

SAFETY DATA SHEET

Revision Date 23-Feb-2022 Revision Number 7

1. Identification

Product Name 4-Chloro-1-butanol, balance THF and HCI

Cat No.: AC356310000; AC356310100; AC356311000; AC356315000

CAS No 928-51-8

Synonyms Tetramethylene chlorohydrin

Recommended Use Laboratory chemicals.

Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410
Fair Lawn, NJ 07410

Tel: (201) 796-7100

Emergency Telephone Number For information US call: 001-800-ACROS-01 / Europe call: +32 14 57 52 11

Emergency Number **US**:001-201-796-7100 / **Europe**: +32 14 57 52 99 **CHEMTREC** Tel. No.**US**:001-800-424-9300 / **Europe**:001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids
Corrosive to metals
Category 1
Acute oral toxicity
Category 4
Skin Corrosion/Irritation
Category 1
Serious Eye Damage/Eye Irritation
Carcinogenicity
Category 2
Specific target organ toxicity (single exposure)

Category 3

Category 3

Target Organs - Respiratory system.

Label Elements

Signal Word

Danger

Hazard Statements

Flammable liquid and vapor May be corrosive to metals Harmful if swallowed Causes severe skin burns and eye damage May cause respiratory irritation Suspected of causing cancer



Precautionary Statements

Prevention

Obtain special instructions before use

Do not handle until all safety precautions have been read and understood

Use personal protective equipment as required

Wash face, hands and any exposed skin thoroughly after handling

Do not eat, drink or smoke when using this product

Do not breathe dust/fume/gas/mist/vapors/spray

Use only outdoors or in a well-ventilated area

Keep away from heat/sparks/open flames/hot surfaces. - No smoking

Keep container tightly closed

Ground/bond container and receiving equipment

Use explosion-proof electrical/ventilating/lighting equipment

Use only non-sparking tools

Take precautionary measures against static discharge

Keep only in original container

Keep cool

Response

Immediately call a POISON CENTER or doctor/physician

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower

Wash contaminated clothing before reuse

Eves

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

Ingestion

Rinse mouth

Do NOT induce vomiting

In case of fire: Use CO2, dry chemical, or foam for extinction

Absorb spillage to prevent material damage

Storage

Store locked up

Store in a well-ventilated place. Keep container tightly closed

Store in corrosive resistant polypropylene container with a resistant inliner

Store in a dry place

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

May form explosive peroxides

WARNING. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
1-Butanol, 4-chloro-	928-51-8	>85
Hydrochloric acid	7647-01-0	8
Tetrahydrofuran	109-99-9	2

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is

required.

Eye ContactRinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

Immediate medical attention is required.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Remove and wash

contaminated clothing and gloves, including the inside, before re-use. Call a physician

immediately.

Inhalation If not breathing, give artificial respiration. Remove from exposure, lie down. Do not use

mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory

medical device. Call a physician immediately.

Ingestion Do NOT induce vomiting. Clean mouth with water. Never give anything by mouth to an

unconscious person. Call a physician immediately.

Most important symptoms and

effects

Causes burns by all exposure routes. Difficulty in breathing. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting: Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe

damage to the delicate tissue and danger of perforation

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water mist may be used to cool closed containers. CO 2, dry chemical, dry sand,

alcohol-resistant foam.

Unsuitable Extinguishing Media No information available

Flash Point 36 °C / 96.8 °F

Method - No information available

Autoignition Temperature

Explosion Limits

No information available

Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical

Thermal decomposition can lead to release of irritating gases and vapors. The product causes burns of eyes, skin and mucous membranes. Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back.

Hazardous Combustion Products

Revision Date 23-Feb-2022

Carbon monoxide (CO). Carbon dioxide (CO2). Hydrogen chloride gas.

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

HealthFlammabilityInstabilityPhysical hazards320N/A

6. Accidental release measures

Personal Precautions

Ensure adequate ventilation. Use personal protective equipment as required. Remove all sources of ignition. Take precautionary measures against static discharges. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Should not be released into the environment. See Section 12 for additional Ecological

Environmental Precautions

Information.

Methods for Containment and Clean Keep in suitable, closed containers for disposal. Soak up with inert absorbent material. **Up** Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling

Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Use only under a chemical fume hood. Do not breathe mist/vapors/spray. Do not ingest. If swallowed then seek immediate medical assistance. If peroxide formation is suspected, do not open or move container. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Take precautionary measures against static discharges.

Storage.

Keep container tightly closed. Refrigerator/flammables. Keep away from heat, sparks and flame. Corrosives area. Keep containers tightly closed in a dry, cool and well-ventilated place. Containers should be dated when opened and tested periodically for the presence of peroxides. Should crystals form in a peroxidizable liquid, peroxidation may have occurred and the product should be considered extremely dangerous. In this instance, the container should only be opened remotely by professionals. Incompatible Materials. Strong oxidizing agents. Acid anhydrides. Acid chlorides. Metals.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Hydrochloric acid	Ceiling: 2 ppm	Ceiling: 5 ppm Ceiling: 7 mg/m³ (Vacated) Ceiling: 5 ppm (Vacated) Ceiling: 7 mg/m³	IDLH: 50 ppm Ceiling: 5 ppm Ceiling: 7 mg/m³	Ceiling: 2 ppm
Tetrahydrofuran	TWA: 50 ppm STEL: 100 ppm Skin	(Vacated) TWA: 200 ppm (Vacated) TWA: 590 mg/m³ (Vacated) STEL: 250 ppm (Vacated) STEL: 735 mg/m³ TWA: 200 ppm TWA: 590 mg/m³	TWA: 590 mg/m ³	TWA: 200 ppm TWA: 590 mg/m³ STEL: 250 ppm STEL: 735 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures

Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations

and safety showers are close to the workstation location. Use explosion-proof

electrical/ventilating/lighting equipment.

Personal Protective Equipment

Eye/face Protection 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 and body protectionWear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection 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.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State Liquid Appearance Clear

Odor No information available
Odor Threshold No information available
pH No information available

Melting Point/Range No data available

Boiling Point/Range 58 - 60 °C / 136.4 - 140 °F @ 3 mmHg

Flash Point 36 °C / 96.8 °F **Evaporation Rate** No information available

Flammability (solid,gas) Not applicable

Flammability or explosive limits

Upper
LowerNo data available
No data availableVapor PressureNo information availableVapor DensityNo information available

Specific Gravity 1.089

Solubility
No information available
Partition coefficient; n-octanol/water
No data available

Autoignition TemperatureNo information availableDecomposition TemperatureNo information availableViscosityNo information available

Viscosity No informat Molecular Formula C4 H9 CI O

Molecular Weight 108.57

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Keep away from open flames, hot surfaces and sources of ignition. Incompatible products.

Incompatible Materials Strong oxidizing agents, Acid anhydrides, Acid chlorides, Metals

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO2), Hydrogen chloride gas

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous ReactionsNone under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Oral LD50 Category 4. ATE = 300 - 2000 mg/kg.

Category 4. ATE = 1000 - 2000 mg/kg. Based on ATE data, the classification criteria are **Dermal LD50**

not met. ATE > 2000 mg/kg.

Category 4. ATE = 10 - 20 mg/l. Based on ATE data, the classification criteria are not met. Vapor LC50

ATE > 20 mg/l.

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Hydrochloric acid	238 - 277 mg/kg (Rat)	> 5010 mg/kg (Rabbit)	1.68 mg/L (Rat)1 h
Tetrahydrofuran	1650 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	180 mg/L (Rat)1 h 53.9 mg/L (Rat)4 h

Toxicologically Synergistic

Products

Hygienists)

No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
1-Butanol, 4-chloro-	928-51-8	Not listed				
Hydrochloric acid	7647-01-0	Not listed				
Tetrahydrofuran	109-99-9	Group 2B	Not listed	A3	X	A3

IARC (International Agency for Research on Cancer)

IARC (International Agency for Research on Cancer)

Group 1 - Carcinogenic to Humans

Group 2A - Probably Carcinogenic to Humans Group 2B - Possibly Carcinogenic to Humans

A1 - Known Human Carcinogen

A2 - Suspected Human Carcinogen A3 - Animal Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

A1 - Confirmed Human Carcinogen A2 - Suspected Human Carcinogen

A3 - Confirmed Animal Carcinogen A4 - Not Classifiable as a Human Carcinogen

A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects No information available

ACGIH: (American Conference of Governmental Industrial

Mexico - Occupational Exposure Limits - Carcinogens

No information available. **Reproductive Effects**

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system STOT - repeated exposure None known

No information available **Aspiration hazard**

delayed

Symptoms / effects,both acute and Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting: Product is a corrosive material. Use of gastric lavage or emesis is contraindicated.

Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

Endocrine Disruptor Information

Component	EU - Endocrine Disrupters	EU - Endocrine Disruptors -	Japan - Endocrine Disruptor

	Candidate List	Evaluated Substances	Information
Tetrahydrofuran	Group III Chemical	Not applicable	Not applicable

Other Adverse Effects

The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

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Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Hydrochloric acid	-	282 mg/L LC50 96 h	=	56mg/L EC50 72h Daphnia
		Gambusia affinis		
		mg/L LC50 48 h Leucscus		
		idus		
Tetrahydrofuran	Not listed	2160 mg/l LC50 = 96 h	Not listed	EC50 48 h 3485 mg/l
		Pimephales promelas		EC50: >10000 mg/L/24h
		Leuciscus idus: LC50: 2820		_
		mg/L/48h		

Persistence and Degradability

Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation

No information available.

Mobility

Will likely be mobile in the environment due to its volatility.

Component	log Pow
Tetrahydrofuran	0.45

13. Disposal considerations

Waste Disposal Methods

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

	Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Tetral	nydrofuran - 109-99-9	U213	-

14. Transport information

DOT

UN-No UN2924

Proper Shipping Name Technical NameFlammable liquid, corrosive, n.o.s.
1-Butanol, 4-chloro-, Hydrochloric acid

Hazard Class 3
Subsidiary Hazard Class 8
Packing Group III

TDG

UN-No UN2924

Proper Shipping Name Flammable liquid, corrosive, n.o.s.

Hazard Class 3
Subsidiary Hazard Class 8
Packing Group III

IATA

UN-No UN2924

Proper Shipping Name Flammable liquid, corrosive, n.o.s.

Hazard Class 3
Subsidiary Hazard Class 8
Packing Group III

IMDG/IMO

UN-No UN2924

Proper Shipping Name Flammable liquid, corrosive, n.o.s.

Hazard Class 3 Subsidiary Hazard Class 8

Packing Group

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification -	TSCA - EPA Regulatory
			Active-Inactive	Flags
1-Butanol, 4-chloro-	928-51-8	X	ACTIVE	-
Hydrochloric acid	7647-01-0	X	ACTIVE	-
Tetrahydrofuran	109-99-9	X	ACTIVE	-

Legend:

TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)

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X - Listed

'-' - Not Listed

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT)

Not applicable

TSCA 12(b) - Notices of Export

Component	CAS No	TSCA 12(b) - Notices of Export
Tetrahydrofuran	109-99-9	Section 4, 1 % de minimus concentration

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
1-Butanol, 4-chloro-	928-51-8	Х	-	213-175-5	-	Χ	Х	-	Х	-
Hydrochloric acid	7647-01-0	Х	-	231-595-7	Χ	Χ	Х	Х	Х	KE-20189
Tetrahydrofuran	109-99-9	X	-	203-726-8	Х	X	Х	Х	X	KE-33454

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Hydrochloric acid	7647-01-0	8	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

51171 (515aii 11aisi 7151)				
Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Hydrochloric acid	X	5000 lb	-	-

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Hydrochloric acid	X		-

OSHA - Occupational Safety and

Not applicable

Health Administration

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Hydrochloric acid	-	TQ: 5000 lb

CERCLA Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs	
Hydrochloric acid	5000 lb	5000 lb	
Tetrahydrofuran	1000 lb	-	

California Proposition 65

This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Tetrahydrofuran	109-99-9	Carcinogen	-	Carcinogen

U.S. State Right-to-Know

Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Hydrochloric acid	X	X	X	X	X
Tetrahydrofuran	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland

This product contains the following DHS chemicals:

Security Legend - STQs = Screening Threshold Quantities, APA = A placarded amount

Component	DHS Chemical Facility Anti-Terrorism Standard
Hydrochloric acid	Release STQs - 15000lb (concentration >=37%)
·	Release STQs - 5000lb (anhydrous)
	Theft STQs - 500lb (anhydrous)

Other International Regulations

Mexico - Grade

No information available

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	,
Hydrochloric acid	-	Use restricted. See item 75. (see link for restriction details)	-
Tetrahydrofuran	-	Use restricted. See item 75. (see link for restriction details)	-

https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
1-Butanol, 4-chloro-	928-51-8	Not applicable	Not applicable	Not applicable	Not applicable
Hydrochloric acid	7647-01-0	Listed	Not applicable	Not applicable	Not applicable
Tetrahydrofuran	109-99-9	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	(2012/18/EC) -	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
1-Butanol, 4-chloro-	928-51-8	Not applicable	Not applicable	Not applicable	Not applicable
Hydrochloric acid	7647-01-0	25 tonne	250 tonne	Not applicable	Annex I - Y34
Tetrahydrofuran	109-99-9	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

Prepared By Regulatory Affairs

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Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard

replacing the current legislation under 29 CFR 1910.1200 to align with the Globally

Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS