

# Material Safety Data Sheet

## Acetonitrile

ACC# 00170

### Section 1 - Chemical Product and Company Identification

**MSDS Name:** Acetonitrile

**Catalog Numbers:** AC149520000, AC149520010, AC149520025, AC149520050, AC149520250, AC149525000, AC167650000, AC258560000, AC258560010, AC258560025, AC258560051, AC268260000, AC268260010, AC268270000, AC268270010, AC325730000, AC325730010, AC325730025, AC326680000, AC326680010, AC326680025, AC326750000, AC326750010, AC326750025, AC326810000, AC326810010, AC326811000, AC326812500, AC364310000, AC364310010, AC364311000, AC364315000, AC400130000, AC400132500, AC423250000, AC423250010, AC423255000, AC610130040, AC61022019, AC61022019, AC61022050, AC61022115, AC61022115, AC61022200, AC61022200, AC610500190, AC610500500, AC610501150, AC610502000, AC610700190, AC610700500, AC610701150, AC610702000, 16765-0010, 16765-2500, 26826-0025, 26827-0025, 26827-0040, 61001-0040, 61022-0010, 61022-1000, 61096-1000, 61110-0500, 61514-0025, A21-1, A21-20, A21-200, A21-4, A21200LC, A21FB115, A21FB19, A21FB200, A21FB50, A21RB115, A21RS-50, A21RS115, A21RS19, A21RS200, A21RS28, A955-1, A955-4, A9931, A993RS-19, A996-1, A996-4, A9964LC, A996J1, A996N2-19, A996RS-115, A996RS-200, A996RS-28, A996RS-50, A996SK-4, A996SS-115, A996SS-19, A996SS-200, A996SS28, A996SS50, A998-1, A998-212, A998-4, A99818, A9984LC, A998J1, A998N1-19, A998N2-19, A998POP-50, A998RS-115, A998RS-19, A998RS-200, A998RS-28, A998RS-50, A998SK-1, A998SK-4, A998SS-115, A998SS-200, A998SS-28, A998SS-50, A999-4, BP1165-50, BP1170-4, BP1170-450, BP1170N1-19, BP1170N2-19, BP1170POP-200, BP1170POP-50, BP1170POP20, BP1170RS-115, BP1170RS-1350, BP1170RS-19, BP1170RS-200, BP1170RS-28, BP1170RS-50, BP1170SS-115, BP1170SS-1350, BP1170SS-200, BP1170SS-30, BP1170SS-50, BP2405-1, BP2405-4, BP2405SK-1, BP2405SK-4, BP2600-100, NC9173153, NC9229342, NC9234885, NC9239862, NC9445091, NC9574352, NC9585208, NC9638863, NC9647795, NC9677816, NC9708859, O1034-500, PS03490, PS03491

**Synonyms:** Cyanomethane; Ethanenitrile; Ethyl nitrile; Methyl cyanide; Methanecarbonitrile.

**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
75-05-8	Acetonitrile	100	200-835-2

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 2 deg C.

**Warning! Flammable liquid and vapor.** Causes eye irritation. May be harmful if swallowed, inhaled, or absorbed through the skin. May cause skin and respiratory tract irritation. Metabolized to cyanide in the body, which may cause headache, dizziness, weakness, unconsciousness, convulsions, coma and possible death. May cause liver and kidney damage.

**Target Organs:** Kidneys, central nervous system, liver, respiratory system, cardiovascular system, eyes.

#### Potential Health Effects

**Eye:** Causes eye irritation. Lachrymator (substance which increases the flow of tears). May produce superficial reversible injury.

**Skin:** Causes mild skin irritation. If absorbed, causes symptoms similar to those of inhalation. May be harmful if absorbed through the skin. May be metabolized to cyanide which in turn acts by inhibiting cytochrome oxidase impairing cellular respiration. A Skin notation is recommended based upon the case report of child poisoning from dermal contact. A LD50 >2000 mg/kg was obtained in a well-conducted acute dermal toxicity study in rabbits.

**Ingestion:** May cause tissue anoxia, characterized by weakness, headache, dizziness, confusion, cyanosis (bluish skin due to deficient oxygenation of the blood), weak and irregular heart beat, collapse, unconsciousness, convulsions, coma and death. Metabolism may release cyanide, which may result in headache, dizziness, weakness, collapse, unconsciousness and possible death. Different animal species and individuals of the same species varied widely in susceptibility to acetonitrile in single-dose toxicity studies by various routes. The range of oral LD50 values for acetonitrile in mammals is between 140 - 6762 mg/kg body weight. Mouse and guinea pig seem to be the most sensitive species. In a well-conducted study in mice, the oral LD50 of acetonitrile was calculated to be 617 mg/kg.

**Inhalation:** May cause respiratory tract irritation. May cause lung damage. May be harmful if inhaled. Acetonitrile breaks down slowly in the body to release the cyanide ion. Exposure to very high concentrations of acetonitrile can result in cyanide poisoning. Symptoms are usually delayed several hours after exposure. Early symptoms include weakness, headache, giddiness, dizziness, confusion, anxiety, nausea and vomiting. In severe cases, breathing is rapid, then becomes slow and gasping. The victim may feel an irregular heart beat and tightness in the chest.

**Chronic:** May be metabolized to cyanide which in turn acts by inhibiting cytochrome oxidase impairing cellular respiration. Exposure to small amounts of cyanide compounds over long periods of time is reported to cause loss of appetite, headache, weakness, nausea, dizziness, and symptoms of irritation of the upper respiratory tract and eyes. Animal studies indicate that the product may affect the liver and kidneys. Animal evidence for acetonitrile and other cyanide compounds clearly indicates that toxic effects would be expected in the fetus at exposure levels which are toxic to the

## 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, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

**Ingestion:** 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:** Exposure should be treated as a cyanide poisoning. Effects may be delayed. For methemoglobinemia, administer oxygen alone or with Methylene Blue depending on the methemoglobin concentration in the blood. May be partially metabolized to cyanide in the body.

**Antidote:** Always have a cyanide antidote kit on hand when working with cyanide compounds. Get medical advice to use. Methylene blue, alone or in combination with oxygen is indicated as a treatment in nitrite induced methemoglobinemia.

## 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. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. 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 appropriate foam.

**Flash Point:** 2 deg C ( 35.60 deg F)

**Autoignition Temperature:** 524 deg C ( 975.20 deg F)

**Explosion Limits, Lower:** 3.0 vol %

**Upper:** 16.00 vol %

**NFPA Rating:** (estimated) Health: 2; Flammability: 3; Instability: 0

## 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. Remove all sources of ignition. Provide ventilation. Evacuate unnecessary personnel. Approach spill from upwind.

## Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. 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:** Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area. Store protected from moisture.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use explosion-proof ventilation equipment. 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
Acetonitrile	20 ppm TWA; Skin - potential significant contribution to overall exposure by the cutaneous route	20 ppm TWA; 34 mg/m <sup>3</sup> TWA 500 ppm IDLH	40 ppm TWA; 70 mg/m <sup>3</sup> TWA

**OSHA Vacated PELs:** Acetonitrile: 40 ppm TWA; 70 mg/m<sup>3</sup> TWA

### Personal Protective Equipment

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**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 respirator use.

## Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** clear, colorless

**Odor:** sweetish odor - ethereal odor  
**pH:** Not available.  
**Vapor Pressure:** 88.8 mm Hg @ 25 deg C  
**Vapor Density:** 1.42 (air=1)  
**Evaporation Rate:**5.79 (Butyl acetate=1)  
**Viscosity:** 0.36 cP 20 deg C  
**Boiling Point:** 81.6 deg C @ 760 mmHg  
**Freezing/Melting Point:**-45 deg C  
**Decomposition Temperature:**> 500 deg C  
**Solubility:** Soluble.  
**Specific Gravity/Density:**.7810g/cm3  
**Molecular Formula:**C2H3N  
**Molecular Weight:**41.05

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.  
**Conditions to Avoid:** Ignition sources, excess heat, exposure to moist air or water.  
**Incompatibilities with Other Materials:** Strong oxidizing agents, strong reducing agents, strong acids.  
**Hazardous Decomposition Products:** Hydrogen cyanide, nitrogen oxides, carbon monoxide, carbon dioxide.  
**Hazardous Polymerization:** Will not occur.

## Section 11 - Toxicological Information

**RTECS#:**

**CAS#** 75-05-8: AL7700000

**LD50/LC50:**

CAS# 75-05-8:

Draize test, rabbit, eye: 100 uL/24H Moderate;  
Inhalation, mouse: LC50 = 2693 ppm/1H;  
Inhalation, rabbit: LC50 = 2828 ppm/4H;  
Inhalation, rat: LC50 = 7551 ppm/8H;  
Oral, mouse: LD50 = 269 mg/kg;  
Oral, rabbit: LD50 = 50 mg/kg;  
Oral, rat: LD50 = 2460 mg/kg;  
Skin, rabbit: LD50 = >2 gm/kg;

In a well-conducted study in mice, the oral LD50 of acetonitrile was calculated to be 617 mg/kg.

**Carcinogenicity:**

CAS# 75-05-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** Three volunteers were exposed for 4 hours at 40, 80, or 160 ppm

acetonitrile. At 40 ppm, odor was detected, after which olfactory fatigue was noted. At this concentration, 2 persons had no signs of response, including no appreciable blood or urinary cyanide or thiocyanate. The third person experienced slight tightness in the chest that evening. A sensation of cooling in the lungs was observed and persisted for 24 hours. Traces of urinary thiocyanate were recorded.

**Teratogenicity:** In most of the available assays, teratogenicity was associated with maternal toxicity. In a well-conducted study, rats exposed by inhalation to acetonitrile did not result in significant fetal effects, even at concentrations which were overtly toxic to the dam. In this study, a maternal NOAEL of 1200 ppm and NOAEL of 1200 ppm with respect to developmental toxicity were established. A case-control study of pregnancy outcome among Finnish lab workers revealed no association between exposure to acetonitrile and increased risk of spontaneous abortion in mothers, or malformation and birth weight in their children.

**Reproductive Effects:** In relation to fertility, there is no information available in humans and there are no animal studies specifically investigating such effects. However, no changes were seen in weight of the right cauda or right testis and no effect on sperm motility in rats or mice exposed for 13 weeks with 100, 200 and 400 ppm to acetonitrile.

**Mutagenicity:** See actual entry in RTECS for complete information.

**Neurotoxicity:** No information available.

**Other Studies:**

## Section 12 - Ecological Information

**Ecotoxicity:** Fish: Fathead Minnow: 1150 ppm; 24 Hr; TLm (hard water) Fish: Fathead Minnow: 1000 mg/L; 96 Hr; TLm (soft water) Fish: Bluegill/Sunfish: 1850 mg/L; 96 Hr; TLm (soft water) Fish: Fathead Minnow: 1640 mg/L; 96 Hr; LC50 (flow-bioassay) Fish: Fathead Minnow: 1640 mg/L; 96 Hr; EC50 (flow-bioassay) No data available.

**Environmental:** Estimated Koc value = 16. Acetonitrile is expected to weakly adsorb to most soils based on the Koc value. Volatilization from soil surfaces and leaching into ground water is expected to be significant. Estimated BCF value = 0.3. This value indicates that acetonitrile will not significantly bioconcentrate in aquatic organisms or adsorb to suspended solids and sediments in water. Acetonitrile is unreactive towards photochemically-generated free radicals and direct photolysis in the gaseous phase.

**Physical:** No information available.

**Other:** Biodegradable.

## 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# 75-05-8: waste number U003 (Ignitable waste, Toxic waste).

## Section 14 - Transport Information

	US DOT	Canada TDG
<b>Shipping Name:</b>	ACETONITRILE	ACETONITRILE
<b>Hazard Class:</b>	3	3
<b>UN Number:</b>	UN1648	UN1648
<b>Packing Group:</b>	II	II
<b>Additional Info:</b>		FLASHPOINT 6 C

## Section 15 - Regulatory Information

### US FEDERAL

#### TSCA

CAS# 75-05-8 is listed on the TSCA inventory.

#### Health & Safety Reporting List

CAS# 75-05-8: Effective 10/4/82, Sunset 10/4/92

#### Chemical Test Rules

CAS# 75-05-8: 40 CFR 799.5115

#### Section 12b

CAS# 75-05-8: Section 4, 1 % de minimus concentration

#### TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

#### CERCLA Hazardous Substances and corresponding RQs

CAS# 75-05-8: 5000 lb final RQ; 2270 kg final RQ

#### SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

#### SARA Codes

CAS # 75-05-8: immediate, delayed, fire.

#### Section 313

This material contains Acetonitrile (CAS# 75-05-8, 100%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

#### Clean Air Act:

CAS# 75-05-8 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# 75-05-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

**California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**

XN F

**Risk Phrases:**

R 11 Highly flammable.

R 20/21/22 Harmful by inhalation, in contact with skin and if swallowed.

R 36 Irritating to eyes.

**Safety Phrases:**

S 16 Keep away from sources of ignition - No smoking.

S 36/37 Wear suitable protective clothing and gloves.

**WGK (Water Danger/Protection)**

CAS# 75-05-8: 2

**Canada - DSL/NDSL**

CAS# 75-05-8 is listed on Canada's DSL List.

**Canada - WHMIS**

This product has a WHMIS classification of B2, D1B, D2B.

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

**Canadian Ingredient Disclosure List**

CAS# 75-05-8 is listed on the Canadian Ingredient Disclosure List.

# Material Safety Data Sheet

## Cyclohexane

ACC# 05870

### Section 1 - Chemical Product and Company Identification

**MSDS Name:** Cyclohexane

**Catalog Numbers:** AC111110000, AC111110010, AC111110025, AC111110050, AC111110100, AC111110250, AC167740000, AC167740010, AC167740025, AC167745000, AC176810000, AC176810010, AC176810025, AC176810050, AC176810250, AC176815000, AC210570000, AC210570010, AC210570025, AC279590000, AC279590010, AC279590025,



AC326590000, AC326590010, AC326590025, AC326830000, AC326831000, AC326832500, AC364660000, AC364660010, AC364661000, AC406020000, AC406025000, AC610040040, AC610150040, AC610291000, S79990, S79990-1, S93227, S93228, S93327A, S93328A, C553-4, C555-1, C555-4, C556-1, C556-4, C556-500, C620-1, C620-4, C620SK-1, C620SK-4, O2093-20, O2093-4

**Synonyms:** Benzene hexahydride; Hexahydrobenzene; Hexamethylene.

**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
110-82-7	Cyclohexane	>99	203-806-2

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Appearance: colorless liquid. Flash Point: -20 deg C.

**Danger!** Extremely flammable liquid and vapor. Vapor may cause flash fire. Breathing vapors may cause drowsiness and dizziness. Causes skin irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. May cause eye and respiratory tract irritation.

**Target Organs:** Central nervous system, skin.

#### Potential Health Effects

**Eye:** May cause mild eye irritation. Vapors may cause eye irritation.

**Skin:** May cause irritation with burning pain, itching and redness. Not expected to cause an allergic skin reaction. A single prolonged skin exposure is not likely to result in the material being absorbed in harmful amounts.

**Ingestion:** Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal. May cause central nervous system depression.

**Inhalation:** May cause respiratory tract irritation. Inhalation of vapors may cause drowsiness and dizziness.

**Chronic:** Prolonged or repeated skin contact may cause defatting and dermatitis.

## 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:** Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.

**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. Liquid will float and may reignite on the surface of water. Extremely flammable liquid and vapor. Vapor may cause flash fire. 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:** Water may be ineffective. This material is lighter than water and insoluble in water. The fire could easily be spread by the use of water in an area where the water cannot be contained. Do NOT use straight streams of water. For large fires, use water spray, fog or regular foam. For small fires, use dry chemical, carbon dioxide, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out.

**Flash Point:** -20 deg C ( -4.00 deg F)

**Autoignition Temperature:** 245 deg C ( 473.00 deg F)

**Explosion Limits, Lower:** 1.3

**Upper:** 8.0

**NFPA Rating:** (estimated) Health: 1; Flammability: 3; Instability: 0

## 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. Remove all sources of ignition. Provide ventilation.

## Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. 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.

**Storage:** Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

## 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
Cyclohexane	100 ppm TWA	300 ppm TWA; 1050 mg/m <sup>3</sup> TWA 1300 ppm IDLH	300 ppm TWA; 1050 mg/m <sup>3</sup> TWA

**OSHA Vacated PELs:** Cyclohexane: 300 ppm TWA; 1050 mg/m<sup>3</sup> TWA

### Personal Protective Equipment

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear appropriate gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

## Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** colorless

**Odor:** sweetish odor - chloroform-like

**pH:** Not available.

**Vapor Pressure:** 96.9 mm Hg @ 25 deg C

**Vapor Density:** 2.90 (air=1)  
**Evaporation Rate:**6.1 (Butyl acetate=1)  
**Viscosity:** 1.02 cP @ 17 deg C  
**Boiling Point:** 80.7 deg C  
**Freezing/Melting Point:**6.5 deg C  
**Decomposition Temperature:**Not available.  
**Solubility:** Practically insoluble in water.  
**Specific Gravity/Density:**0.77 (Water=1)  
**Molecular Formula:**C6H12  
**Molecular Weight:**84.15

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions.

**Conditions to Avoid:** Ignition sources, excess heat, confined spaces.

**Incompatibilities with Other Materials:** Strong oxidizing agents, nitrogen dioxide.

**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide.

**Hazardous Polymerization:** Has not been reported.

## Section 11 - Toxicological Information

**RTECS#:**

**CAS#** 110-82-7: GU6300000

**LD50/LC50:**

CAS# 110-82-7:

Draize test, rabbit, skin: 1548 mg/2D (Intermittent);

Inhalation, mouse: LC50 = 70000 mg/m<sup>3</sup>/2H;

Oral, mouse: LD50 = 813 mg/kg;

Oral, rat: LD50 = 12705 mg/kg;

**Carcinogenicity:**

CAS# 110-82-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information available.

**Teratogenicity:** No information available.

**Reproductive Effects:** No information available.

**Mutagenicity:** No data available.

**Neurotoxicity:** No information available.

**Other Studies:**

## Section 12 - Ecological Information

**Ecotoxicity:** Fish: Fathead Minnow: LC50 = 117.0 mg/L; 96 Hr.; Static conditions Fish: Bluegill/Sunfish: LC50 = 34.72 mg/L; 96 Hr.; 25 degrees C Water flea Daphnia: EC50 = 400.00 mg/L; 48 Hr.; Unspecified Bacteria: Phytobacterium phosphoreum: EC50 = 227.00 mg/L; 5, 30 minutes; Microtox test No data available.

**Environmental:** Atmospheric Fate: Cyclohexane is expected to partition to the atmosphere where it will rapidly react with hydroxyl radicals. TERRESTRIAL FATE: If released on land, cyclohexane will be lost through volatilization and should leach into the ground. Cyclohexane is resistant to biodegradation but may biodegrade slowly in the presence of other hydrocarbons that are themselves degraded. AQUATIC FATE: Volatilization from water (estimated half-life 2 hr in a model river) should be the most important fate process occurring in aquatic systems.

**Physical:** ATMOSPHERIC FATE: In the atmosphere, cyclohexane will degrade by reaction with photochemically produced hydroxyl radicals (half-life 52 hr). The half-life is much faster under photochemical smog conditions with half-lives as low as 6 hr being reported.

**Other:** No experimental data are available on the bioconcentration of cyclohexane in aquatic organisms. Using the octanol/water partition coefficient, 3.44, one can estimate a BCF of 242 using a recommended regression equation.

## 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# 110-82-7: waste number U056 (Ignitable waste).

## Section 14 - Transport Information

	US DOT	Canada TDG
<b>Shipping Name:</b>	CYCLOHEXANE	CYCLOHEXANE
<b>Hazard Class:</b>	3	3
<b>UN Number:</b>	UN1145	UN1145
<b>Packing Group:</b>	II	II

## Section 15 - Regulatory Information

## **US FEDERAL**

### **TSCA**

CAS# 110-82-7 is listed on the TSCA inventory.

### **Health & Safety Reporting List**

CAS# 110-82-7: Effective 12/19/85, Sunset 12/19/95

### **Chemical Test Rules**

CAS# 110-82-7: 40 CFR 799.5000

### **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.

### **CERCLA Hazardous Substances and corresponding RQs**

CAS# 110-82-7: 1000 lb final RQ; 454 kg final RQ

### **SARA Section 302 Extremely Hazardous Substances**

None of the chemicals in this product have a TPQ.

### **SARA Codes**

CAS # 110-82-7: immediate, delayed, fire.

### **Section 313**

This material contains Cyclohexane (CAS# 110-82-7, >99%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

### **Clean Air Act:**

This material does not contain any hazardous air pollutants.

This material does not contain any Class 1 Ozone depleters.

This material does not contain any Class 2 Ozone depleters.

### **Clean Water Act:**

CAS# 110-82-7 is listed as a Hazardous Substance 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# 110-82-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

### **California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

## **European/International Regulations**

### **European Labeling in Accordance with EC Directives**

#### **Hazard Symbols:**

XN F N

#### **Risk Phrases:**

R 11 Highly flammable.

R 38 Irritating to skin.

R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

R 65 Harmful: may cause lung damage if swallowed.

R 67 Vapours may cause drowsiness and dizziness.

**Safety Phrases:**

- S 16 Keep away from sources of ignition - No smoking.
- S 25 Avoid contact with eyes.
- S 33 Take precautionary measures against static discharges.
- S 9 Keep container in a well-ventilated place.
- S 60 This material and its container must be disposed of as hazardous waste.
- S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.
- S 62 If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

**WGK (Water Danger/Protection)**

CAS# 110-82-7: 1

**Canada - DSL/NDSL**

CAS# 110-82-7 is listed on Canada's DSL List.

**Canada - WHMIS**

This product has a WHMIS classification of B2.

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

**Canadian Ingredient Disclosure List**

CAS# 110-82-7 is listed on the Canadian Ingredient Disclosure List.

# Material Safety Data Sheet

## Hexanes

ACC# 89589

### Section 1 - Chemical Product and Company Identification

**MSDS Name:** Hexanes

**Catalog Numbers:** AC168570000, AC168570025, AC168575000, AC176660000, AC176660010, AC176660025 AC176660025, AC176660051, AC210590000, AC210590010, AC210590025, AC210590050 AC210590050, AC268360000, AC268360010, AC268360025, AC390740000, AC390740010 AC390740010, AC390740025, AC411540000, AC411540010, AC411540020, AC411550000 AC411550000, AC411555000, AC423760000, AC423760010, AC423765000, AC610070040 AC610070040, AC610180040, AC610371000

**Synonyms:** Hexane isomers, mostly n-hexane.

**Company Identification:**

Acros Organics N.V.  
One Reagent Lane  
Fair Lawn, NJ 07410

**For information in North America, call:** 800-ACROS-01

**For emergencies in the US, call CHEMTREC:** 800-424-9300

### Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
110-54-3	Hexane	86.1	203-777-6
96-37-7	Methylcyclopentane	9.7	202-503-2
96-14-0	3-Methylpentane	4.2	202-481-4

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Appearance: clear colorless liquid. Flash Point: -22 deg C.

**Danger!** Extremely flammable liquid and vapor. Vapor may cause flash fire. Breathing vapors may cause drowsiness and dizziness. Causes eye, skin, and respiratory tract irritation. May be harmful if absorbed through the skin. Aspiration hazard if swallowed. Can enter lungs and cause damage. Possible risk of impaired fertility. Long-term exposure may cause damage to the nervous system of the extremities (the hands, arms, legs and feet). Dangerous for the environment.

**Target Organs:** Central nervous system, respiratory system, eyes, skin, peripheral nervous system, testes.

#### Potential Health Effects

**Eye:** Causes mild eye irritation.

**Skin:** Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. Causes irritation with burning pain, itching, and redness. Absorbed through the skin. There have been no reports of skin sensitization in people occupationally exposed to n-hexane. Skin sensitization was not observed in a maximization test using 25 volunteers.

**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal. May cause central nervous system depression.

**Inhalation:** Causes respiratory tract irritation. Exposure produces central nervous system depression. Vapors may cause dizziness or suffocation. n-Hexane vapor concentrations can become so high that oxygen is displaced, especially in confined spaces.

**Chronic:** Prolonged or repeated skin contact may cause defatting and dermatitis. Prolonged or repeated exposure may cause adverse reproductive effects. Chronic exposure may cause visual disturbances. Laboratory experiments have resulted in mutagenic effects. Peripheral neuropathy symptoms include: muscular weakness, paresthesia, numbing of the hands, feet, legs and arms, unsteadiness, and difficulty in walking and standing. Repeated exposure may cause nervous system abnormalities with muscle weakness and damage, motor incoordination, and sensation disturbances. Chronic exposure produces peripheral neuropathy.



## 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:** Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.

**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. For ingestion, the stomach could be intubated, aspirated, and lavaged with a slurry of activated charcoal--protect the airway from aspiration of gastric contents. Monitor arterial blood gases in cases of severe aspiration.

## 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. May accumulate static electrical charges, and may cause ignition of its own vapors. Extremely flammable liquid and vapor. Vapor may cause flash fire. 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. This liquid floats on water and may travel to a source of ignition and spread fire.

**Extinguishing Media:** Use dry chemical, carbon dioxide, or appropriate foam. Solid streams of water may be ineffective and spread material. Water may be ineffective because it will not cool material below its flash point.

**Flash Point:** -22 deg C ( -7.60 deg F)

**Autoignition Temperature:** 225 deg C ( 437.00 deg F)

**Explosion Limits, Lower:** 1.1 vol %

**Upper:** 7.5 vol %

**NFPA Rating:** (estimated) Health: 1; Flammability: 3; Instability: 0

## 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. Provide ventilation. A vapor suppressing foam may be used to reduce vapors. Use only non-sparking tools and equipment.

## Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. 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. Keep away from heat, sparks and flame. 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:** Keep away from heat and flame. Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

## 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 explosion-proof ventilation to keep airborne levels to acceptable levels.

**Exposure Limits**

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Hexane	50 ppm TWA; Skin - potential significant contribution to overall exposure by the cutaneous route	50 ppm TWA; 180 mg/m <sup>3</sup> TWA 1100 ppm IDLH	500 ppm TWA; 1800 mg/m <sup>3</sup> TWA
Methylcyclopentane	none listed	none listed	none listed
3-Methylpentane	500 ppm TWA (other than n-Hexane) (listed under Hexane isomers).1000 ppm STEL (other than n-Hexane) (listed under Hexane isomers).	100 ppm TWA (other than n-hexane); 350 mg/m <sup>3</sup> TWA (other than n-hexane) (listed under Hexane isomers).	none listed

**OSHA Vacated PELs:** Hexane: 50 ppm TWA; 180 mg/m<sup>3</sup> TWA Methylcyclopentane: No OSHA Vacated PELs are listed for this chemical. 3-Methylpentane: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**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 respirator use.

## Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** clear colorless

**Odor:** gasoline-like

**pH:** Not available.

**Vapor Pressure:** 151 mm Hg @ 25 deg C

**Vapor Density:** 2.97(Air = 1)

**Evaporation Rate:**Not available.

**Viscosity:** 0.31 mPas 20 deg C

**Boiling Point:** 69 deg C @ 760 mmHg

**Freezing/Melting Point:**-95 deg C

**Decomposition Temperature:**Not available.

**Solubility:** Insoluble.

**Specific Gravity/Density:**0.6500

**Molecular Formula:**C<sub>6</sub>H<sub>14</sub>

**Molecular Weight:**86.18

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.

**Conditions to Avoid:** Ignition sources, excess heat, electrical sparks, confined spaces.

**Incompatibilities with Other Materials:** Strong oxidizing agents.

**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide.

**Hazardous Polymerization:** Will not occur.

## Section 11 - Toxicological Information

**RTECS#:**

**CAS#** 110-54-3: MN9275000

**CAS#** 96-37-7: GY4640000

**CAS#** 96-14-0 unlisted.

**LD50/LC50:**

CAS# 110-54-3:

Draize test, rabbit, eye: 10 mg Mild;

Inhalation, mouse: LC50 = 150000 mg/m<sup>3</sup>/2H;

Inhalation, rat: LC50 = 48000 ppm/4H;  
Inhalation, rat: LC50 = 627000 mg/m<sup>3</sup>/3M;  
Oral, rat: LD50 = 25 gm/kg;

CAS# 96-37-7:

CAS# 96-14-0:

**Carcinogenicity:**

CAS# 110-54-3: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

CAS# 96-37-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

CAS# 96-14-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** Occupational polyneuropathy has resulted from hexane exposures as low as 500 ppm, but the minimum levels of n-hexane that are neurotoxic in humans haven't been established. Nearly continuous exposure of animals at 250 ppm has caused neurotoxic effects.

**Teratogenicity:** No evidence of teratogenicity or embryotoxicity in animal studies with hexane. Fetotoxicity has been observed in the presence of maternal toxicity.

**Reproductive Effects:** Severe testicular damage has been observed in rats exposed to hexane at concentrations which have produced other significant toxicity. Although subneurotoxic doses of its principle toxic metabolite, 2,5-hexanedione, can induce progressive testicular toxicity in rats, there have been no reports of human sterility or other reproductive toxicity associated with n-hexane exposures.

**Mutagenicity:** Positive results (chromosomal damage in the bone marrow cells) obtained for rats exposed by inhalation to n-hexane.

**Neurotoxicity:** n-Hexane is a mild irritant and CNS depressant in acute exposure, but its principal effects are damage to the sensory and motor peripheral nerves, particularly in chronic exposure.

**Other Studies:**

## Section 12 - Ecological Information

**Ecotoxicity:** No data available. Estimated BCF values = 2.24 and 2.89. These values suggest that hexane will show low bioconcentration in aquatic organisms. Estimated Koc value = 4.11. This product will show slight soil mobility and is expected to rapidly volatilize from moist surface soils.

**Environmental:** Terrestrial: Volatilization and adsorption are expected to be the most important fate processes. Aquatic: Photolysis or hydrolysis are not expected to be important. Atmospheric: Expected to exist entirely in the vapor phase in ambient air, expected half life 2.8 days. Expected to biodegrade but not bioconcentrate.

**Physical:** No information available.

**Other:** No information available.

## 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:** None listed.

## Section 14 - Transport Information

	US DOT	Canada TDG
<b>Shipping Name:</b>	HEXANES	HEXANES
<b>Hazard Class:</b>	3	3
<b>UN Number:</b>	UN1208	UN1208
<b>Packing Group:</b>	II	II
<b>Additional Info:</b>		FLASHPOINT -22C

## Section 15 - Regulatory Information

### US FEDERAL

#### TSCA

CAS# 110-54-3 is listed on the TSCA inventory.

CAS# 96-37-7 is listed on the TSCA inventory.

CAS# 96-14-0 is listed on the TSCA inventory.

#### Health & Safety Reporting List

CAS# 96-37-7: Effective 6/20/85, Sunset 11/9/93

#### 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.

#### CERCLA Hazardous Substances and corresponding RQs

CAS# 110-54-3: 5000 lb final RQ; 2270 kg final RQ

#### SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

#### SARA Codes

CAS # 110-54-3: immediate, delayed, fire.

CAS # 96-37-7: fire.

CAS # 96-14-0: immediate, fire.

### **Section 313**

This material contains Hexane (CAS# 110-54-3, 86.1%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

### **Clean Air Act:**

CAS# 110-54-3 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# 110-54-3 can be found on the following state right to know lists: New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 96-37-7 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 96-14-0 can be found on the following state right to know lists: California, (listed as Hexane isomers), Pennsylvania, Massachusetts.

### **California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

## **European/International Regulations**

### **European Labeling in Accordance with EC Directives**

#### **Hazard Symbols:**

XN F N

#### **Risk Phrases:**

R 11 Highly flammable.

R 38 Irritating to skin.

R 48/20 Harmful : danger of serious damage to health by prolonged exposure through inhalation.

R 62 Possible risk of impaired fertility.

R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

R 65 Harmful: may cause lung damage if swallowed.

R 67 Vapours may cause drowsiness and dizziness.

#### **Safety Phrases:**

S 16 Keep away from sources of ignition - No smoking.

S 29 Do not empty into drains.

S 33 Take precautionary measures against static discharges.

S 36/37 Wear suitable protective clothing and gloves.

S 9 Keep container in a well-ventilated place.

S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

S 62 If swallowed, do not induce vomiting; seek medical advice immediately and show this container or label.

**WGK (Water Danger/Protection)**

CAS# 110-54-3: 1

CAS# 96-37-7: 1

CAS# 96-14-0: 1

**Canada - DSL/NDSL**

CAS# 110-54-3 is listed on Canada's DSL List.

CAS# 96-37-7 is listed on Canada's DSL List.

CAS# 96-14-0 is listed on Canada's DSL List.

**Canada - WHMIS**

This product has a WHMIS classification of B2, D2B.

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

**Canadian Ingredient Disclosure List**

CAS# 110-54-3 is listed on the Canadian Ingredient Disclosure List.

CAS# 96-14-0 (listed as Hexane isomers) is listed on the Canadian Ingredient Disclosure List.

# Material Safety Data Sheet

## N-Nonane, 99%

ACC# 96172

### Section 1 - Chemical Product and Company Identification

**MSDS Name:** N-Nonane, 99%

**Catalog Numbers:** AC129110000, AC129110020, AC129111000, AC129115000

**Synonyms:** Nonane

**Company Identification:**

Acros Organics N.V.  
One Reagent Lane  
Fair Lawn, NJ 07410

**For information in North America, call:** 800-ACROS-01

**For emergencies in the US, call CHEMTREC:** 800-424-9300

### Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
111-84-2	Nonane	99.0	203-913-4

### Section 3 - Hazards Identification

## EMERGENCY OVERVIEW

Appearance: colorless liquid. Flash Point: 31 deg C.

**Warning! Flammable liquid and vapor.** Causes eye and skin irritation. Causes digestive and respiratory tract irritation. May cause central nervous system depression. May cause cardiac disturbances.

**Target Organs:** Central nervous system, cardiovascular system.

### Potential Health Effects

**Eye:** Causes eye irritation. May cause chemical conjunctivitis and corneal damage.

**Skin:** Causes skin irritation. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. May cause cyanosis of the extremities.

**Ingestion:** Causes 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:** Causes respiratory tract irritation. Irritation may lead to chemical pneumonitis and pulmonary edema. Exposure produces central nervous system depression. Aspiration may lead to pulmonary edema. Vapors may cause dizziness or suffocation. May cause burning sensation in the chest.

**Chronic:** Prolonged or repeated skin contact may cause defatting and dermatitis.

## Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.

**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

**Inhalation:** Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Get medical aid. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

**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. Vapors



may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Flammable Liquid. Can release vapors that form explosive mixtures at temperatures above the flashpoint. Use water spray to keep fire-exposed containers cool. Water may be ineffective. Material is lighter than water and a fire may be spread by the use of water. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. May polymerize explosively when involved in a fire.

**Extinguishing Media:** Use water spray to cool fire-exposed containers. Water may be ineffective. Water may spread fire. Do NOT use straight streams of water. For large fires, use water spray, fog or regular foam. For small fires, use dry chemical, carbon dioxide, water spray or regular foam.

**Flash Point:** 31 deg C ( 87.80 deg F)

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:**0.8%

**Upper:** 2.9%

**NFPA Rating:** (estimated) Health: 0; Flammability: 3; Instability: 0

## 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. 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 with adequate ventilation. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep away from heat, sparks and flame. Do not get on skin or in eyes. Do not ingest or inhale. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

**Storage:** Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use adequate general or local exhaust ventilation to keep airborne

concentrations below the permissible exposure limits. Use adequate general or local explosion-proof ventilation to keep airborne levels to acceptable levels.

#### Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Nonane	200 ppm TWA	200 ppm TWA; 1050 mg/m <sup>3</sup> TWA	none listed

**OSHA Vacated PELs:** Nonane: 200 ppm TWA; 1050 mg/m<sup>3</sup> TWA

#### Personal Protective Equipment

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear impervious gloves.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

## Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** colorless

**Odor:** gasoline-like

**pH:** Not available.

**Vapor Pressure:** 10 mm Hg @38C

**Vapor Density:** 4.42

**Evaporation Rate:** Not available.

**Viscosity:** .711 cP @ 20C

**Boiling Point:** 150.7 deg C

**Freezing/Melting Point:** -53.7 deg C

**Decomposition Temperature:** Not available.

**Solubility:** Insoluble in water.

**Specific Gravity/Density:** 0.72

**Molecular Formula:** CH<sub>3</sub>(CH<sub>2</sub>)<sub>7</sub>CH<sub>3</sub>

**Molecular Weight:** 128.14

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.

**Conditions to Avoid:** Incompatible materials, ignition sources, excess heat.

**Incompatibilities with Other Materials:** Strong oxidizing agents.

**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#** 111-84-2: RA6115000

**LD50/LC50:**

CAS# 111-84-2:

Inhalation, rat: LC50 = 3200 ppm/4H;

Inhalation, rat: LC50 = 17000 mg/m<sup>3</sup>/4H;

**Carcinogenicity:**

CAS# 111-84-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information found

**Teratogenicity:** No information found

**Reproductive Effects:** No information found

**Mutagenicity:** No information found

**Neurotoxicity:** No information found

**Other Studies:**

## Section 12 - Ecological Information

**Ecotoxicity:** No data available. No information available.

**Environmental:** Terrestrial: Photolysis or hydrolysis is not expected to be important in soils. Biodegradation may occur in soils; however, volatilization and adsorption are expected to be far more important fate processes. Aquatic: Photolysis and hydrolysis in aquatic systems are not expected to be important. The log bioconcentration factor has been estimated to range from 3.31 to 3.92, suggesting bioconcentration may be an important fate process in aquatic systems. Atmospheric: Expected to exist almost entirely in the vapor phase in ambient air.

**Physical:** No information found.

**Other:** For more information, see "HANDBOOK OF ENVIRONMENTAL FATE AND EXPOSURE DATA." On soil, substance volatilizes and biodegrades.

## 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:** None listed.

## Section 14 - Transport Information

	US DOT	Canada TDG
<b>Shipping Name:</b>	NONANES	NONANES
<b>Hazard Class:</b>	3	3
<b>UN Number:</b>	UN1920	UN1920
<b>Packing Group:</b>	III	III
<b>Additional Info:</b>		FLASHPOINT 31C

## Section 15 - Regulatory Information

### US FEDERAL

#### TSCA

CAS# 111-84-2 is listed on the TSCA inventory.

#### Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

#### Chemical Test Rules

CAS# 111-84-2: Testing required by manufacturers, processors

#### Section 12b

CAS# 111-84-2: Section 4

#### TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

#### CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

#### SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

#### SARA Codes

CAS # 111-84-2: immediate, fire.

**Section 313** No chemicals are reportable under Section 313.

#### Clean Air Act:

This material does not contain any hazardous air pollutants.

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# 111-84-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

**California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**

Not available.

**Risk Phrases:**

R 10 Flammable.

**Safety Phrases:**

S 16 Keep away from sources of ignition - No smoking.

S 23 Do not inhale gas/fumes/vapour/spray.

S 33 Take precautionary measures against static discharges.

S 9 Keep container in a well-ventilated place.

**WGK (Water Danger/Protection)**

CAS# 111-84-2: 1

**Canada - DSL/NDSL**

CAS# 111-84-2 is listed on Canada's DSL List.

**Canada - WHMIS**

This product has a WHMIS classification of B2, D2B.

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

**Canadian Ingredient Disclosure List**

CAS# 111-84-2 is listed on the Canadian Ingredient Disclosure List.

# Material Safety Data Sheet

## n-Propyl acetate

ACC# 97171

### Section 1 - Chemical Product and Company Identification

**MSDS Name:** n-Propyl acetate

**Catalog Numbers:** AC158290000, AC158290010, AC158290025, AC158290100, AC158291000, AC158295000, AC180840000, AC180840025, AC180840050, AC180845000, AC418410000, AC418410010, AC418410030, AC418410200, EK1083120, EK1083138

**Synonyms:** Acetic acid n-propyl ester; 1-Acetoxypropane.

**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
109-60-4	n-Propyl acetate	90+	203-686-1

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Appearance: APHA: 15 max liquid. Flash Point: 10 deg C.

**Danger!** Flammable liquid and vapor. Causes eye, skin, and respiratory tract irritation. Breathing vapors may cause drowsiness and dizziness. Repeated exposure may cause skin dryness or cracking.

**Target Organs:** Blood, central nervous system, respiratory system, eyes, skin.

#### Potential Health Effects

**Eye:** Causes eye irritation.

**Skin:** Causes skin irritation. May be harmful if absorbed through the skin. Repeated or prolonged exposure may cause drying and cracking of the skin.

**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed. May cause central nervous system depression.

**Inhalation:** Causes respiratory tract irritation. May cause narcotic effects in high concentration. May be harmful if inhaled. Inhalation of vapors may cause drowsiness and dizziness.

**Chronic:** Prolonged or repeated skin contact may cause defatting and dermatitis. Chronic exposure may cause blood effects.

## Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.

**Ingestion:** Do not induce vomiting. Get medical aid.

**Inhalation:** Remove from exposure and move to fresh air immediately. 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. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Containers may explode in the heat of a fire. Flammable liquid and vapor.

**Extinguishing Media:** Use water spray to cool fire-exposed containers. Use foam, dry chemical, or carbon dioxide. Water may be ineffective.

**Flash Point:** 10 deg C ( 50.00 deg F)

**Autoignition Temperature:** 450 deg C ( 842.00 deg F)

**Explosion Limits, Lower:** 1.8 vol %

**Upper:** 8 vol %

**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. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Remove all sources of ignition. Use a spark-proof tool. Do not let this chemical enter the environment.

## Section 7 - Handling and Storage

**Handling:** Use spark-proof tools and explosion proof equipment. Do not get in eyes, on skin, or on clothing. Take precautionary measures against static discharges. Keep away from heat, sparks and flame. Do not ingest or inhale. Use only in a chemical fume hood.

**Storage:** Keep away from sources of ignition. Store in a cool, dry place. Store in a tightly closed container. Flammables-area.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

### Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
n-Propyl acetate	200 ppm TWA; 250 ppm STEL	200 ppm TWA; 840 mg/m <sup>3</sup> TWA 1700 ppm IDLH	200 ppm TWA; 840 mg/m <sup>3</sup> TWA

**OSHA Vacated PELs:** n-Propyl acetate: 200 ppm TWA; 840 mg/m<sup>3</sup> TWA

### Personal Protective Equipment

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**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 respirator use.

## Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** clear, colorless - APHA: 15 max

**Odor:** odor of pears

**pH:** Not available.

**Vapor Pressure:** 33 mbar @ 20 deg C

**Vapor Density:** 3.5 (air=1)

**Evaporation Rate:**Not available.

**Viscosity:** 0.58 mPa @ 20 deg C

**Boiling Point:** 102 deg C @ 760 mmHg

**Freezing/Melting Point:**-95 deg C

**Decomposition Temperature:**Not available.

**Solubility:** Soluble.

**Specific Gravity/Density:**0.880

**Molecular Formula:**C<sub>5</sub>H<sub>10</sub>O<sub>2</sub>

**Molecular Weight:**102.13

## Section 10 - Stability and Reactivity



**Chemical Stability:** Moisture sensitive.

**Conditions to Avoid:** Incompatible materials, ignition sources, excess heat, exposure to moist air or water.

**Incompatibilities with Other Materials:** Strong oxidizing agents, acids, bases.

**Hazardous Decomposition Products:** Carbon monoxide, carbon monoxide, carbon dioxide.

**Hazardous Polymerization:** Will not occur.

## Section 11 - Toxicological Information

**RTECS#:**

**CAS#** 109-60-4: AJ3675000

**LD50/LC50:**

CAS# 109-60-4:

Draize test, rabbit, eye: 500 mg/24H Mild;

Oral, mouse: LD50 = 8300 mg/kg;

Oral, rabbit: LD50 = 6640 mg/kg;

Oral, rat: LD50 = 9370 mg/kg;

Skin, rabbit: LD50 = >20 mL/kg;

**Carcinogenicity:**

CAS# 109-60-4: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information found

**Teratogenicity:** No information found

**Reproductive Effects:** No information found

**Mutagenicity:** No information found

**Neurotoxicity:** No information found

**Other Studies:**

## Section 12 - Ecological Information

**Ecotoxicity:** Fish: Fathead Minnow: 60mg/L; 96H; No data available.

**Environmental:** Terrestrial: Expected to have high mobility in soil. Volatilization is expected from moist soil surfaces. Aquatic: Not expected to adsorb to suspended solids and sediment in water. Expected to volatilize from water surfaces. Atmospheric: Expected to exist solely as a vapor in the ambient atmosphere. Vapor-phase is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; half-life estimated to be about 5 days. Expected to slightly biodegrade and bioconcentrate.

**Physical:** No information available.

**Other:** Do not empty into drains.

## 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:** None listed.

## Section 14 - Transport Information

	US DOT	Canada TDG
<b>Shipping Name:</b>	N-PROPYL ACETATE	N-PROPYL ACETATE
<b>Hazard Class:</b>	3	3
<b>UN Number:</b>	UN1276	UN1276
<b>Packing Group:</b>	II	II
<b>Additional Info:</b>		FLASHPOINT 10 C

## Section 15 - Regulatory Information

### US FEDERAL

#### TSCA

CAS# 109-60-4 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.

#### CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

#### SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

#### SARA Codes

CAS # 109-60-4: immediate, fire.

**Section 313** No chemicals are reportable under Section 313.

**Clean Air Act:**

This material does not contain any hazardous air pollutants.

This material does not contain any Class 1 Ozone depleters.

This material does not contain any Class 2 Ozone depleters.

**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# 109-60-4 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

**California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations****European Labeling in Accordance with EC Directives****Hazard Symbols:**

XI F

**Risk Phrases:**

R 11 Highly flammable.

R 36 Irritating to eyes.

R 66 Repeated exposure may cause skin dryness or cracking.

R 67 Vapours may cause drowsiness and dizziness.

**Safety Phrases:**

S 16 Keep away from sources of ignition - No smoking.

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S 29 Do not empty into drains.

S 33 Take precautionary measures against static discharges.

**WGK (Water Danger/Protection)**

CAS# 109-60-4: 1

**Canada - DSL/NDSL**

CAS# 109-60-4 is listed on Canada's DSL List.

**Canada - WHMIS**

This product has a WHMIS classification of B2, D2B.

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

**Canadian Ingredient Disclosure List**

CAS# 109-60-4 is listed on the Canadian Ingredient Disclosure List.

FISHER SCIENTIFIC,CHEMICAL DIVISION -- 1-PROPANOL (N-PROPYL ALCOHOL,(SEE SUPP DA) -- 6810-01-119-7846

=====  
Product Identification  
=====

Product ID:1-PROPANOL (N-PROPYL ALCOHOL, (SEE SUPP DA)  
MSDS Date:06/24/1989  
FSC:6810  
NIIN:01-119-7846  
MSDS Number: BLLCL  
=== Responsible Party ===  
Company Name:FISHER SCIENTIFIC,CHEMICAL DIVISION  
Address:1 REAGENT LANE  
City:FAIR LAWN  
State:NJ  
ZIP:07410  
Country:US  
Info Phone Num:201-796-7100  
Emergency Phone Num:201-796-7100 DAY;(SEE SUPP DATA)  
Preparer's Name:GASTON PILLORI (CONTACT)  
CAGE:1B464

==== Contractor Identification ====

Company Name:FISHER SCIENTIFIC CO. CHEMICAL MFG DIV  
Address:1 REAGENT LANE  
Box:City:FAIRLAWN  
State:NJ  
ZIP:07410-2802  
Country:US  
Phone:201-796-7100  
CAGE:1B464

=====  
Composition/Information on Ingredients  
=====

Ingred Name:N-PROPYL ALCOHOL  
CAS:71-23-8  
RTECS #:UH8225000  
Fraction by Wt: 100%  
Other REC Limits:N/K  
OSHA PEL:200 PPM/250 STEL  
ACGIH TLV:S,200PPM/250STEL9192

Ingred Name:FIRE FIGHT PROC:OF STOR TANK DUE TO FIRE.EXTING ONLY IF  
FIRE CAN BE STOPPED.USE FLOODING AMTS OF H\*2O AS FOG (SEE ING 3)  
RTECS #:9999999ZZ  
Other REC Limits:N/K  
OSHA PEL:N/K  
ACGIH TLV:N/K

Ingred Name:FIRE FIGHT PROC:& TO COOL CONTR.APPLY FROM AS FAR AWAY AS  
POSS.AVOID BRTHG VAP.KEEP UPWIND.SOLID H\*2O STREAM (SEE ING 4)  
RTECS #:9999999ZZ  
Other REC Limits:N/K  
OSHA PEL:N/K  
ACGIH TLV:N/K

Ingred Name:FIRE FIGHT PROC:MAY BE INEFFECTIVE.MATL TO AVOID:RUBBER  
ATTACKED.STRONG OXIDIZERS (POSS FIRE & EXPLO).POSS (SEE ING 5)

RTECS #:9999999ZZ  
Other REC Limits:N/K  
OSHA PEL:N/K  
ACGIH TLV:N/K

Ingred Name:MATL TO AVOID:VIOLENT RXN W/ POTASSIUM  
TERT-BUTOXIDE.LD50-LC50 MIX:LC50 MOUSE INHAL 48 G/M3.ODOR  
THRESHOLD:30 PPM.  
RTECS #:9999999ZZ  
Other REC Limits:N/K  
OSHA PEL:N/K  
ACGIH TLV:N/K

Ingred Name:SPILL PROC:UNNECESSARY PERS AWAY.ISOLATE HAZ.DENY ENTRY.EYE  
PROT:SFTY GOGGLES & FACESHIELD.DO NOT WEAR CONTACT LENSES.  
RTECS #:9999999ZZ  
Other REC Limits:N/K  
OSHA PEL:N/K  
ACGIH TLV:N/K

Ingred Name:ROUTES OF ENTRY:INGESTION/SKIN/INHALATION .EYE PROT:SFTY  
GOGGLES & FACESHIELD.DO NOT WEAR CONTACT LENSES.  
RTECS #:9999999ZZ  
Other REC Limits:N/K  
OSHA PEL:N/K  
ACGIH TLV:N/K

=====  
===== Hazards Identification =====

LD50 LC50 Mixture:LD50 RAT ORAL 1870 MG/KG;(SEE ING 5)  
Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES  
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO  
Health Hazards Acute and Chronic:REPEATED OR PROLONGED EXPOSURE MAY  
CAUSE DERMATITIS AND POSSIBLE CORROSION AND/OR  
CONJUNCTIVITIS.INGEST/INHAL:MAY CAUSE OLIGURIA FOLLOWED BY DIURESIS  
AND LIVER DAMAGE,BRAIN AND LUNG EDEMA.USE OF ALCOHOLIC BEVERAGES  
MAY ENHANCE TOXIC EFFECTS.TOXIC BY SKIN ABSORPTION.  
Explanation of Carcinogenicity:NONE  
Effects of  
Overexposure:EYES:IRRITATION, REDNESS, PAIN.SKIN:IRRITATION, REDNESS.C  
HRONIC:DEFAT, DRYING, CRACKING.POISONING DUE TO SKIN  
ABSORPTION.INGESTION:CRAMPS, DIARRHEA, DECREASED BLOOD PRESSURE, CNS  
DEPRESSION.ASPIRATION HAZARD. INHAL:IRRITATION, COUGH, SHORTNESS OF  
BREATH, CNS DEPRESSION.HIGH CONCENTRATIONS:DEATH BY RESPIRATORY  
FAILURE.  
Medical Cond Aggravated by Exposure:PERSONS WITH PRE-EXISTING SKIN  
DISORDERS, IMPAIRED LIVER, RENAL &/OR PULMONARY FUNCTION.PERSONS  
SENSITIVE TO ISOPROPYL ALCOHOL MAY HAVE A CROSS-REACTION WITH  
N-PROPYL ALCOHOL.

=====  
===== First Aid Measures =====

First Aid:EYES:WASH IMMED W/ H\*2O OR SALINE OCCASNLY LIFTING LIDS  
(APPROX 15-20 MIN).GET MED ATTN.REMOVE CONTAM CLTHG & SHOES.WASH W/  
SOAP OR MILD DETERGENT & LG AMT OF H\*2O (APPROX 15-20 MIN).GET MED  
ATTN.INGESTION:GIVE ACTIVATED CHARCOAL.GASTRIC LAVAGE MAY BE  
USEFUL.GIVE OXYGEN.MAINTAIN BLOOD PRESS.INHALATION:MOVE TO FRESH

AIR IMMED.KEEP WARM & AT REST.IF BRTHG STOPPED,GIVE ARTF RESP.GET  
MED ATTN IMMED.

=====  
===== Fire Fighting Measures =====

Flash Point Method:CC  
Flash Point:74F,23C  
Autoignition Temp:Autoignition Temp Text:775 F  
Lower Limits:2.2%  
Upper Limits:13.7%  
Extinguishing Media:DRY CHEM,CARBON DIOXIDE,HALON,H\*2O SPRAY/ALCOHOL  
FOAM.LG FIRE:H\*2O SPRAY,FOG OR ALCOHOL FOAM.WATER MAY BE  
INEFFECTIVE.  
Fire Fighting Procedures:MOVE CONTR FROM FIRE AREA IF POSS.COOL  
FIRE-EXPOS CONTR W/ H\*2O FROM SIDE UNTIL WELL AFTER FIRE IS  
OUT.STAY AWAY FROM STOR TANK ENDS.MASSIVE FIRE IN (SEE SUPP)  
Unusual Fire/Explosion Hazard:DANGEROUS FIRE HAZ,MOD EXPLO HAZ IF EXPOS  
TO HEAT/FLAME.VAP HEAVIER THAN AIR,MAY TRAVEL TO IGNIT SOURCE &  
FLASH BACK.VAPOR-AIR MIX EXPLOSIVE ABOVE FLASH POINT.

=====  
===== Accidental Release Measures =====

Spill Release Procedures:SHUT OFF IGNITION SOURCE.STOP LEAK IF W/O  
RISK.USE WATER SPRAY TO REDUCE VAPOR.SM SPILL-TAKE UP W/ SAND OR  
OTHER ABSORB MATL.PLACE IN CONTR FOR DISP.LG SPILL:DIKE FAR AHEAD  
OF SPILL FOR LATER DISP.NO SMKNG/FLAME/FLARES IN HAZ AREA.KEEP  
(SEE ING 6)  
Neutralizing Agent:N/K

=====  
===== Handling and Storage =====

Handling and Storage Precautions:OBSERVE ALL FED,STATE & LOCAL REGS  
WHEN STORING OR DISPOSING OF THIS SUBSTANCE.CONTACT THE DISTRICT  
DIRECTOR OF THE EPA.STORE IAW 29 CFR 1910.106.  
Other Precautions:STORE AWAY FROM INCOMPATIBLE SUBSTANCES.BONDING &  
GROUNDING:SUBSTANCES WITH LOW ELECTROCONDUCTIVITY,WHICH MAY BE  
IGNITED BY ELECTROSTATIC SPARKS,SHOULD BE STORED IN CONTR MEETING  
NFPA 77-1983 REC PRAC TICE ON STATIC ELECTRICITY.

=====  
===== Exposure Controls/Personal Protection =====

Respiratory Protection:THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED  
ON CONTAMINATION LEVELS IN THE WORKPLACE AND BE JOINTLY APPROVED BY  
NIOSH/MSHA.  
Ventilation:PROVIDE GENERAL DILUTION VENTILATION TO MEET PUBLISHED  
EXPOSURE LIMITS.VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.  
Protective Gloves:WEAR APPROP GLOVES TO PVNT SKIN CONTACT.  
Eye Protection:SPLASH-PROOF/DUST-RESISTANT (SEE ING 7)  
Other Protective Equipment:WEAR APPROP IMPERVIOUS CLTHG & EQUIP TO PVNT  
RPTD/PRLNG SKIN CONT.IF EYE/SKIN CONT POSS:EYE WASH,QUICK DRENCH  
SHOWER.  
Work Hygienic Practices:N/K  
Supplemental Safety and Health  
PART NO:ETHYL CARBINOL).EMER PHONE NO:201-796-7523 (NIGHT);800-429-9300  
(CHEMTREC).SOLUBLE IN ETHANOL,ETHYL ETHER,ACETONE,BENZENE.FIRE  
FIGHT PROC:STOR AREA-USE UNMANNED HOSE HOLDER/MONITOR NOZZ,ELSE W  
ITHDRAW FROM AREA & LET FIRE BURN.WITHDRAW IMMED IF RISING SOUND

FROM VENTING SFTY DEVICE/ANY DISCOLORATION (SEE ING 2)

===== Physical/Chemical Properties =====

Boiling Pt:B.P. Text:207F,97C  
Melt/Freeze Pt:M.P/F.P Text:-195F,-126C  
Decomp Temp:Decomp Text:N/K  
Vapor Pres:15 MMHG  
Vapor Density:2.1,AIR=1  
Spec Gravity:0.8053 (H\*20=1)  
Viscosity:2.256CP AT20C  
Evaporation Rate & Reference:1.3,BUTYL ACETATE=1  
Solubility in Water:SOLUBLE  
Appearance and Odor:COLORLESS LIQUID;MILD ALCOHOL-LIKE,SLIGHTLY  
STUPEFYING ODOR.

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES  
REACTS VIOLENTLY W/ ALKALI & ALKALINE EARTH METALS GENERATING HIGHLY  
FLAMM HYDROGEN GAS.COATINGS,PLASTICS & (SEE ING 4)  
Stability Condition to Avoid:HEAT,SPARKS,FLAME.  
Hazardous Decomposition Products:THERMAL DECOMPOSITION PRODUCTS MAY  
INCLUDE TOXIC OXIDES OF CARBON.  
Conditions to Avoid Polymerization:HAZARDOUS POLYMERIZATION HAS NOT  
BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

===== Disposal Considerations =====

Waste Disposal Methods:DISP MUST BE IAW FED,STATE & LOC  
REGS.COORDINATION W/ SUPPORTING INSTALLATION &/OR MACOM  
ENVIRONMENTAL COORDINATION PRIOR TO DISP IS REC TO DETERMINE APPROP  
DISP METH .FOR ASSISTANCE,CONTACT THE DISTRICT DIRECTOR OF THE  
ENVIRON PROT AGENCY.

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particular situation.

## Material Safety Data Sheet

### n-Octane

ACC# 95624

Section 1 - Chemical Product and Company Identification

**MSDS Name:** n-Octane

**Catalog Numbers:** AC129370000, AC129370020, AC129370250, AC232420000, AC325950000, AC325950010, AC325950020, AC325950025, AC325950250, 12937-5000

**Synonyms:** Octane.

**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
111-65-9	n-Octane	97%	203-892-1

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 13 deg C.

**Danger!** Flammable liquid and vapor. Causes eye, skin, and respiratory tract irritation. Breathing vapors may cause drowsiness and dizziness. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Aspiration hazard if swallowed. Can enter lungs and cause damage. May cause central nervous system effects.

**Target Organs:** Blood, central nervous system, liver, respiratory system, gastrointestinal system, eyes, skin.

#### Potential Health Effects

**Eye:** Causes eye irritation.

**Skin:** Causes skin irritation. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. May be harmful if absorbed through the skin.

**Ingestion:** Harmful if swallowed. Aspiration hazard. Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May cause lung damage.

**Inhalation:** Causes respiratory tract irritation. Irritation may lead to chemical pneumonitis and pulmonary edema. May cause narcotic effects in high concentration. Exposure produces central nervous system depression. Inhalation of vapors may cause drowsiness and dizziness.



**Chronic:** Prolonged or repeated skin contact may cause defatting and dermatitis. Chronic exposure may cause liver damage. Chronic exposure may cause blood effects.

## Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.

**Ingestion:** Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.

**Inhalation:** Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Get medical aid. Possible aspiration hazard. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

**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. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Containers may explode in the heat of a fire. Flammable liquid and vapor.

**Extinguishing Media:** Use water spray to cool fire-exposed containers. Use foam, dry chemical, or carbon dioxide. Water may be ineffective. Water may spread fire.

**Flash Point:** 13 deg C ( 55.40 deg F)

**Autoignition Temperature:** 220 deg C ( 428.00 deg F)

**Explosion Limits, Lower:**0.8 Vol %

**Upper:** 6.5 Vol %

**NFPA Rating:** (estimated) Health: 2; Flammability: 3; Instability: 0

## 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. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Remove all sources of ignition. Use a spark-proof tool. Do not let this chemical enter the environment.

## Section 7 - Handling and Storage

**Handling:** Use spark-proof tools and explosion proof equipment. Do not get in eyes, on skin, or on clothing. Take precautionary measures against static discharges. Keep away from heat, sparks and flame. Do not ingest or inhale. Use only in a chemical fume hood.

**Storage:** Keep away from sources of ignition. Store in a cool, dry place. Store in a tightly closed container. Flammables-area.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

### Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
n-Octane	300 ppm TWA	75 ppm TWA; 350 mg/m <sup>3</sup> TWA 1000 ppm IDLH (10% LEL)	500 ppm TWA; 2350 mg/m <sup>3</sup> TWA

**OSHA Vacated PELs:** n-Octane: 300 ppm TWA; 1450 mg/m<sup>3</sup> TWA

### Personal Protective Equipment

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**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 respirator use.

## Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** clear, colorless

**Odor:** gasoline-like - mild odor

**pH:** Not available.

**Vapor Pressure:** 14 mbar @ 20 deg C

**Vapor Density:** Not available.

**Evaporation Rate:**Not available.  
**Viscosity:** 0.55 mPa @ 20 deg C  
**Boiling Point:** 125 - 127 deg C @ 760mmHg  
**Freezing/Melting Point:**-57 deg C  
**Decomposition Temperature:**Not available.  
**Solubility:** Negligible.  
**Specific Gravity/Density:**0.708  
**Molecular Formula:**C8H18  
**Molecular Weight:**114.23

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.  
**Conditions to Avoid:** Incompatible materials, ignition sources, excess heat, temperatures above 200°C.  
**Incompatibilities with Other Materials:** Strong oxidizing agents.  
**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide.  
**Hazardous Polymerization:** Will not occur.

## Section 11 - Toxicological Information

**RTECS#:**  
**CAS#** 111-65-9: RG8400000  
**LD50/LC50:**  
CAS# 111-65-9:  
Inhalation, rat: LC50 = 118 gm/m<sup>3</sup>/4H;

**Carcinogenicity:**  
CAS# 111-65-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information found  
**Teratogenicity:** No information found  
**Reproductive Effects:** No information found  
**Mutagenicity:** No information found  
**Neurotoxicity:** No information found  
**Other Studies:**

## Section 12 - Ecological Information

**Ecotoxicity:** No data available. Fish toxicity: Coho salmon (96 hr) no mortality at 100 ppm

in artificial sea water [Morrow. J.E. Report 1974, EPA-660/3-73-018]. Bioaccumulation: Calculated bioconcentration factors of 780-5100 indicate that environmental accumulation would be significant [Lyman, W.K. et al Handbook of Chemical Property Estimation Methods Environ- mental Behaviour of Organic Compounds 1982, McGraw-Hill, New York [1] ].Log Pow = 5.15

**Environmental:** Nitrification inhibition: 50% inhibition of ammonia consumption (25 days) Nitrosomonas sp. 45 mg/l Anaerobic effects: 50% toxic inhibition (50 days) methanogenic bacterial culture 2 mg/l [Blum, D.J.W. et al Res. J. Water Pollut. Control Fed. 1991, 63(3), 198-207]. Absorption: Estimated Koc of 5,500-15,600 indicate that adsorption to soil and sediments would be significant. [1]

**Physical:** No information available.

**Other:** Do not empty into drains.

## 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:** None listed.

## Section 14 - Transport Information

	US DOT	Canada TDG
<b>Shipping Name:</b>	OCTANES	OCTANES
<b>Hazard Class:</b>	3	3
<b>UN Number:</b>	UN1262	UN1262
<b>Packing Group:</b>	II	II

## Section 15 - Regulatory Information

### US FEDERAL

#### TSCA

CAS# 111-65-9 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.

**CERCLA Hazardous Substances and corresponding RQs**

None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**

None of the chemicals in this product have a TPQ.

**SARA Codes**

CAS # 111-65-9: immediate, fire.

**Section 313** No chemicals are reportable under Section 313.

**Clean Air Act:**

This material does not contain any hazardous air pollutants.

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# 111-65-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

**California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**

XN F N

**Risk Phrases:**

R 11 Highly flammable.

R 38 Irritating to skin.

R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

R 65 Harmful: may cause lung damage if swallowed.

R 67 Vapours may cause drowsiness and dizziness.

**Safety Phrases:**

S 16 Keep away from sources of ignition - No smoking.

S 29 Do not empty into drains.

S 33 Take precautionary measures against static discharges.

S 9 Keep container in a well-ventilated place.

S 60 This material and its container must be disposed of as hazardous waste.

S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

S 62 If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

**WGK (Water Danger/Protection)**

CAS# 111-65-9: 1

**Canada - DSL/NDSL**

CAS# 111-65-9 is listed on Canada's DSL List.

**Canada - WHMIS**

This product has a WHMIS classification of B2, D2B.

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

**Canadian Ingredient Disclosure List**

CAS# 111-65-9 is listed on the Canadian Ingredient Disclosure List.

# Material Safety Data Sheet

## n-Pentane

ACC# 18210

### Section 1 - Chemical Product and Company Identification

**MSDS Name:** n-Pentane

**Catalog Numbers:** AC167870000, AC167870025, AC167875000, AC170070000, AC170070025, AC170070050, AC170070200, AC170070250, AC217240000, AC217240010, AC217240250, AC326640000, AC326640010, AC326640025, AC383900000, AC383900010, AC383900025, AC389070000, AC389070010, AC389070025, AC600180050, 17007-0010, 21724-0040, O4062-20, O4062-4, O4062RS19, P393-1, P399-1, P399-4, P399J4, P399RS19, P399RS28, P399SK-1, P399SK-4, P400-4, P400-4LC, S80116SPEC

**Synonyms:** Pentane; Pentane mixed isomers.

**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
109-66-0	n-Pentane	95+	203-692-4

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: -49 deg C.

**Danger!** Extremely flammable liquid and vapor. Vapor may cause flash fire. Breathing vapors may cause drowsiness and dizziness. Causes eye and skin irritation. Repeated exposure may cause skin dryness or cracking. Aspiration hazard if swallowed. Can enter lungs and cause damage.

**Target Organs:** Central nervous system, respiratory system, eyes, skin.

#### Potential Health Effects

**Eye:** Causes eye irritation.

**Skin:** Causes skin irritation. Repeated or prolonged exposure may cause drying and cracking of the skin. Volunteers suffered from painful burning sensations, accompanied by itching, after topical application of pentane; after 5 hours, blisters formed on the treated areas.

**Ingestion:** 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. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.

**Inhalation:** Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. May cause respiratory tract irritation. Vapors may cause dizziness or suffocation.

**Chronic:** Prolonged or repeated skin contact may cause defatting and dermatitis. Chronic exposure to vapors may produce polyneuropathy. The possibility that chronic exposure to very high concentrations may lead to polyneuropathy cannot be ruled out altogether, despite the substantially lower toxicity of pentane, in comparison with hexane and its neurotoxicity.

## Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for a t 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:** Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.

**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:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Use water spray to keep fire-exposed containers cool. Extremely flammable liquid and vapor. Vapor may cause flash fire. 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. Sensitive to static discharge.

**Extinguishing Media:** For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. This material is lighter than water and insoluble in water. The fire could easily be spread by the use of water in an area where the water cannot be contained. Do NOT use straight streams of water.

**Flash Point:** -49 deg C ( -56.20 deg F)

**Autoignition Temperature:** 260 deg C ( 500.00 deg F)

**Explosion Limits, Lower:**1.5

**Upper:** 7.8

**NFPA Rating:** (estimated) Health: 1; Flammability: 4; Instability: 0

## 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. Remove all sources of ignition. Use a spark-proof tool. 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. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. 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. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, sparks and flame. Avoid breathing vapor or mist.

**Storage:** Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.



## 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. Ventilation fans and other electrical service must be non-sparking and have an explosion-proof design.

### Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
n-Pentane	600 ppm TWA	120 ppm TWA; 350 mg/m <sup>3</sup> TWA 1500 ppm IDLH (10% LEL)	1000 ppm TWA; 2950 mg/m <sup>3</sup> TWA
Isopentane	600 ppm TWA (listed under Pentane, all isomers)	none listed	none listed
Cyclopentane	600 ppm TWA	600 ppm TWA; 1720 mg/m <sup>3</sup> TWA	none listed

**OSHA Vacated PELs:** n-Pentane: 600 ppm TWA; 1800 mg/m<sup>3</sup> TWA Isopentane: No OSHA Vacated PELs are listed for this chemical. Cyclopentane: 600 ppm TWA; 1720 mg/m<sup>3</sup> TWA

### Personal Protective Equipment

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear appropriate gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

## Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** clear, colorless

**Odor:** mild odor - gasoline-like - pleasant odor

**pH:** Not applicable.

**Vapor Pressure:** 514 mm Hg @ 25 deg C

**Vapor Density:** 2.5 (Air=1)

**Evaporation Rate:**28.6 (Butyl acetate=1)

**Viscosity:** Not available.

**Boiling Point:** 36 deg C

**Freezing/Melting Point:**-130 deg C

**Decomposition Temperature:**Not available.

**Solubility:** Negligible (0.04% at 20°C).

**Specific Gravity/Density:**0.62

**Molecular Formula:**C5H12

**Molecular Weight:**72.15

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions.

**Conditions to Avoid:** Ignition sources, excess heat.

**Incompatibilities with Other Materials:** Strong oxidizing agents.

**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide.

**Hazardous Polymerization:** Has not been reported.

## Section 11 - Toxicological Information

**RTECS#:**

**CAS#** 109-66-0: RZ9450000

**CAS#** 78-78-4: EK4430000

**CAS#** 287-92-3: GY2390000

**LD50/LC50:**

CAS# 109-66-0:

Inhalation, rat: LC50 = 364 gm/m<sup>3</sup>/4H;

Oral, rat: LD50 = >2000 mg/kg;

.

CAS# 78-78-4:

Inhalation, mouse: LC50 = 150000 mg/m<sup>3</sup>/2H;

Inhalation, rat: LC50 = 280000 mg/m<sup>3</sup>/4H;

.

CAS# 287-92-3:

Inhalation, mouse: LC50 = 72 gm/m<sup>3</sup>;

Inhalation, rat: LC50 = 106 gm/m<sup>3</sup>;

Oral, mouse: LD50 = 12800 mg/kg;

Oral, rat: LD50 = 11400 mg/kg;

.

**Carcinogenicity:**

CAS# 109-66-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

CAS# 78-78-4: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

CAS# 287-92-3: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information found

**Teratogenicity:** No information found

**Reproductive Effects:** No information found

**Mutagenicity:** No information found

**Neurotoxicity:** n-Hexane is a mild irritant and CNS depressant in acute exposure, but its principal effects are damage to the sensory and motor peripheral nerves, particularly in chronic exposure. Because of the otherwise substantially lower toxicity of pentane, in comparison with hexane, it is believed that such effects, if they occur, would require gross exposures, & the 600-ppm TLV-TWA should minimize potential for development of axonopathies.

**Other Studies:**

## Section 12 - Ecological Information

**Ecotoxicity:** Fish: Rainbow trout: LC50 = 9.87 mg/L; 96 Hr.; Unspecified Fish: Fathead Minnow: LC50 = 11.59 mg/L; 96 Hr.; Unspecified Fish: Bluegill/Sunfish: LC50 = 9.99 mg/L; 96 Hr.; Unspecified Water flea Daphnia: LC50 = 9.7 mg/L; 48 Hr.; Unspecified No data available.

**Environmental:** Photolysis or hydrolysis of n-pentane is not expected to be important in soils. The biodegradation of n-pentane may occur in soils; however, primarily volatilization and to some extent adsorption are expected to be far more important fate processes. A calculated Koc range of 580 to 1600 indicates a low mobility class for n-pentane in soils. Based upon an estimated Henry's Law Constant of 1.26 atm-cu m/mole, n-pentane is expected to rapidly volatilize from surface soils.

**Physical:** Based on a vapor pressure of 514 mm Hg at 25°C, n-pentane is expected to exist entirely in the vapor phase in ambient air. n-Pentane does not absorb UV light in the environmentally significant range, >290 nm and probably will not undergo direct photolysis in the atmosphere.

**Other:** Based upon a water solubility of 38.5 mg/l at 25°C and a log Kow of 3.39, the bioconcentration factor (log BCF) for n-pentane has been calculated to be 1.90 and 2.35, respectively, from recommended regression derived equations. These BCF values are not indicative of important bioconcentration in aquatic organisms.

## 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:** None listed.

## Section 14 - Transport Information

	US DOT	Canada TDG
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<b>Shipping Name:</b>	PENTANES	PENTANES
<b>Hazard Class:</b>	3	3
<b>UN Number:</b>	UN1265	UN1265
<b>Packing Group:</b>	II	II
<b>Additional Info:</b>		FLASHPOINT -49 C

## Section 15 - Regulatory Information

### US FEDERAL

#### TSCA

CAS# 109-66-0 is listed on the TSCA inventory.

CAS# 78-78-4 is listed on the TSCA inventory.

CAS# 287-92-3 is listed on the TSCA inventory.

#### Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

#### Chemical Test Rules

CAS# 109-66-0: 40 CFR 799.5115

#### Section 12b

CAS# 109-66-0: Section 4, 1 % de minimus concentration

#### TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

#### CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

#### SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

#### SARA Codes

CAS # 109-66-0: immediate, delayed, fire.

CAS # 78-78-4: immediate, fire.

CAS # 287-92-3: fire.

**Section 313** No chemicals are reportable under Section 313.

#### Clean Air Act:

This material does not contain any hazardous air pollutants.

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# 109-66-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 78-78-4 can be found on the following state right to know lists: New Jersey,

Pennsylvania, Massachusetts.

CAS# 287-92-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

### **California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

## **European/International Regulations**

### **European Labeling in Accordance with EC Directives**

#### **Hazard Symbols:**

XN F+ N

#### **Risk Phrases:**

R 12 Extremely flammable.

R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

R 65 Harmful: may cause lung damage if swallowed.

R 66 Repeated exposure may cause skin dryness or cracking.

R 67 Vapours may cause drowsiness and dizziness.

#### **Safety Phrases:**

S 16 Keep away from sources of ignition - No smoking.

S 29 Do not empty into drains.

S 33 Take precautionary measures against static discharges.

S 9 Keep container in a well-ventilated place.

S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

### **WGK (Water Danger/Protection)**

CAS# 109-66-0: 1

CAS# 78-78-4: 1

CAS# 287-92-3: 1

### **Canada - DSL/NDSL**

CAS# 109-66-0 is listed on Canada's DSL List.

CAS# 78-78-4 is listed on Canada's DSL List.

CAS# 287-92-3 is listed on Canada's DSL List.

### **Canada - WHMIS**

This product has a WHMIS classification of B2.

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

### **Canadian Ingredient Disclosure List**

CAS# 109-66-0 is listed on the Canadian Ingredient Disclosure List.

CAS# 287-92-3 is listed on the Canadian Ingredient Disclosure List.

# Material Safety Data Sheet

# Tert-Amyl Alcohol, P.A.

ACC# 01599

## Section 1 - Chemical Product and Company Identification

**MSDS Name:** Tert-Amyl Alcohol, P.A.

**Catalog Numbers:** AC220230000, AC220230010, AC220230050, NC9252979

**Synonyms:** tert-Pentanol; 2-Butanol, 2-Methyl; Ethyl Dimethyl Carbinol; 3-Methylbutan-3-ol; Amylene Hydrate, 2-methyl-2-butanol

**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
75-85-4	2-METHYL-2-BUTANOL	100.0	200-908-9

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 20 deg C.

**Warning! Flammable liquid and vapor.** May be harmful if absorbed through the skin. May be harmful if swallowed. May cause eye and skin irritation. May cause respiratory tract irritation. May cause central nervous system depression. Light sensitive.

**Target Organs:** Central nervous system.

#### Potential Health Effects

**Eye:** May cause eye irritation.

**Skin:** May cause skin irritation. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. May be harmful if absorbed through the skin.

**Ingestion:** 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. May be harmful if swallowed.

**Inhalation:** May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability. May cause effects similar to those described for ingestion. May cause respiratory tract irritation.

**Chronic:** Prolonged or repeated skin contact may cause dermatitis.

## Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Get medical aid if irritation develops or persists. Wash clothing before reuse. Flush skin with plenty of soap and water.

**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation.

**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. Vapors can travel to a source of ignition and flash back. 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. Water may be ineffective. Material is lighter than water and a fire may be spread by the use of water. Flammable liquid and vapor. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Containers may explode if exposed to fire.

**Extinguishing Media:** For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. Water may be ineffective. For large fires, use water spray, fog or alcohol-resistant foam. Do NOT use straight streams of water. Cool containers with flooding quantities of water until well after fire is out.

**Flash Point:** 20 deg C ( 68.00 deg F)

**Autoignition Temperature:** 435 deg C ( 815.00 deg F)

**Explosion Limits, Lower:** 1.30 vol %

**Upper:** 9.60 vol %

**NFPA Rating:** (estimated) Health: 1; Flammability: 3; Instability: 0

## 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. 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 with adequate ventilation. Avoid contact with skin and eyes. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Do not ingest or inhale. Prevent build up of vapors to explosive concentration. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.  
**Storage:** Keep away from heat, sparks, and flame. Store in a cool, dry place. Flammables-area. Keep containers tightly closed. Store protected from light.

## 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 ventilation to keep airborne concentrations low.

### Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
2-METHYL-2-BUTANOL	none listed	none listed	none listed

**OSHA Vacated PELs:** 2-METHYL-2-BUTANOL: No OSHA Vacated PELs are listed for this chemical.

### Personal Protective Equipment

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**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 respirator use.

## Section 9 - Physical and Chemical Properties



**Physical State:** Liquid  
**Appearance:** clear, colorless  
**Odor:** camphor  
**pH:** Not available.  
**Vapor Pressure:** 10 mm Hg  
**Vapor Density:** 3.0  
**Evaporation Rate:**Not available.  
**Viscosity:** 3.7 mPas 25 deg C  
**Boiling Point:** 102 deg C @ 760.00mm Hg  
**Freezing/Melting Point:**-12 deg C  
**Decomposition Temperature:**Not available.  
**Solubility:** SOLUBLE IN WATER: 120 G/L (20°C)  
**Specific Gravity/Density:** .8050g/cm3  
**Molecular Formula:**C5H12O  
**Molecular Weight:**88.15

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.  
**Conditions to Avoid:** High temperatures, incompatible materials, ignition sources, excess heat, exposure to flame.  
**Incompatibilities with Other Materials:** Strong oxidizing agents.  
**Hazardous Decomposition Products:** Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.  
**Hazardous Polymerization:** Will not occur.

## Section 11 - Toxicological Information

**RTECS#:**  
**CAS#** 75-85-4: SC0175000  
**LD50/LC50:**  
CAS# 75-85-4:  
Oral, rabbit: LD50 = 2028 mg/kg;  
Oral, rat: LD50 = 1 gm/kg;  
Oral, rat: LD50 = 1000 mg/kg;

**Carcinogenicity:**  
CAS# 75-85-4: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information available.  
**Teratogenicity:** No information available.  
**Reproductive Effects:** No information available.

**Mutagenicity:** No information available.  
**Neurotoxicity:** No information available.  
**Other Studies:**

## Section 12 - Ecological Information

**Ecotoxicity:** No data available. No information available.  
**Environmental:** Terrestrial: High volatility, high mobility in soil. Aquatic: High volatility. Atmospheric: Exists as vapor, half-life 3.3 days. Biodegradation slight and low bioconcentration potential.  
**Physical:** No information available.  
**Other:** For more information, see "HANDBOOK OF ENVIRONMENTAL FATE AND EXPOSURE DATA."

## 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:** None listed.

## Section 14 - Transport Information

	US DOT	Canada TDG
<b>Shipping Name:</b>	PENTANOLS	No information available.
<b>Hazard Class:</b>	3	
<b>UN Number:</b>	UN1105	
<b>Packing Group:</b>	II	

## Section 15 - Regulatory Information

### US FEDERAL

TSCA

CAS# 75-85-4 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.

**CERCLA Hazardous Substances and corresponding RQs**

None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**

None of the chemicals in this product have a TPQ.

**SARA Codes**

CAS # 75-85-4: fire.

**Section 313** No chemicals are reportable under Section 313.

**Clean Air Act:**

This material does not contain any hazardous air pollutants.

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# 75-85-4 can be found on the following state right to know lists: Pennsylvania, Massachusetts.

**California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**

XN F

**Risk Phrases:**

R 11 Highly flammable.

R 21/22 Harmful in contact with skin and if swallowed.

**Safety Phrases:**

S 16 Keep away from sources of ignition - No smoking.

S 24/25 Avoid contact with skin and eyes.

S 9 Keep container in a well-ventilated place.

**WGK (Water Danger/Protection)**

CAS# 75-85-4: 1

**Canada - DSL/NDSL**

CAS# 75-85-4 is listed on Canada's DSL List.

**Canada - WHMIS**

This product has a WHMIS classification of B2, D2B.

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

**Canadian Ingredient Disclosure List**

# Material Safety Data Sheet

## Tetrahydrofuran

ACC# 96564

**Section 1 - Chemical Product and Company Identification****MSDS Name:** Tetrahydrofuran**Catalog Numbers:** AC164240000, AC164240010, AC164240025, AC164240050, AC164240250, AC176630000 AC176630000, AC176630010, AC176630025, AC176630050, AC176630100, AC176630200 AC176630200, AC176630250, AC176635000, AC181500000, AC181500010, AC181502500 AC181502500, AC222160000, AC222160010, AC222162500, AC268290000, AC268290010 AC268290010, AC268290025, AC268295000, AC326970000, AC326970010, AC326970025 AC326970025, AC326971000, AC348450000, AC348450010, AC348450025, AC348451000 AC348451000**Synonyms:** Diethylene oxide, 1,4-Epoxybutane, THF, Cyclotetramethylene oxide**Company Identification:**

Acros Organics N.V.  
One Reagent Lane  
Fair Lawn, NJ 07410

**For information in North America, call:** 800-ACROS-01**For emergencies in the US, call CHEMTREC:** 800-424-9300**Section 2 - Composition, Information on Ingredients**

CAS#	Chemical Name	Percent	EINECS/ELINCS
109-99-9	Tetrahydrofuran		203-726-8

**Section 3 - Hazards Identification****EMERGENCY OVERVIEW**

Not available.

**Target Organs:** Kidneys, central nervous system, liver, respiratory system, eyes.

### Potential Health Effects

**Eye:** Contact with eyes may cause severe irritation, and possible eye burns. Vapors may cause eye irritation. Contact may cause ulceration of the conjunctiva and cornea. Damage may be permanent.

**Skin:** May cause skin irritation. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. No sensitizing effects known.

**Ingestion:** Harmful if swallowed. May cause gastrointestinal irritation with nausea, vomiting and diarrhea.

**Inhalation:** Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation.

**Chronic:** Prolonged or repeated eye contact may cause conjunctivitis. Prolonged or repeated skin contact may cause defatting and dermatitis. May cause liver and kidney damage.

## Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

**Skin:** Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Discard contaminated clothing in a manner which limits further exposure.

**Ingestion:** If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Wash mouth out with water.

**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

**Notes to Physician:** Treat symptomatically and supportively.

## Section 5 - Fire Fighting Measures

**General Information:** Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. Forms peroxides of unknown stability. Flammable liquid and vapor.

**Extinguishing Media:** For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective.

**Flash Point:** -21 deg C ( -5.80 deg F)

**Autoignition Temperature:** 215 deg C ( 419.00 deg F)

**Explosion Limits, Lower:** 1.50 vol %

**Upper:** 12.00 vol %

**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. Use water spray to dilute spill to a non-flammable mixture. Remove all sources of ignition.

## Section 7 - Handling and Storage

**Handling:** Use only in a well-ventilated area. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Avoid ingestion and inhalation. Prevent build up of vapors to explosive concentration.

**Storage:** Keep away from heat, sparks, and flame. Store in a cool place in the original container and protect from sunlight. Keep from contact with oxidizing materials. Flammables-area. Regularly check inhibitor levels to maintain peroxide levels below 1%.

## 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 ventilation to keep airborne concentrations low.

### Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Tetrahydrofuran	50 ppm TWA; 100 ppm STEL; Skin - potential significant contribution to overall exposure by the cutaneous route	200 ppm TWA; 590 mg/m <sup>3</sup> TWA 2000 ppm IDLH	200 ppm TWA; 590 mg/m <sup>3</sup> TWA

**OSHA Vacated PELs:** Tetrahydrofuran: 200 ppm TWA; 590 mg/m<sup>3</sup> TWA

### Personal Protective Equipment

**Eyes:** Not available.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to minimize contact with skin.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

## Section 9 - Physical and Chemical Properties

**Physical State:** Clear liquid

**Appearance:** APHA: 5 max

**Odor:** fruity odor

**pH:** Not available.

**Vapor Pressure:** 200 mbar @20 deg C

**Vapor Density:** 2.5

**Evaporation Rate:**8 (n-Butyl Acetate=1)

**Viscosity:** 0.55 cP 20 deg C

**Boiling Point:** 66 deg C @ 760.00mm Hg

**Freezing/Melting Point:**-108.4 deg C

**Decomposition Temperature:**Not available.

**Solubility:** soluble in water

**Specific Gravity/Density:**.8880g/cm<sup>3</sup>

**Molecular Formula:**Not available.

**Molecular Weight:**72.11

## Section 10 - Stability and Reactivity

**Chemical Stability:** Prolonged exposure to air and sunlight may form unstable peroxides. Hygroscopic: absorbs moisture or water from the air.

**Conditions to Avoid:** Hygroscopic: absorbs moisture or water from the air., incompatible materials, light, excess heat, exposure to moist air or water.

**Incompatibilities with Other Materials:** Sodium hydroxide, caustics (e.g. ammonia, ammonium hydroxide, calcium hydroxide, potassium hydroxide, sodium hydroxide), oxidizing agents (strong, e.g. bromine, hydrogen peroxide, nitrogen dioxide, potassium nitrate), potassium hydroxide, bromine, metal halides.

**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide.

**Hazardous Polymerization:** May occur.

## Section 11 - Toxicological Information

**RTECS#:**

**CAS#** 109-99-9: LU5950000

**LD50/LC50:**

CAS# 109-99-9:

Inhalation, rat: LC50 = 21000 ppm/3H;

Oral, rat: LD50 = 1650 mg/kg;<BR.

**Carcinogenicity:**

CAS# 109-99-9:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** Not listed.
- **NTP:** Not listed.
- **IARC:** Not listed.

**Epidemiology:** No data available.**Teratogenicity:** No data available.**Reproductive Effects:** inh-rat TCL0: 5000 ppm/6H (6-19D preg)inh-mus TCL0: 1800 ppm/6H (6-17D preg)(see RTECS)**Mutagenicity:** mmo-esc: 1 µmol/l(see RTECS)**Neurotoxicity:** No data available.**Other Studies:**

## Section 12 - Ecological Information

**Ecotoxicity:** No data available. Blue-green algae, growth inhibition microcystis=225 mg/L (PH=7);Protozoa, cell multiplication inhibition test=858 mg/L.(See also Dictionary of Substances and Their Effects 1992).Biodegradation: 39% / 28DLog Pow = 0.45 (25°C)**Environmental:** In air, THF photodegrades by reaction with hydroxyl radicals with an estimated half-life of hours to a few days . It is soluble and expected to wash out in rain. In water, its fate is uncertain. Base on very limited evidence, THF is expected to biodegrade and not absorb into sediment. Tests in distilled water showed THF to last as follows: 0.5 mg/L for 1 to 2 days , 5 mg/L for 6 to 8 days, and 10 mg/L for 10 days.(See also Dictionary of Substances and Their Effects 1992).**Physical:** No information available.**Other:** No information available.

## 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# 109-99-9: waste number U213 (Ignitable waste).

## Section 14 - Transport Information



	<b>US DOT</b>	<b>Canada TDG</b>
<b>Shipping Name:</b>	TETRAHYDROFURAN	TETRAHYDROFURAN
<b>Hazard Class:</b>	3	3
<b>UN Number:</b>	UN2056	UN2056
<b>Packing Group:</b>	II	II
<b>Additional Info:</b>		FLASHPOINT -21 C

## Section 15 - Regulatory Information

### US FEDERAL

#### TSCA

CAS# 109-99-9 is listed on the TSCA inventory.

#### Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

#### Chemical Test Rules

CAS# 109-99-9: Testing required by manufacturers, processors; Test for Health Effects

#### Section 12b

CAS# 109-99-9: Section 4

#### TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

#### CERCLA Hazardous Substances and corresponding RQs

CAS# 109-99-9: 1000 lb final RQ; 454 kg final RQ

#### SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

#### SARA Codes

CAS # 109-99-9: acute, flammable, reactive.

**Section 313** No chemicals are reportable under Section 313.

#### Clean Air Act:

This material does not contain any hazardous air pollutants.

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# 109-99-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

#### California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

## **European/International Regulations**

### **European Labeling in Accordance with EC Directives**

#### **Hazard Symbols:**

XI F

#### **Risk Phrases:**

- R 11 Highly flammable.
- R 19 May form explosive peroxides.
- R 36/37 Irritating to eyes and respiratory system.

#### **Safety Phrases:**

- S 16 Keep away from sources of ignition - No smoking.
- S 29 Do not empty into drains.
- S 33 Take precautionary measures against static discharges.

#### **WGK (Water Danger/Protection)**

CAS# 109-99-9: 1

#### **Canada - DSL/NDSL**

CAS# 109-99-9 is listed on Canada's DSL List.

#### **Canada - WHMIS**

This product does not have a WHMIS classification.

#### **Canadian Ingredient Disclosure List**

CAS# 109-99-9 is

listed on the Canadian Ingredient Disclosure List.

# Material Safety Data Sheet

Water HPLC GRADE

ACC# 00199

## Section 1 - Chemical Product and Company Identification

**MSDS Name:** Water

**Catalog Numbers:** AC268300000, AC268300010, AC276010000, AC276010050, AC276010200, AC326650000, AC326650010, AC326650025, AC327390000, AC327390010, AC327390050, AC345470000, AC345470050, AC389390000, AC389390010, AC389390025, AC389400000, AC389400010, AC389400025, AC615150000, 26830-0025, 26830-0040, 61515-0025, NC9271177, NC9533256, W6-1, W6-4

**Synonyms:**

**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
7732-18-5	Water	100	231-791-2

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Appearance: water-white liquid.

Expected to be non-hazardous.

**Target Organs:** None.

#### Potential Health Effects

**Eye:** Non-irritating to the eyes.

**Skin:** Non-irritating to the skin.

**Ingestion:** No hazard expected in normal industrial use.

**Inhalation:** No hazard expected in normal industrial use.

**Chronic:** None

## Section 4 - First Aid Measures

**Eyes:** No specific treatment is necessary, since this material is not likely to be hazardous.

**Skin:** No specific treatment is necessary, since this material is not likely to be hazardous.

**Ingestion:** No specific treatment is necessary, since this material is expected to be non-hazardous.

**Inhalation:** No specific treatment is necessary since this material is not likely to be hazardous by inhalation.

**Notes to Physician:** Treat symptomatically and supportively.

## Section 5 - Fire Fighting Measures

**General Information:** Material will not burn.

**Extinguishing Media:** Not available.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 0; Flammability: 0; Instability: 0

## 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.

## Section 7 - Handling and Storage

**Handling:** No special handling procedures are required.

**Storage:** No special storage requirements.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** There are no special ventilation requirements.

### Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Water	none listed	none listed	none listed

**OSHA Vacated PELs:** Water: No OSHA Vacated PELs are listed for this chemical.

### Personal Protective Equipment

**Eyes:** Eye protection is not normally required.

**Skin:** Protective garments not normally required.

**Clothing:** Protective garments not normally required.

**Respirators:** Respirator protection is not normally required.

## Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** colorless - Clear - water-white

**Odor:** odorless

**pH:** Not available.

**Vapor Pressure:** 17.5 mm Hg @ 20 deg C.

**Vapor Density:** Not available.

**Evaporation Rate:** Not available.

**Viscosity:** 1 cP @ 20C

**Boiling Point:** 100 deg C

**Freezing/Melting Point:** Not available.

**Decomposition Temperature:** Not available.

**Solubility:** Not available.

**Specific Gravity/Density:** 1.000

**Molecular Formula:** H<sub>2</sub>O

**Molecular Weight:** 18.0134

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable.

**Conditions to Avoid:** None reported.

**Incompatibilities with Other Materials:** None.

**Hazardous Decomposition Products:** None.

**Hazardous Polymerization:** Will not occur.

## Section 11 - Toxicological Information

**RTECS#:**

**CAS#** 7732-18-5: ZC0110000

**LD50/LC50:**

CAS# 7732-18-5:

Oral, rat: LD50 = >90 mL/kg;

**Carcinogenicity:**

CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information found

**Teratogenicity:** No information found

**Reproductive Effects:** No information found

**Mutagenicity:** No information found

**Neurotoxicity:** No information found

**Other Studies:**

## Section 12 - Ecological Information

**Ecotoxicity:** No data available. No information available.

**Environmental:** Nonhazardous to the environment.

**Physical:** No information available.

**Other:** No information available.

## 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:** None listed.

## Section 14 - Transport Information

	<b>US DOT</b>	<b>Canada TDG</b>
<b>Shipping Name:</b>	NOT REGULATED FOR DOMESTIC TRANSPORT	Not Regulated.
<b>Hazard Class:</b>	XCP	
<b>UN Number:</b>		
<b>Packing Group:</b>		

## Section 15 - Regulatory Information

### US FEDERAL

#### TSCA

CAS# 7732-18-5 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.

#### CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

#### SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

**Section 313** No chemicals are reportable under Section 313.

#### Clean Air Act:

This material does not contain any hazardous air pollutants.

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# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

#### California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

## **European/International Regulations**

### **European Labeling in Accordance with EC Directives**

#### **Hazard Symbols:**

Not available.

#### **Risk Phrases:**

#### **Safety Phrases:**

#### **WGK (Water Danger/Protection)**

CAS# 7732-18-5: No information available.

#### **Canada - DSL/NDSL**

CAS# 7732-18-5 is listed on Canada's DSL List.

#### **Canada - WHMIS**

not available.

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

#### **Canadian Ingredient Disclosure List**