MSDS – MATERIAL SAFETY DATA SHEET

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DIOXANE

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1. Product Identification

Synonyms: Diethylene dioxide; 1,4-dioxane; dioxyethylene ether; p-dioxane; Diethylene Ether
CAS No.: 123-91-1
Molecular Weight: 88.12
Chemical Formula: C4H8O2

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2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Dioxane	123-91-1	99 - 100%	Yes

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3. Hazards Identification

Emergency Overview

DANGER! TENDS TO FORM EXPLOSIVE PEROXIDES, ESPECIALLY WHEN ANHYDROUS. FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

SAFETY DATA Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Cancer)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Highly toxic by inhalation. Easily absorbed through lungs. Symptoms include irritation of the respiratory tract, headache, nausea, vomiting, dizziness, and narcosis. Can cause liver damage and brain and lung edema. Death may occur from kidney failure. Dioxane poisoning has poor warning properties.
Ingestion:
Sore throat, abdominal pain. Other symptoms parallel those from inhalation.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.
Eye Contact:
Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.
Chronic Exposure:
Prolonged exposure may cause central nervous system depression, loss of appetite, nausea, abdominal tenderness, and liver or kidney damage. Prolonged skin contact may cause dermatitis. Suspected human carcinogen based on animal data. Repeated inhalation exposures to low concentrations have been fatal.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Flash point: 12C (54F) CC
Autoignition temperature: 180C (356F)
Flammable limits in air % by volume:
lel: 2.0; uel: 22.0
Flammable.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Substance can explode when redistilled. Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. This highly flammable liquid must be kept from sparks, open flame, hot surfaces, and all sources of heat and ignition.

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6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response

Center is (800) 424-8802.

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7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from direct sunlight and any area where the fire hazard may be acute. Store in tightly closed containers (preferably under nitrogen atmosphere). Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Separate from oxidizing materials. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment. Protect from freezing. Before using bulk quantities of this material, test for presence of explosive peroxides. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA) skin
-ACGIH Threshold Limit Value (TLV):
20 ppm (TWA) skin, A3 - Animal Carcinogen
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has questionable warning properties.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Nitrile is recommended as a suitable material for personal protective equipment.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:
Clear, colorless solution.
Odor:
Faint ether-like odor.
Solubility:
Soluble
Specific Gravity:
1.03 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
101C (214F)
Melting Point:
11.8C (54F)
Vapor Density (Air=1):
3.03
Vapor Pressure (mm Hg):
27 @ 20C (68F)
Evaporation Rate (BuAc=1):
2.7

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10. Stability and Reactivity

Stability:
Stable in closed containers under nitrogen at room temperature. Anhydrous dioxane slowly reacts with atmospheric oxygen to form explosive peroxides. If these peroxides are concentrated by evaporation or distillation, there exists a serious risk of explosion.
Hazardous Decomposition Products:
Reacts with air to form explosive peroxides under certain conditions; exposure to sunlight accelerates this formation. Decomposes to carbon monoxide.

Hazardous Polymerization:
Will not occur.
Incompatibilities:
Silver perchlorate, oxidizing agents, sulfur trioxide. Dioxane may react with hydrogen in the presence of Raney nickel above 210C (410F).
Conditions to Avoid:
Heat, flame, ignition sources, incompatibles, air, sunlight.

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11. Toxicological Information

Oral rat LD50:4200 mg/kg; inhalation rat LC50: 46 gm/m3/2H; skin rabbit LD50: 7600 mg/kg; investigated as a mutagen, tumorigen, reproductive effector.

--------\Cancer Lists\----------

	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
Dioxane (123-91-1)	No	Yes	2B

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12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into water, this material is not expected to biodegrade. When released into water, this material may evaporate to a moderate extent. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day.
Environmental Toxicity:
This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l.

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13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

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14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, DIOXANE
Hazard Class: 3
UN/NA: UN1165
Packing Group: II
Information reported for product/size: 2.5L

International (Water, I.M.O.)

Proper Shipping Name: DIOXANE
Hazard Class: 3
UN/NA: UN1165
Packing Group: II
Information reported for product/size: 2.5L

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15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Dioxane (123-91-1)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

		--Canada--		
Ingredient	Korea	DSL	NDSL	Phil.
Dioxane (123-91-1)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

	-SARA 302-		------SARA 313------	
Ingredient	RQ	TPQ	List	Chemical Catg.
Dioxane (123-91-1)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------

		-RCRA-	-TSCA-
Ingredient	CERCLA	261.33	8(d)
Dioxane (123-91-1)	100	U108	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: Yes (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2SE
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **1**
Label Hazard Warning:
DANGER! TENDS TO FORM EXPLOSIVE PEROXIDES, ESPECIALLY WHEN ANHYDROUS. FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.
Label Precautions:
Wash thoroughly after handling.
Do not breathe vapor.
Keep container tightly closed.
Use only with adequate ventilation.
Do not get in eyes, on skin, or on clothing.
Keep away from heat, sparks and flame.
Do not evaporate to dryness unless absence of peroxides has been shown.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.
Product Use:
Laboratory Reagent.

Revision Information: No Changes.
Disclaimer:
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