Material Safety Data Sheet
1,4-Dioxane, anhydrous, 99.0%, OptiDry

ACC# 26970

Section 1 - Chemical Product and Company Identification

MSDS Name: 1,4-Dioxane, anhydrous, 99.0%, OptiDry
Catalog Numbers: AC408810000, AC408810010, AC408810030, AC408810200, AC408815000, BP2611-100, D111-4, D111-500, D111POP19, D116-200, D116-4, D117-1, D117POP19, D117POP200, D117POP50, D117RS-19, D117RS-200, D117RS-50, D117SS-19, D117SS-200, D117SS-50, D56S-4, NC9969921
Synonyms: p-Dioxane; Diethylene ether; Diethylene dioxide; Diox; Glycol ethylene ether.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
123-91-1	1,4-Dioxane	>99	204-661-8

Hazard Symbols: XN F
Risk Phrases: 11 19 36/37 40 66

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 12 deg C. **Warning! Flammable liquid and vapor.** May form explosive peroxides. Hygroscopic. Causes eye irritation. Causes respiratory tract irritation. Prolonged or repeated contact causes defatting of the skin with irritation, dryness, and cracking. May be harmful if absorbed through the skin. May cause cancer based on animal studies.
Target Organs: Kidneys, liver, respiratory system, eyes, skin.

Potential Health Effects

Eye: Causes eye irritation.
Skin: May cause skin irritation. May be absorbed through the skin in harmful amounts. Prolonged and/or repeated contact may cause irritation and/or dermatitis. Studies in which dioxane was applied to the skin of rabbits and guinea pigs demonstrated that dioxane was rapidly absorbed and resulted in s igns of incoordination and narcosis. Microscopically, renal and hepati c lesions (cellular degeneration) were observed.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure.
Inhalation: Effects may be delayed. Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. Inhalation of vapor may cause severe respiratory tract irritation. Olfactory fatigue may occur.
Chronic: May cause liver and kidney damage. May cause cancer according to animal studies.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: Possible aspiration hazard. If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. May form explosive peroxides. May accumulate static electrical charges, and may cause ignition of its own vapors. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or alcohol-resistant foam.
Flash Point: 12 deg C (53.60 deg F)
Autoignition Temperature: 180 deg C (356.00 deg F)
Explosion Limits, Lower:2.0%
Upper: 22.0%
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 1

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Use a spark-proof tool. Flush spill area with water. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use spark-proof tools and explosion proof equipment. Loosen closure cautiously before opening. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Take precautionary measures against static discharges. If peroxide formation is suspected, do not open or move container. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Avoid breathing vapor or mist.
Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area. After opening, purge container with nitrogen before reclosing. Periodically test for peroxide formation on long-term storage. Addition of water or appropriate reducing materials will lessen peroxide formation. Containers should be dated when opened and tested periodically for the presence of peroxides. Should crystals form in a peroxidizable liquid, peroxidation may have occurred and the product should be considered extremely dangerous. In this instance, the container should only be opened remotely by professionals. All peroxidizable substances should be stored away from heat and light and be protected from ignition sources.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
1,4-Dioxane	20 ppm TWA; skin - potential for cutaneous absorption	NIOSH Potential Occupational Carcinogen - see Appendix A Potential NIOSH carcinogen.	100 ppm TWA; 360 mg/m3

OSHA Vacated PELs: 1,4-Dioxane: 25 ppm TWA; 90 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear chemical goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear nitrile-latex gloves, apron, and/or clothing. Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR §1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: ethereal odor
pH: Not available.
Vapor Pressure: 29 mm Hg @ 20 deg C
Vapor Density: 3 (air=1)
Evaporation Rate:5.8 (diethylether=1)
Viscosity: 0.012cP @ 25 deg C
Boiling Point: 101 deg C
Freezing/Melting Point:12 deg C
Decomposition Temperature: Not available.
Solubility: Soluble.
Specific Gravity/Density:1.0300 g/cm3
Molecular Formula:C4H8O2
Molecular Weight:88.11

Section 10 - Stability and Reactivity

Chemical Stability: Prolonged exposure to air and sunlight may form unstable peroxides. Tends to form explosive peroxides; especially when anhydrous. Under normal storage conditions, peroxidizable compounds can form and accumulate peroxides which may explode when subjected to heat or shock. This material is most hazardous when peroxide levels are concentrated by distillation or evaporation.
Conditions to Avoid: Light, ignition sources, excess heat, electrical sparks.
Incompatibilities with Other Materials: Strong oxidizing agents, strong acids.
Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization: Has not been reported

Section 11 - Toxicological Information

RTECS#:
CAS# 123-91-1: JG8225000
LD50/LC50:
CAS# 123-91-1:
Draize test, rabbit, eye: 100 mg Severe;
Draize test, rabbit, eye: 100 mg/24H Moderate;
Inhalation, mouse: LC50 = 37 gm/m3/2H;
Inhalation, rat: LC50 = 46 gm/m3/2H;
Oral, mouse: LD50 = 5300 mg/kg;
Oral, rabbit: LD50 = 2 gm/kg;
Oral, rat: LD50 = 4200 mg/kg;

Skin, rabbit: LD50 = 7600 uL/kg;
Carcinogenicity:
CAS# 123-91-1:
ACGIH: A3 - Animal Carcinogen
California: carcinogen; initial date 1/1/88
NIOSH: occupational carcinogen
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2B carcinogen
Epidemiology: In view of the rodent liver & lung tumors at or near the 10 000-ppm dietary level & the lack of such findings at inhal ation exposure concentrations slightly above 100 ppm f or 2 yrs, dioxane has been judged an animal carcinogen o f such low potency as to be of no practical significan ce as an occupational carcinogen. This conclusion is support ed by the results of published epidemiologic evaluations of workers exposed to 1,4-dioxane for up to 50 years.
Teratogenicity: See actual entry in RTECS for complete information.
Reproductive Effects: No information available.
Neurotoxicity: Dioxane at a concentration of 470 ppm caused convulsions or changes in the seizure threshold.
Mutagenicity: See actual entry in RTECS for complete information.
Other Studies: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity: Fish: Bluegill/Sunfish: LC50 = >10,000mg/L; 96 Hr.; Static conditions, 23 degrees C flea Daphnia: EC50 =163 mg/L; 48 Hr.; Static Condition, 20-21 degrees C No data available.
Environmental: Terrestrial: Mobile in soil and will leach into groundwater. Aquatic: Will not hydrolyze but may volatilize. Atmospheric: Half-life 7-9.6 hours. The reaction products of ethers with hydroxyl radicals are aldehydes and ketones. Resistant to biodegradation. Will not bioconcentrate.
Physical: ATMOSPHERIC FATE: The half-life of the reaction of 1,4-dioxane with photochemically produced hydroxyl radicals in the atmosphere was estimated to be 6.69 to 9.6 hr. Experimental results of sunlight irradiated mixtures of dioxane/NO suggest similiar half-lives. The products of the reaction of ethers with hydroxyl radicals are likely to be aldehydes and ketones.
Other: 1,4-Dioxane has been found to be resistant to biodegradation and has been classified as relatively undegradable. 1,4-Dioxane, therefore, is not expected to biodegrade rapidly in the environment.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 123-91-1: waste number U108.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	No information available.				No information available.
Hazard Class:					
UN Number:					
Packing Group:					

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 123-91-1 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

Section 302 (RQ)
CAS# 123-91-1: final RQ = 100 pounds (45.4 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 123-91-1: chronic, flammable.
Section 313
This material contains 1,4-Dioxane (CAS# 123-91-1, 99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 123-91-1 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 123-91-1 can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains 1,4-Dioxane, a chemical known to the state of California to cause cancer. California No Significant Risk Level: CAS# 123-91-1: no significant risk level = 30 ug/day

European / International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
XN F
Risk Phrases:
R 11 Highly flammable.
R 19 May form explosive peroxides.
R 36/37 Irritating to eyes and respiratory system.
R 40 Limited evidence of a carcinogenic effect.
R 66 Repeated exposure may cause skin dryness or cracking.

Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 36/37 Wear suitable protective clothing and gloves.
S 46 If swallowed, seek medical advice immediately and show this container or label.
S 9 Keep container in a well-ventilated place.

WGK (Water Danger/Protection)
CAS# 123-91-1: 2
Canada - DSL/NDSL
CAS# 123-91-1 is listed on Canada's DSL List.
Canada - WHMIS
This product has a WHMIS classification of B2, D2A, D2B.

Canadian Ingredient Disclosure List
CAS# 123-91-1 is listed on the Canadian Ingredient Disclosure List.
Exposure Limits
CAS# 123-91-1: OEL-AUSTRALIA:TWA 25 ppm (90 mg/m3);Skin OEL-AUSTRIA :TWA 50 ppm (180 mg/m3);Skin OEL-BELGIUM:TWA 25 ppm (90 mg/m3);Skin OEL-DENMARK:TWA 10 ppm (36 mg/m3);Skin OEL-FINLAND:TWA 25 ppm (90 mg/m3);STEL 40 ppm (13 mg/m3);Skin OEL-FRANCE:TWA 10 ppm (35 mg/m3);STEL 40 ppm (140 mg/m3);CAR OEL-GERMANY:TWA 50 ppm (180 mg/m3);Skin;Carcinoge OEL-HUNGARY:STEL 10 mg/m3;Skin;Carcinogen OEL-JAPAN:TWA 10 ppm (36 mg/m3);Skin;Carcinogen OEL-THE NETHERLANDS:TWA 50 ppm (180 mg/m3) ;Skin OEL-THE PHILIPPINES:TWA 100 ppm (360 mg/m3);Skin OEL-POLAND:TWA 10 mg/m3 OEL-RUSSIA:TWA 10 ppm;STEL 10 mg/m3;Skin OEL-SWEDEN:TWA 25 ppm (90 mg/m3);STEL 50 ppm;Skin;CAR OEL-SWITZERLAND:TWA 25 ppm (90 mg/m3);STEL 50 ppm;Skin OEL-TURKEY:TWA 100 ppm (360 mg/m3);Skin OEL-UNITED KINGDOM:TWA 25 ppm (90 mg/m3);STEL 100 ppm;Skin OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 6/16/1999
Revision #6 Date: 7/23/2002