flame, high temperature, friction, static electrical charges and sparks
INCOMPATIBLE MATERIALS :	Oxidizers, strong acids, persulfates, moisture
HAZARDOUS	Carbon monoxide, nitrogen oxides, nitrogen gas and hydrogen chloride may
DECOMPOSITION PRODUCTS :	be formed.
REACTIVITY	- Decompose at an accelerating pace and discharge N₂ gas. - May develop runaway reaction by heat or sunlight because of self-reactivity (SADT=140°C) - Decompose gradually when store it more than 30°C.

11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY(oral/dermal/inhalation) :	LD50(oral, male rat): 3.2g/kg LD50(oral, female rat): 2.8g/kg
SKIN CORROSION/IRRITATION :	Skin; rabbit; Negative
EYE DAMAGE/EYE IRRITATION :	Not available
RESPIRATORY OR SKIN SENSITIZATION :	Not available
GERM CELL MUTAGENICITY :	Reverse mutation assay in S.typhimurium and E.coli; Weak positive
TOXIC TO REPRODUCTION :	Not available
STOST-SINGLE EXPOSURE :	Not available
STOST-REPEATED EXPOSURE :	Not available
ASPIRATION TOXICITY :	Not available
CARCINOGENICITY :	Not available
ADDITIONAL INFORMATION ;	
NTP :	Not listed
IARC :	Not listed
OSHA :	Not listed
ACGIH :	Not listed

12. ECOLOGICAL INFORMATION

ECOTOXICITY :	Not available
PERSISTENCE AND DEGRADABILITY :	Not available
BIOACCUMULATION POTENTIAL :	Not available
MOBILITY IN SOIL :	Not available

OTHER ADVERSE EFFECTS : Not available

13. DISPOSAL CONSIDERATION (INCLUDING CONTAINER)

Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber in accordance with all applicable regulations. Any disposal practice must be in compliance with country, local, state, and federal laws and regulations (contact country, local or state environmental agency for specific rules).

After contents are completely removed. Dispose of its container in accordance with regulations.

14. TRANSPORT INFORMATION

IATA : Not Restricted.

DOT(Department of Transportation)Not Restricted.

15. REGULATORY INFORMATION

US REGULATIONS ;

EPA : CERCLA RQ= Not listed

EPCRA TPQ= Not listed

OSHA :TQ= Not listed

NFPA : HR= health- 1 , flam.- 1 , react.- 2

HMIS : HR= health- 1 , flam.- 1 , react.- 2

16. OTHER INFORMATION

No specific notes

The above information is believed to be correct to be the best of our knowledge and information but does not purport to be all inclusive and shall be used only as a guide. This product is intended to be used by expert persons having chemical knowledge and skill, at their own discretion and risk and Wako shall not be held liable for any damage resulting from handling or from contact with the above material.

MATERIAL SAFETY DATA SHEET

MSDS No. EW921187

Revised Date: 2011/03/04

CODE: 921-11856

IDENTITY VA-086

1. IDENTIFICATION OF THE SUBSTANCE OR MIXTURE AND OF THE SUPPLIER

PRODUCT IDENTIFIER : VA-086

MANUFACTURER : Wako Pure Chemical Industries, Ltd.

SUPPLIER : SUPPLIER(In JAPAN) : Wako Pure Chemical Industries, Ltd.

ADDRESS : Takeda Honchou Bldg. 1-7 Nihonbashi-Honchou, 2-chome Chuo-ku,
Tokyo 103-0023, Japan

Specialty Chemicals Department: TEL: (03)3244-0307 FAX: (03)5355-6157

Emergency Tel.(Office Hours in Japan): Marketing Department (03)3244-0305

SUPPLIER(In U.S.A.) : Wako Chemicals USA, Inc.

ADDRESS : 1600 Bellwood Road, Richmond, VA 23237, U.S.A.

TELEPHONE NUMBER : (804)271-7677

EMERGENCY TELEPHONE NUMBER : (800)424-9300 (CHEMTREC)

SUPPLIER(In EUROPE) : Wako Chemicals GmbH, Germany

ADDRESS : Fuggerstrasse 12 ,D-41468 Neuss, GERMANY

TELEPHONE NUMBER & EMERGENCY TELEPHONE NUMBER : (02131)311-0

2. HAZARDS IDENTIFICATION

GHS CLASSIFICATION : Self-heating substances and mixtures: Category 1

Sensitization-skin: Category 1A

Hazardous to the aquatic environment -Chronic hazard: Category 3

HAZARD SYMBOL :



DANGER

HAZARD STATEMENTS : H251: Self-heating; may catch fire

H317: May cause an allergic skin reaction

H412: Harmful to aquatic life with long lasting effects

PRECAUTIONARY P235+P410: Keep cool. Protect from sunlight.

STATEMENTS : P261: Avoid breathing dust/fume/gas/mist/vapours/spray.

P273: Avoid release to the environment.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P302+P352: IF ON SKIN: Wash with plenty of soap and water.

P333+P313: If skin irritation or rash occurs: Get medical advice/attention.

P407: Maintain air gap between stacks/pallets.

P501: Dispose of content/container in accordance with local/regional/national/
international regulations.

EU CLASSIFICATION:

HAZARD SYMBOL: Xi ; Irritant

Risk Phrase:

R43: May cause sensitization by skin contact.

R52/53: Harmful to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S12: Do not keep the container sealed.

S15: Keep away from heat.

S24: Avoid contact with skin.

S37: Wear suitable protective gloves.

S61: Avoid release to the environment. Refer to special instruction/safety data sheets.

3. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL IDENTITY : 2,2'-Azobis[2-methyl-N-(2-hydroxyethyl)propionamide]

FORMULA : C₁₂H₂₄N₄O₄

MOLECULAR WEIGHT : 288.36

CAS NUMBER : 61551-69-7

TSCA INVENTORY : Listed

EC No. : ELINCS No. : 429-090-3

EC INDEX NUMBER : 616-160-00-5

CONTENT more than 98%

4. FIRST AID MEASURES

INHALATION : Move victim to fresh air. Try to keep a person at rest and warm. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration. If no recovery from symptoms, consult a physician immediately.

SKIN CONTACT: Remove contaminated clothes and shoes, rinse skin with plenty of water and soap. If irritation persists, consult a physician.

EYE CONTACT: Remove any contact lenses at once if easy to do. Flush eyes well with large amounts of running water for at least 15 minutes. Rinse the reverse side of eyelids. Consult a physician immediately.

INGESTION : Rinse mouth, give plenty of water to dilute the substance and try to get a person to vomit. Never give anything by mouth to an unconscious person. Consult a physician immediately.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA : Carbon dioxide, dry chemical powder, foam, water

FIRE & EXPLOSION HAZARDS : Hazardous, toxic and irritating dust or smoke may be emitted. May

	explode if exposed heat or fire. Dust forms an explosive mixture with air.
SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS	Firemen should wear normal protective equipment (full bunker gear) and positive-pressure self-contained breathing apparatus.
CAUTION :	Fight fire from maximum distance. Use extreme caution, as heat may decompose material and rupture containers.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :	Evacuate personnel from immediate vicinity. Wear full personal protection equipment including boots, rubber gloves and a respirator.
ENVIRONMENTAL PRECAUTIONS :	Avoid washing contaminated waste containing the substance to the drains.
METHODS FOR CLEANING UP :	Carefully transfer the spillage to waste containers, or use a sealed industrial vacuum machine. Containers filled with waste must be labeled in the same way as the original substance containers. Dispose of waste material in accordance with local regulations by incineration.

7. HANDLING AND STORAGE

HANDLING

PRECAUTIONS	The substance should be handled under conditions of good industrial practice and to avoid exposure full personal protection equipment should be worn.
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TECHNICAL MEASURES	Engineering controls such as local exhaust ventilation are necessary to reduce exposure to the substance.
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STORAGE

SPECIFIC DESIGN for STORAGE ROOMS or VESSELS:	Storage rooms should be kept dry, well ventilated and situated away from source of ignition.
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INCOMPATIBLE MATERIALS:	Oxidizers, strong acids
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CONDITIONS of STORAGE	Store in a cool (below 25 °C), dry and well ventilated area away from sunlight and sources of ignition. Containers should not be sealed tightly and strong impacts should be avoided.
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8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING MEASURES : Engineering controls are necessary to reduce exposure to the substance.

VENTILATION : Local Exhaust ; Necessary, Mechanical(General) ; Recommended

INDIVIDUAL PROTECTION MEASURES ;

Respiratory protection : Use a NIOSH/MSHA or European Standard EN149 approved respirator if the vapor concentrations exceed regulatory guidelines.

Hand protection : Chemical resistant gloves

Eye protection : Safety glasses(goggles)

Skin protection : Protective clothing

CONTROL PARAMETER :

OSHA (PEL) : None established

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE :	White-slightly yellowish crystalline powder
ODOUR :	Odorless
pH :	Approx. 7.7
MELTING WITH DECOMPOSITION	151°C with decomposition
INITIAL BOILING POINT :	Not available
FLASH POINT :	Not applicable to a solid
FLAMMABILITY (solid, gas) :	Not highly flammable
EXPLOSIVE LIMITS :	Minimum Explosive Concentration of a dust ; 40mg/L
VAPOR PRESSURE :	1.5×10^{-9} Pa at 25°C
BULK DENSITY :	1.24g/ml at 25°C
SOLUBILITY IN ;	
WATER :	Soluble (4.5g/100ml at 20 °C)
METHANOL :	Soluble (7.4g/100ml at 20 °C)
DMF	Soluble (4.36g/100ml at 20 °C)
CHLOROFORM :	Slightly soluble (0.14g/100ml)
PARTITION COEFFICIENT :	Pow = 0.173, Log ₁₀ Pow = -0.761 at 25°C

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY :	Stable under recommended conditions.
CONDITIONS TO AVOID :	Strong sunlight, heat
INCOMPATIBLE MATERIALS :	Oxidizers, strong acids
HAZARDOUS	Nitrogen oxides (NOx)
DECOMPOSITION PRODUCTS :	
REACTIVITY	• Release Nitrogen gas with decomposition at an accelerating pace. • May cause runaway reaction by light or heat because of self-reactivity. • Decompose gradually at more than 25 °C.

11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY(oral/dermal/inhalation) : LD50(oral, rat):	>2000mg/kg
	LD50(dermal, rat): >2000mg/kg
TOXICITY DATA :	NOEL(oral, rat): 40mg/kg/day (28day)
SKIN CORROSION/IRRITATION :	Skin irritation = not classified. (Number of rabbit = 3, Duration of exposure = 4 hours.) Skin; rabbit; PII= 0.0 non-irritant Skin sensitization (Magnusson & Kligman Maximization) study in the guinea pig; 30% sensitization rate
EYE DAMAGE/EYE IRRITATION :	The substance is not an irritant to eye of rabbit.
SKIN SENSITIZATION :	It is a skin sensitizer (3/10 sensitization rate in a Magnusson and

	Kligman maximization study in the guinea pig).
GERM CELL MUTAGENICITY :	The substance was determined to be non-mutagenic to bacterial cells (<i>S. typhimurium</i> and <i>E.coli</i>) in an Ames test and non-clastogenic to human lymphocytes in vitro in a chromosome aberration test.
TOXIC TO REPRODUCTION :	Not available
STOST-SINGLE EXPOSURE :	Not available
STOST-REPEATED EXPOSURE :	Not available
ASPIRATION TOXICITY :	Not available
CARCINOGENICITY :	Not available

12. ECOLOGICAL INFORMATION

ECOTOXICITY :	The substance is not harmful to Rainbow Trout (LC_{50} at 96h > 100mg/L) or to <i>Daphnia magna</i> (EC_{50} at 48h > 100mg/L, NOEC after 48h ? 100 mg/L). The substance is harmful to algae (EcC_{50} at 70h = 52mg/L, ErC_{50} at 72h > 69mg/L, NOEC = 9.2mg/L). The substance is not toxic to sewage micro-organisms (IC_{50} ? 1000mg/L).
DEGRADATION	No significant aerobic degradation occurs (3% after 28 days) in a closed bottle test for ready biodegradability. No information on anaerobic degradation is available. Abiotic degradation by hydrolysis is not considered likely in the aquatic environment as the substance half-life at 25 °C is estimated to be > 1 year.
BIOACCUMULATION	The substance is not bioaccumulative based on a log P_{ow} of -0.761.
MOBILITY	The substance is highly water soluble and involatile. It will distribute to the aqueous environment. Surface activity is not expected. Log K_{oc} of < 1.25 at 30 °C.
OTHER ADVERSE EFFECTS :	There is no ozone depletion, photochemical ozone creation or global warming potential. No effects on waste-water treatment plants are anticipated.
ALGAL INHIBITION TEST:	NOEC=20mg/L (72 hours)

13. DISPOSAL CONSIDERATION (INCLUDING CONTAINER)

Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber in accordance with all applicable regulations. Any disposal practice must be in compliance with country, local, state, and federal laws and regulations (contact country, local or state environmental agency for specific rules).

After contents are completely removed, dispose of its container in accordance with local/regional/national/international regulation.

14. TRANSPORT INFORMATION

IATA :

UN NUMBER : UN3088

UN PROPER SHIPPING NAME : Self-heating solid, organic, n.o.s.
(2,2'-Azobis[2-methyl-N-(2-hydroxyethyl)propionamide])

CLASS or DIVISION : Substances liable to spontaneous combustion.(Division 4.2)

PACKING GROUP : PG II

DOT(Department of Transportation) :

IDENTIFICATION NUMBER : UN3088

PROPER SHIPPING NAME : Self-heating solid, organic, n.o.s.

HAZARD CLASS : Spontaneously combustible material (Class 4.2)

15. REGULATORY INFORMATION

US REGULATIONS ;

EPA : CERCLA RQ= Not listed

EPCRA TPQ= Not listed

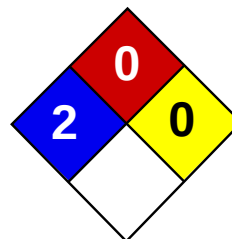
OSHA :TQ= Not listed

NFPA : HR= health-1, flam.-1, react.-2

HMIS : HR= health-1, flam.-1, react.-2

16. OTHER INFORMATION

The above information is believed to be correct to be the best of our knowledge and information but does not purport to be all inclusive and shall be used only as a guide. This product is intended to be used by expert persons having chemical knowledge and skill, at their own discretion and risk and Wako shall not be held liable for any damage resulting from handling or from contact with the above material.



Health	2
Fire	0
Reactivity	0
Personal Protection	

Material Safety Data Sheet

Sodium Hydroxide, 25% MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium Hydroxide, 25%

Catalog Codes: SLS4210

CAS#: Mixture.

RTECS: Not applicable.

TSCA: TSCA 8(b) inventory: Sodium hydroxide; Water

CI#: Not applicable.

Synonym:

Chemical Name: Not applicable.

Chemical Formula: Not applicable.

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium hydroxide	1310-73-2	25
Water	7732-18-5	75

Toxicological Data on Ingredients: Sodium hydroxide LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of skin contact (corrosive, irritant), of eye contact (irritant), of ingestion. Hazardous in case of inhalation. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:

Non-corrosive for skin. Non-irritant for skin. Non-sensitizer for skin. Non-permeator by skin. Non-irritating to the eyes. Non-hazardous in case of ingestion. Non-hazardous in case of inhalation. CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe

skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Finish by rinsing thoroughly with running water to avoid a possible infection. Cold water may be used.

Skin Contact:

If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical got on the victim's exposed skin, such as the hands : Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of acetic acid.

Large Spill:

Corrosive liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of acetic acid. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep container dry. Do not breathe gas/fumes/ vapour/spray. Never add water to this product In case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes Keep away from incompatibles such as acids.

Storage:

Alkalis may be stored in heavy duty gauge steel containers. Corrosive materials should be stored in a separate safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection:

Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

Sodium hydroxide CEIL: 2 (mg/m3) from ACGIH [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Odorless.

Taste: Alkaline. Bitter. (Strong.)

Molecular Weight: Not applicable.

Color: Clear Colorless.

pH (1% soln/water): Basic.

Boiling Point: The lowest known value is 100°C (212°F) (Water).

Melting Point: Not available.

Critical Temperature: Not available.

Specific Gravity: Weighted average: 1.15 (Water = 1)

Vapor Pressure: The highest known value is 17.535 mm of Hg (@ 20°C) (Water).

Vapor Density: The highest known value is 0.62 (Air = 1) (Water).

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Extremely reactive or incompatible with acids.

Corrosivity:

Highly corrosive in presence of aluminum. Slightly corrosive to corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

LD50: Not available. LC50: Not available.

Chronic Effects on Humans: The substance is toxic to lungs, mucous membranes.

Other Toxic Effects on Humans:

Very hazardous in case of skin contact (corrosive, irritant), of ingestion. Hazardous in case of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 8: Corrosive liquid.

Identification: : Sodium hydroxide, solution (Sodium hydroxide) : UN1824 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Pennsylvania RTK: Sodium hydroxide Massachusetts RTK: Sodium hydroxide TSCA 8(b) inventory: Sodium hydroxide; Water

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):

CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC): R35- Causes severe burns.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References: Not available.

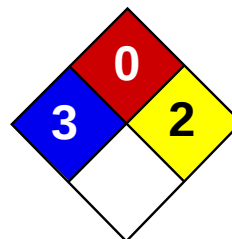
Other Special Considerations: Not available.

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Health	3
Fire	0
Reactivity	2
Personal Protection	

Material Safety Data Sheet

Sulfuric acid MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sulfuric acid

Catalog Codes: SLS2539, SLS1741, SLS3166, SLS2371, SLS3793

CAS#: 7664-93-9

RTECS: WS5600000

TSCA: TSCA 8(b) inventory: Sulfuric acid

CI#: Not applicable.

Synonym: Oil of Vitriol; Sulfuric Acid

Chemical Name: Hydrogen sulfate

Chemical Formula: H₂-SO₄

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sulfuric acid	7664-93-9	95 - 98

Toxicological Data on Ingredients: Sulfuric acid: ORAL (LD50): Acute: 2140 mg/kg [Rat.]. VAPOR (LC50): Acute: 510 mg/m 2 hours [Rat]. 320 mg/m 2 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, of inhalation. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified 1 (Proven for human.) by IARC, + (Proven.) by OSHA. Classified A2 (Suspected for human.) by ACGIH. **MUTAGENIC EFFECTS:** Not available. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance may be toxic to kidneys, lungs, heart, cardiovascular system, upper respiratory tract, eyes, teeth. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged

contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion:

Products of combustion are not available since material is non-flammable. However, products of decomposition include fumes of oxides of sulfur. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas. Reacts with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide respectively.

Fire Hazards in Presence of Various Substances: Combustible materials

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of oxidizing materials.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:

Metal acetylides (Monocesium and Monorubidium), and carbides ignite with concentrated sulfuric acid. White Phosphorous + boiling Sulfuric acid or its vapor ignites on contact. May ignite other combustible materials. May cause fire when sulfuric acid is mixed with Cyclopentadiene, cyclopentanone oxime, nitroaryl amines, hexalithium disilicide, phosphorous (III) oxide, and oxidizing agents such as chlorates, halogens, permanganates.

Special Remarks on Explosion Hazards:

Mixtures of sulfuric acid and any of the following can explode: p-nitrotoluene, pentasilver trihydroxydiaminophosphate, perchlorates, alcohols with strong hydrogen peroxide, ammonium tetraperoxychromate, mercuric nitrite, potassium chlorate, potassium permanganate with potassium chloride, carbides, nitro compounds, nitrates, carbides, phosphorous, iodides, picrates, fulminates, dienes, alcohols (when heated) Nitramide decomposes explosively on contact with concentrated sulfuric acid. 1,3,5-Trinitrosohexahydro-1,3,5-triazine + sulfuric acid causes explosive decomposition.

Section 6: Accidental Release Measures**Small Spill:**

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:

Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage**Precautions:**

Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, combustible materials, organic materials, metals, acids, alkalis, moisture. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

Storage:

Hygroscopic. Reacts violently with water. Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 23°C (73.4°F).

Section 8: Exposure Controls/Personal Protection**Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 1 STEL: 3 (mg/m³) [Australia] Inhalation TWA: 1 (mg/m³) from OSHA (PEL) [United States] Inhalation TWA: 1 STEL: 3 (mg/m³) from ACGIH (TLV) [United States] [1999] Inhalation TWA: 1 (mg/m³) from NIOSH [United States] Inhalation TWA: 1 (mg/m³) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Thick oily liquid.)

Odor: Odorless, but has a choking odor when hot.

Taste: Marked acid taste. (Strong.)

Molecular Weight: 98.08 g/mole

Color: Colorless.

pH (1% soln/water): Acidic.

Boiling Point:

270°C (518°F) - 340 deg. C Decomposes at 340 deg. C

Melting Point: -35°C (-31°F) to 10.36 deg. C (93% to 100% purity)

Critical Temperature: Not available.

Specific Gravity: 1.84 (Water = 1)

Vapor Pressure: Not available.

Vapor Density: 3.4 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility:

Easily soluble in cold water. Sulfuric is soluble in water with liberation of much heat. Soluble in ethyl alcohol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability:

Conditions to Avoid: Incompatible materials, excess heat, combustible material materials, organic materials, exposure to moist air or water, oxidizers, amines, bases. Always add the acid to water, never the reverse.

Incompatibility with various substances:

Reactive with oxidizing agents, reducing agents, combustible materials, organic materials, metals, acids, alkalis, moisture.

Corrosivity:

Extremely corrosive in presence of aluminum, of copper, of stainless steel(316). Highly corrosive in presence of stainless steel(304). Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Hygroscopic. Strong oxidizer. Reacts violently with water and alcohol especially when water is added to the product. Incompatible (can react explosively or dangerously) with the following: ACETIC ACID, ACRYLIC ACID, AMMONIUM HYDROXIDE, CRESOL, CUMENE, DICHLOROETHYL ETHER, ETHYLENE CYANOHYDRIN, ETHYLENEIMINE, NITRIC ACID, 2-NITROPROPANE, PROPYLENE OXIDE, SULFOLANE, VINYLIDENE CHLORIDE, DIETHYLENE GLYCOL MONOMETHYL ETHER, ETHYL ACETATE, ETHYLENE CYANOHYDRIN, ETHYLENE GLYCOL MONOETHYL ETHER ACETATE, GLYOXAL, METHYL ETHYL KETONE, dehydrating agents, organic materials, moisture (water), Acetic anhydride, Acetone, cyanohydrin, Acetone+nitric acid, Acetone + potassium dichromate, Acetonitrile, Acrolein, Acrylonitrile, Acrylonitrile +water, Alcohols + hydrogen peroxide, ally compounds such as Allyl alcohol, and Allyl Chloride, 2-Aminoethanol, Ammonium hydroxide, Ammonium triperchromate, Aniline, Bromate + metals, Bromine pentafluoride, n-Butyraldehyde, Carbides, Cesium acetylene carbide, Chlorates, Cyclopentanone oxime, chlorinates, Chlorates + metals, Chlorine trifluoride, Chlorosulfonic acid, 2-cyano-4-nitrobenzenediazonium hydrogen sulfate, Cuprous nitride, p-chloronitrobenzene, 1,5-Dinitronaphthlene +

sulfur, Diisobutylene, p-dimethylaminobenzaldehyde, 1,3-Diazidobenzene, Dimethylbenzylcarbinol + hydrogen peroxide, Epichlorohydrin, Ethyl alcohol + hydrogen peroxide, Ethylene diamine, Ethylene glycol and other glycols, , Ethylenimine, Fulminates, hydrogen peroxide, Hydrochloric acid, Hydrofluoric acid, Iodine heptafluoride, Indane + nitric acid, Iron, Isoprene, Lithium silicide, Mercuric nitride, Mesityl oxide, Mercury nitride, Metals (powdered), Nitromethane, Nitric acid + glycerides, p-Nitrotoluene, Pentasilver trihydroxydiaminophosphate, Perchlorates, Perchloric acid, Permanganates + benzene, 1-Phenyl-2-methylpropyl alcohol + hydrogen peroxide, Phosphorus, Phosphorus isocyanate, Picrates, Potassium tert-butoxide, Potassium chlorate, Potassium Permanganate and other permanganates, halogens, amines, Potassium Permanganate + Potassium chloride, Potassium Permanganate + water, Propiolactone (beta)-, Pyridine, Rubidium acetelyene carbide, Silver permanganate, Sodium, Sodium carbonate, sodium hydroxide, Steel, styrene monomer, toluene + nitric acid, Vinyl acetate, Thallium (I) azidodithiocarbonate, Zinc chlorate, Zinc Iodide, azides, carbonates, cyanides, sulfides, sulfites, alkali hydrides, carboxylic acid anhydrides, nitriles, olefinic organics, aqueous acids, cyclopentadiene, cyano-alcohols, metal acetylides, Hydrogen gas is generated by the action of the acid on most metals (i.e. lead, copper, tin, zinc, aluminum, etc.). Concentrated sulfuric acid oxidizes, dehydrates, or sulfonates most organic compounds.

Special Remarks on Corrosivity:

Non-corrosive to lead and mild steel, but dilute acid attacks most metals. Attacks many metals releasing hydrogen. Minor corrosive effect on bronze. No corrosion data on brass or zinc.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2140 mg/kg [Rat.]. Acute toxicity of the vapor (LC50): 320 mg/m3 2 hours [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified 1 (Proven for human.) by IARC, + (Proven.) by OSHA. Classified A2 (Suspected for human.) by ACGIH. May cause damage to the following organs: kidneys, lungs, heart, cardiovascular system, upper respiratory tract, eyes, teeth.

Other Toxic Effects on Humans:

Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (corrosive), of ingestion, .

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

Mutagenicity: Cytogenetic Analysis: Hamster, ovary = 4mmol/L Reproductive effects: May cause adverse reproductive effects based on animal data. Developmental abnormalities (musculoskeletal) in rabbits at a dose of 20 mg/m3 for 7 hrs.(RTECS) Teratogenecity: neither embryotoxic, fetotoxic, nor teratogenetic in mice or rabbits at inhaled doses producing some maternal toxicity

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes severe skin irritation and burns. Continued contact can cause tissue necrosis. Eye: Causes severe eye irritation and burns. May cause irreversible eye injury. Ingestion: Harmful if swallowed. May cause permanent damage to the digestive tract. Causes gastrointestinal tract burns. May cause perforation of the stomach, GI bleeding, edema of the glottis, necrosis and scarring, and sudden circulatory collapse(similar to acute inhalation). It may also cause systemic toxicity with acidosis. Inhalation: May cause severe irritation of the respiratory tract and mucous membranes with sore throat, coughing, shortness of breath, and delayed lung edema. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Cause corrosive action on mucous membranes. May affect cardiovascular system (hypotension, depressed cardiac output, bradycardia). Circulatory collapse with clammy skin, weak and rapid pulse, shallow respiration, and scanty urine may follow. Circulatory shock is often the immediate cause of death. May also affect teeth(changes in teeth and supporting structures - erosion, discoloration). Chronic Potential Health Effects: Inhalation: Prolonged or repeated inhalation may affect behavior (muscle contraction or spasticity), urinary system (kidney damage), and cardiovascular system, heart (ischemic heart leisons), and respiratory system/lungs(pulmonary edema, lung damage), teeth (dental discoloration, erosion). Skin: Prolonged or repeated skin contact may cause dermatitis, an allergic skin reaction.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 49 mg/l 48 hours [bluegill/sunfish].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Sulfuric acid may be placed in sealed container or absorbed in vermiculite, dry sand, earth, or a similar material. It may also be diluted and neutralized. Be sure to consult with local or regional authorities (waste regulators) prior to any disposal. Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Sulfuric acid UNNA: 1830 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Illinois toxic substances disclosure to employee act: Sulfuric acid New York release reporting list: Sulfuric acid Rhode Island RTK hazardous substances: Sulfuric acid Pennsylvania RTK: Sulfuric acid Minnesota: Sulfuric acid Massachusetts RTK: Sulfuric acid New Jersey: Sulfuric acid California Director's List of Hazardous Substances (8 CCR 339): Sulfuric acid Tennessee RTK: Sulfuric acid TSCA 8(b) inventory: Sulfuric acid SARA 302/304/311/312 extremely hazardous substances: Sulfuric acid SARA 313 toxic chemical notification and release reporting: Sulfuric acid CERCLA: Hazardous substances.: Sulfuric acid: 1000 lbs. (453.6 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):

R35- Causes severe burns. S2- Keep out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S30- Never add water to this product. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 2

Personal Protection:**National Fire Protection Association (U.S.A.):****Health:** 3**Flammability:** 0**Reactivity:** 2**Specific hazard:****Protective Equipment:**

Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information**References:**

-Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.

Other Special Considerations: Not available.**Created:** 10/09/2005 11:58 PM**Last Updated:** 06/09/2012 12:00 PM

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