



Name: MCF or (-)-(1R)-Menthylchloroformate 0.1 M in Chloroform  
 Code: 1-440003-200, 1-440003-500

..... **SAFETY DATA SHEET** .....

**SECTION 1 IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY** .....

- 1.1 Product Identifier
  - Name MCF or (-)-(1R)-Menthylchloroformate 0.1 M in Chloroform
  - Code 1-440003-200, 1-440003-500
- 1.2 Use of Substance/Mixture
  - Use Analytical reagent
- 1.3 Details of Manufacturer/Supplier
  - Company Regis Technologies, Inc.  
 8210 N. Austin Avenue  
 Morton Grove, IL 60053  
 847-967-6000; 800-323-8144 (toll free)  
 Email: cservice@registech.com  
 www.registech.com
- 1.4 Emergency Telephone
  - INFOTRAC 800-535-5053 [U.S.A.]

**SECTION 2 HAZARDS IDENTIFICATION** .....

- 2.1 Classification of the Substance or Mixture
  - GHS Classification

Health Hazards

Acute toxicity (oral)	Category 4	H302
Acute toxicity (inhalation)	Category 3	H331
Skin Corrosion / Irritation	Category 2	H315
Serious Eye Damage / Irritation	Category 2	H320
Carcinogenicity	Category 2	H351
Reproductive Toxin	Category 2	H361
Specific Target Organ Toxicity – Single Exposure, Narcotic Effects	Category 3	H336
Specific Target Organ Toxicity – Repeat Exposure, Causes damage to Kidney, Liver, Central Nervous System (CNS)	Category 1	H372

GHS Label Elements

Pictograms or hazard symbols



Signal Word Danger

Hazard Statement

- H302 – Harmful if swallowed.
- H315 + H320 – Causes skin and eye irritation.
- H331 – Toxic if inhaled.
- H336 – May cause drowsiness or dizziness.
- H351 – Suspected of causing cancer.
- H361 – May damage fertility or the unborn child.
- H372 – Caused damage to organs through prolonged or repeated exposure (kidney, liver, CNS).

Precautionary Statements

[Prevention] P261 - Avoid breathing vapours.

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[Response] P280 - Wear protective gloves/eye protection/face protection  
 P281 - Use personal protective equipment as require  
 P264 - Wash hands thoroughly after handling.  
 P362 - Take off contaminated clothing and wash before reuse.  
 P302+P352 - IF ON SKIN: Wash with plenty of soap and water.  
 P332+P313 - If skin irritation occurs: Get medical advice/attention.  
 P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
 P308+P313 - IF exposed or concerned: Get medical advice/attention.  
 [Storage] P402 + P404 - Store in a dry place. Store in a closed container.  
 P403 + P235 - Store in a well-ventilated place. Keep cool.

**SECTION 3 ..... COMPOSITION / INFORMATION ON INGREDIENTS .....**

Name MCF or (-)-(1*R*)-Menthylchloroformate 0.1 M in Chloroform

Synonyms Menthyl chloroformate, 0.1 M in Chloroform;  
 (-)-(1*R*)-Menthylchloroformate 0.1 M in Chloroform;  
 (-)-(1*R*)-Menthylchloroformate, optical purity NLT 98.0% ee

Hazardous components

Component	Classification	Concentration
Chloroform CAS No. 67-66-3 EC No. 200-663-8 Formula CHCl <sub>3</sub> Molecular Mass 119.3	Acute Tox. 4; Acute Tox. 3; Skin Irr. 2; Eye Irr. 2; Carc. 2; Repr. 2; STOT SE 3; STOT RE 1; H302, H315, H320, H331, H336, H351, H361d, H372	98.6%
Menthyl chloroformate CAS No. 14602-86-9 Formula C <sub>7</sub> H <sub>7</sub> ClF <sub>3</sub> NO <sub>2</sub> Molecular Mass 218.5	Eye Irr. 2; H320	1.4%

For full test of the H-Statements mentioned in this Section, see Section 16.

**SECTION 4 ..... FIRST AID MEASURES .....**

4.1 Description of first aid measures

General: Chloroform is a strong anesthetic.  
 Eye contact: Rinse eyes with plenty of water for at least 15 minutes; lift eyelids occasionally. If irritation persists, consult physician.  
 Skin contact: Immediately remove contaminated clothing and shoes, then wash skin with soap and plenty of water. If irritation persists, consult physician.  
 Inhalation: Remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration and keep person warm and at rest. Consult physician.  
 Ingestion: Give large amounts of water or milk (maximum two glasses). Avoid vomiting. Consult physician immediately.  
 Physician note: Symptomatic and supportive care. There is no specific antidote.

4.2 Most important symptoms and effects, both acute and delayed.

Cough, central nervous system effects with large or prolonged exposure (dizziness, headache, nausea, narcotic effects).  
 Long term exposure may cause liver damage.

4.3 Indication of immediate medical attention and special treatment needed.

No information available.



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**SECTION 5 ..... FIRE-FIGHTING MEASURES.....**

- 5.1 Suitable Extinguishing Media  
Use extinguishing measures that are appropriate to the local circumstances and the surrounding environment.
- 5.2 Specific hazards arising from the chemical.  
Not combustible. Negligible fire hazard.  
Chloroform is readily absorbed through skin. Immediately Dangerous to Life/Health (IDLH) at 500 ppm.  
Ambient fire may liberate hazardous vapors.  
Vapors are heavier than air.  
Emits toxic fumes under fire conditions: carbon oxides, chlorine, hydrogen chloride gas, phosgene
- 5.3 Advice for fire-fighters  
Wear personal protective equipment for flammable conditions and self-contained breathing apparatus (SCBA), if necessary.

**SECTION 6 ..... ACCIDENTAL RELEASE MEASURES.....**

- 6.1 Personal precautions, protective equipment, and emergency procedures  
For non-emergency personnel - Do not breath vapors. Avoid material contact. Evacuate unnecessary personnel from area, observe emergency procedures, consult an expert.  
  
For emergency responders – Protective equipment for chlorinated vapor conditions. See Section 8.3.
- 6.2 Environmental precautions  
Prevent material from entering drains.
- 6.3 Methods of clean up  
Evacuate unnecessary people from area. Isolate spilled material.  
Ventilate area. Eliminate all ignition sources. Use spark proof tools.  
If neat or in solution, mix with sand or similar inert adsorbent material or spill pillow.  
Sweep up, seal in appropriate hazardous waste container, and hold for proper waste disposal.  
Keep out of water supplies and sewers. Wash spill site after material pickup is complete.

**SECTION 7 ..... HANDLING AND STORAGE.....**

- 7.1 Safe Handling Precautions  
Avoid inhalation of vapor or mist. Avoid contact with skin or eyes. Wash hands and face thoroughly after handling.  
Handle in a dry, well ventilated area. Use local exhaust if vapor can be generated  
Wear suitable protective equipment to avoid contact with skin, eyes, or inhalation of vapors.  
Readily absorbed through skin. Wash thoroughly after handling. Immediately remove contaminated clothing.
- 7.2 Storage Conditions  
Store under inert gas. in a tightly sealed container. Store in a cool, dry, well ventilated place and store away from incompatible materials (See Section 10.). Suggested Storage Conditions: 2-8°C.

**SECTION 8 ..... EXPOSURE CONTROLS / PERSONAL PROTECTION.....**

- 8.1 Control parameters  
Exposure limits: Chloroform (67-66-3) –  
                          OSHA – PEL 50 ppm (240 mg/m3) Ceiling Limit  
                          ACGIH – TWA 10 ppm  
                          Immediately Dangerous to Life/Health (IDLH) at 500 ppm.  
Environmental Do not empty into drains.
- 8.2 Appropriate engineering controls  
Safety shower and eye wash  
Local exhaust and mechanical ventilation required. Hood recommended. Fume scrubber.

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8.3 Personal protection

Eye/Face Chemical safety eyewear or goggles  
 Hand Compatible chemical-resistant gloves: Rubber (e.g., natural rubber, neoprene, nitrile, or equivalent), Silver Shield®, Viton®  
 Respiratory NIOSH/MSHA or European Standard EN 149 approved respirator for Chloroform vapor and mists, if exposure limits are exceeded or irritation or other symptoms are experienced.  
 Dermal (not hand) Protective Clothing (e.g., lab coat)--flame retardant anti-static material recommended.  
 Hygiene Avoid inhalation, ingestion; contact with eyes, skin, and clothing; and prolonged or repeated exposure. Wash thoroughly after handling. Wash contaminated clothing before reuse. Discard contaminated footwear.  
 Protective material types - Viton®, Polyvinyl alcohol (PVA), Polyethylene (PE)

**SECTION 9 ..... PHYSICAL AND CHEMICAL PROPERTIES .....**

9.1 Information on physical and chemical data

Chemical Formula	CHCl <sub>3</sub>
Molecular Weight	119.3
Form	liquid
Appearance	colorless
Odor	mildly sweet odor
Odor threshold	200 ppm (causes olfactory fatigue)
pH	Not applicable
Melting/freezing point	-63.9°C; -83°F
Boiling point:	61.1°C; 142°F
Flammability (liquid, solid)	
Flash Point	Not flammable                      Method: not applicable
Flammable limits (%v/v)	UEL (upper explosive limit)              Not flammable LEL (lower explosive limit)              Not flammable
Autoignition temperature	> 1000°C; > 1832°F
Decomposition temperature	No data available
OSHA Flammability Class	Not applicable
Evaporation Rate (ether = 1.0)	0.56
Vapor pressure (mmHg)	16 mmHg at 20°C and 20.8 mm Hg at 25°C]
Vapor density (air=1):	4.1
Relative density	1.5 at 25°C
Water Solubility	0.8% at 25°C
Water reactive	No
Partition coefficient: N-octanol/water	log Kow = 1.97
Viscosity	No data available
% Volatiles	100%

**SECTION 10 ..... STABILITY AND REACTIVITY .....**

10.1 Reactivity

Stable at normal temperatures and pressures.

10.2 Chemical Stability

Stable at normal temperatures and pressures.

10.3 Possibility of hazardous reactions

Keep away from heat. Containers may rupture or explode if exposed to heat. Will attack some forms of plastics, rubber, and coatings. Avoid contact with incompatible substances and conditions due to generation of phosgene and other toxic and irritating substances.

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- 10.4 Conditions to avoid  
 Avoid incompatibilities. Protect from heat and ignition sources.  
 Keep out of water supplies and sewers.
- 10.5 Incompatible materials  
 Bases, reactive metals, metallic fines or powders, oxidizing materials, halogens, acetone, aluminum, disilane, magnesium, potassium, sodium
- 10.6 Hazardous decomposition products  
 Combustion carbon oxides, chlorine, phosgene, hydrogen chloride

**SECTION 11** ..... **TOXICOLOGICAL INFORMATION**.....

- 11.1 Toxicological Information
  - Acute toxicity No data available on mixture.
    - Oral Chloroform: LD50 Oral – Rat: 908-1336 mg/kg
    - Inhalation Chloroform: LC50 Inhalation – Rat: 8000-9770 mg/m<sup>3</sup> (4 hr)
    - Dermal Chloroform: LD50 Dermal – Rabbit >20,000 mg/kg
  - Skin corrosion/irritation Chloroform: Skin Rabbit: 10 mg/24 hr open skin, mild; 500 mg/24 hr skin, mild
  - Serious eye damage/irritation Chloroform: Eyes Rabbit: 148 mg; 20 mg/24 hr, moderate
  - Respiratory or skin sensitization No data available
  - Germ cell mutagenicity No data available
  - Carcinogenicity
    - IARC Chloroform: 2B - Group 2B: Possibly carcinogenic to humans
    - NTP Chloroform: Reasonably anticipated to be a human carcinogen
    - OSHA No data available
  - Reproductive toxicity/Teratogenicity Chloroform: Suspected of damaging fertility the unborn child .
  - STOT-single exposure Chloroform: May cause drowsiness or dizziness.
  - STOT-repeated exposure Chloroform: Target Organs: Liver, Kidney, Central Nervous System. Causes damaged to organs through repeated or prolonged exposure.
  - Aspiration hazard No data available on mixture.
  - RTECS Number Chloroform: FS9100000

- 11.2 Further Information  
 Menthyl chloroformate, in anhydrous form, can cause eye irritation.

**SECTION 12** ..... **ECOLOGICAL INFORMATION**.....

- 12.1 Ecotoxicity
  - Toxicity to Fish Chloroform: Rainbow trout LC50 43.8 mg/L 96 hour(s) (static)  
 Chloroform: Bluegill Sunfish LC50 100 mg/L 96 hour(s) (static)
  - Toxicity to Crustacea Chloroform: Daphnia magna (Water flea), LC50 28.9 mg/L 96 hour(s) (static)
- 12.2 Persistence and degradability No data available
- 12.3 Bioaccumulative potential Chloroform: BCF = 2.9-10.35; Bioconcentration potential in aquatic organisms is low.
- 12.4 Motility in soil No data available

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**Emergency Contact:**  
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12.5 Results of PBT and vPvB assessment No data available  
 12.5 Other adverse effects  
 Additional ecological information No data available  
 Do not discharge into the environment.

**SECTION 13 DISPOSAL CONSIDERATIONS**

13.1 Disposal methods  
 U . S. EPA Waste Codes D022  
 Waste Characterization (per U. S. regulations) RCRA Hazard Class (40CFR 261): Chloroform  
 Generator is responsible for proper waste characterization. NOTE: U. S. state hazardous waste regulations may differ considerably from U. S. Federal regulations.  
 Waste Disposal That which cannot be recovered or recycled, should be disposed of in accordance with all applicable international, national, regional, state, and local laws. Do NOT dump into any sewer, on ground, or into any body of water. Empty containers or equipment rinsate may be considered hazardous under regulations. Refer to the European Waste Catalogue (EWC) for appropriate code for disposal in the EC.

**SECTION 14 TRANSPORT INFORMATION**

14.1 UN number UN 1888  
 14.2 UN proper shipping name Chloroform solution  
 14.3 Transport Hazard Class 6.1  
 14.4 Packing group PG III  
 14.5 Environmental hazards Not applicable  
 14.6 RQ RQ 10 lbs (Chloroform)

**SECTION 15 REGULATORY INFORMATION**

15.1 Safety, health and Environmental regulations specific for the product in question.  
 NFPA: H2 F0 R0 HMIS: H2\* F0 PH0 (\*chronic health hazards)

15.2 Chemical Inventory Lists

	Menthyl Chloroformate	Chloroform
CAS Number	14602-86-9	67-66-3
TSCA:	N	Y
EINECS:	NL	Y
Number	NA	200-663-8
CERCLA [Section 103 (40 CFR 302.4)]:	NL	Y
RQ (lbs)	NL	10
RCRA Waste Code	NL	U044
OSHA Process Safety [29 CFR 1910.119]:	NL	NL
TQ (lbs)	NA	NA
Clean Air Act		
[Section 112r (40 CFR 68)]:	N	Y
TQ (lbs)	NA	20,000
Contains Ozone Depleters (Class I or Class II)	N	N
[Section 103 (40 CFR 302.4)]:	NL	NL
SARA Title III Notification [40 CFR 302.4]:		
Section 313 Ingredient [40 CFR 372.65]	N	Y
SARA Hazards Acute.....Y Chronic.....Y Fire.....N Pressure.....N Reactivity.....N		

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	Menthyl Chloroformate	Chloroform
CAS Number.....	14602-86-9	67-66-3
Section 302/304 (EHS) Ingredient [40 CFR 355.3].....	NL	Y
TPQ (lbs).....	NL	10,000
RQ (lbs).....	NL	10,000
State Lists:.....	NL	NL
States.....		CA, FL, MA, MN, NJ, PA
On CA 65 Significant Risk Level.....	N	Y

**WARNING: This product contains a chemical(s) known to the State of California to cause developmental toxicity. (Chloroform)**

**SECTION 16** ..... **OTHER INFORMATION** .....

16.1 Full test of H-Statements referred to under Section 2 and 3.

Acute Tox.	Acute Toxicity
Eye Irr.	Eye Irritant
H302	Harmful if swallowed.
H312	Harmful in contact with skin.
H331	Toxic if inhaled.
H315	Causes skin irritation.
H520	Causes eye irritation.
H336	May cause drowsiness or dizziness.
Skin Irr.	Skin Irritant
STOT-SE	Specific Target Organ Toxicity – Single Exposure
STOT-ME	Specific Target Organ Toxicity – Multiple Exposure

The above information is believed to be correct to the best of our present state knowledge, but does not purport to be all-inclusive and shall be used only as a guide. It characterizes the product with regard to the appropriate safety precautions. It does not represent a guarantee of any properties of the product.

***This is the last page of this MSDS.***

**Prepared by Regis Technologies, Inc.**