1. Identification

**Product identifier**: Benzyl Chloroformate

**Other means of identification**: Not available.

**Recommended use**: Industrial chemical.

**Recommended restrictions**: None known.

**Manufacturer / Importer / Supplier / Distributor information**

**Manufacturer**: VanDeMark Chemical Inc.

**Address**: 1 North Transit Road, Lockport, NY 14094 USA

**Telephone**: 716-433-6764

**e-mail**: sales@vdmchemical.com

**Emergency telephone**: CHEMTREC 1-800-424-9300 (North America)

2. Hazard(s) identification

**Physical hazards**

**Acute toxicity, inhalation**: Category 3

**Skin corrosion/irritation**: Category 1

**Serious eye damage/eye irritation**: Category 1

**Carcinogenicity**: Category 1B

**Specific target organ toxicity, single exposure**: Category 3 respiratory tract irritation

**Health hazards**

Not classified.

**OSHA hazard(s)**

Not classified.

**Label elements**

**Hazard symbol**

- Danger

**Signal word**

- Toxic if inhaled. Causes severe skin burns and eye damage. May cause cancer. May cause respiratory irritation.

**Hazard statement**

**Precautionary statement**

**Prevention**

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe mist. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection. Wash thoroughly after handling.

**Response**

If inhaled: Remove person to fresh air and keep comfortable for breathing. If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. If exposed or concerned: Get medical advice/attention.

**Storage**

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

**Disposal**

Dispose of contents/container in accordance with local/regional/national/international regulations.

**Hazard(s) not otherwise classified (HNOC)**

Not classified.

**Environmental hazards**

**Hazardous to the aquatic environment, acute hazard**: Category 1

**Hazardous to the aquatic environment, long-term hazard**: Category 1

3. Composition/information on ingredients

**Substance**
Hazardous components

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzyl chloroformate</td>
<td></td>
<td>501-53-1</td>
<td>&gt;= 98</td>
</tr>
</tbody>
</table>

Constituents

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzyl chloride</td>
<td>100-44-7</td>
<td>&lt;= 1.5</td>
</tr>
</tbody>
</table>

Composition comments

All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

**Inhalation**
Move injured person into fresh air and keep person calm under observation. Get medical attention immediately.

**Skin contact**
Immediately flush with plenty of water for at least 15 minutes. Get immediate medical attention. Chemical burns must be treated by a physician.

**Eye contact**
Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention immediately. Continue to rinse.

**Ingestion**
Immediately rinse mouth and drink plenty of water. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content does not get into the lungs. Get medical attention immediately.

Most important symptoms/effects, acute and delayed
Causes skin and eye burns.

Indication of immediate medical attention and special treatment needed
Treat symptomatically.

General information
First aid personnel must be aware of own risk during rescue.

5. Fire-fighting measures

**Suitable extinguishing media**
Foam. Carbon Dioxide. Dry powder.

**Unsuitable extinguishing media**
Water. Contact with water liberates toxic gas.

**Specific hazards arising from the chemical**
During fire, gases hazardous to health may be formed.

**Special protective equipment and precautions for firefighters**
Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace. Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire-fighting equipment/instructions
Use standard firefighting procedures and consider the hazards of other involved materials. Move container from fire area if it can be done without risk. Keep upwind.

6. Accidental release measures

**Personal precautions, protective equipment and emergency procedures**
Provide adequate ventilation. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Wear necessary protective equipment. See Section 8 of the MSDS for Personal Protective Equipment.

**Methods and materials for containment and cleaning up**
Absorb spillage with suitable absorbent material. Collect in containers and seal securely. Large Spillages: Dike far ahead of liquid spill for later disposal.

**Environmental precautions**
Do not allow to enter drains, sewers or watercourses.

7. Handling and storage

**Precautions for safe handling**
Mechanical ventilation or local exhaust ventilation is required. Avoid inhalation of vapors and spray mist and contact with skin and eyes. Wear appropriate personal protective equipment. Wash thoroughly after handling. Contaminated clothing and shoes must be discarded. Observe good industrial hygiene practices.

**Conditions for safe storage, including any incompatibilities**
Store at temperature at or below –15°C (5°F) in a dry, well-ventilated location. All equipment and storage vessels must be constructed of Teflon or glass-lined steel. Keep container tightly closed. Protect from sunlight and avoid any contact with iron. Product is stable when stored properly at recommended storage temperature. Storage in recommended temperatures and conditions will ensure product quality for minimum 12 months before retesting may be needed to determine assay. Storage in conditions between –15°C (5°F) and –5°C (23°F) may require retesting after 6 months to determine assay. Storage above 0°C (32°F) not recommended.
8. Exposure controls/personal protection

Occupational exposure limits

<table>
<thead>
<tr>
<th>Constituents</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzyl chloride (CAS 100-44-7)</td>
<td>PEL</td>
<td>5 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 ppm</td>
</tr>
</tbody>
</table>

US. ACGIH Threshold Limit Values

<table>
<thead>
<tr>
<th>Constituents</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzyl chloride (CAS 100-44-7)</td>
<td>TWA</td>
<td>1 ppm</td>
</tr>
</tbody>
</table>

US. NIOSH: Pocket Guide to Chemical Hazards

<table>
<thead>
<tr>
<th>Constituents</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzyl chloride (CAS 100-44-7)</td>
<td>Ceiling</td>
<td>5 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 ppm</td>
</tr>
</tbody>
</table>

Biological limit values
No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls
Provide adequate ventilation. Observe occupational exposure limits and minimize the risk of inhalation of vapors and mist. Provide easy access to water supply and eye wash facilities.

Individual protection measures, such as personal protective equipment

Eye/face protection
Use safety goggles and face shield in case of splash risk.

Skin protection

Hand protection
Wear appropriate chemical resistant gloves. Glove material: Fluoro carbon rubber (0.4 mm). Be aware that the liquid may penetrate the gloves. Frequent change is advisable. The most suitable glove must be chosen in consultation with the gloves supplier, who can inform about the breakthrough time of the glove material.

Other
Wear appropriate chemical resistant clothing.

Respiratory protection
Wear suitable respiratory protection. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits.

Thermal hazards
When material is heated, wear gloves to protect against thermal burns.

General hygiene considerations
Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned.

9. Physical and chemical properties

Appearance
Clear liquid.

Physical state
Liquid.

Form
Liquid.

Color
Clear.

Odor
Pungent.

Odor threshold
Not available.

pH
Not available.

Melting point/freezing point
Not available.

Initial boiling point and boiling range
305.6 °F (152 °C)

Flash point
258.8 °F (126 °C)

Evaporation rate
Not available.

Flammability (solid, gas)
Not applicable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%)
Not available.

Flammability limit - upper (%)
Not available.

Explosive limit - lower (%)
Not available.

Explosive limit - upper (%)
Not available.

Vapor pressure
Not available.
Vapor density
Not available.

Relative density
1.217 (20 °C)

Solubility(ies)
Not available.

Partition coefficient
(n-octanol/water)
Not available.

Auto-ignition temperature
Not available.

Decomposition temperature
Not available.

Viscosity
Not available.

10. Stability and reactivity
Reactivity
Water reactive material.

Chemical stability
Decomposes on heating. Decomposes in the presence of water.

Possibility of hazardous reactions
Thermal decomposition or combustion may liberate toxic gases or fumes. Contact with water liberates toxic gas.

Conditions to avoid

Incompatible materials

Hazardous decomposition products
Hydrogen chloride. Benzyl alcohol.

11. Toxicological information
Information on likely routes of exposure
Ingestion
May cause burns of the gastrointestinal tract if swallowed.

Inhalation
Vapors irritate the respiratory system, and may cause coughing and difficulties in breathing.

Skin contact
Corrosive effects. Causes skin burns.

Eye contact
Corrosive. Prolonged contact causes serious eye and tissue damage.

Symptoms related to the physical, chemical and toxicological characteristics
Contact with this material will cause burns to the skin, eyes and mucous membranes. Permanent eye damage including blindness could result.

Information on toxicological effects
Acute toxicity
Toxic if inhaled.

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzyl chloroformate (CAS 501-53-1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acute</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhalation</td>
<td>Rat</td>
<td>590 mg/m3, 4 hours</td>
</tr>
<tr>
<td>Oral</td>
<td>Rat</td>
<td>3 g/kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Constituents</th>
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<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzyl chloride (CAS 100-44-7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acute</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhalation</td>
<td>Rat</td>
<td>0.74 mg/l, 4 hours</td>
</tr>
<tr>
<td>Oral</td>
<td>Rat</td>
<td>340 mg/kg</td>
</tr>
</tbody>
</table>

Skin corrosion/irritation
Causes severe skin burns.

Serious eye damage/eye irritation
Causes serious eye damage.

Respiratory sensitization
No data available.

Skin sensitization
No data available.

Germ cell mutagenicity
No data available.

Carcinogenicity
May cause cancer.

IARC Monographs. Overall Evaluation of Carcinogenicity
Benzyl chloride (CAS 100-44-7) 2A Probably carcinogenic to humans.

Reproductive toxicity
No data available.

Specific target organ toxicity - single exposure
May cause respiratory irritation.
Specific target organ toxicity - repeated exposure
No data available.

Aspiration hazard
No data available.

Chronic effects
Frequent inhalation of dust over a long period of time increases the risk of developing lung diseases.

12. Ecological information

Ecotoxicity
Very toxic to aquatic life with long lasting effects.

<table>
<thead>
<tr>
<th>Constituents</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzyl chloride (CAS 100-44-7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Aquatic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crustacea</td>
<td>EC50</td>
<td>1.3 mg/l, 24 hours</td>
</tr>
<tr>
<td>Fish</td>
<td>LC50</td>
<td>4.4 - 5.6 mg/l, 96 hours</td>
</tr>
<tr>
<td>Fish</td>
<td>Fathead minnow (Pimephales promelas)</td>
<td>4 mg/l, 96 hours</td>
</tr>
<tr>
<td>Fish</td>
<td>Zebra danio (Danio rerio)</td>
<td>4 mg/l, 96 hours</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micro-organisms</td>
<td>EC50</td>
<td>2.97 mg/l, 30 minutes</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>2.25 mg/l, 15 minutes</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>1.92 mg/l, 5 minutes</td>
</tr>
</tbody>
</table>

Persistence and degradability
Decomposes in the presence of water.

Bioaccumulative potential
Partition coefficient n-octanol / water (log Kow)
Benzyl chloride 2.3

Mobility in soil
Not available.

Other adverse effects
Not available.

13. Disposal considerations

Disposal instructions
Dispose of in accordance with all applicable regulations. Do not discharge into drains, water courses or onto the ground.

Local disposal regulations
Dispose of in accordance with local regulations.

Hazardous waste code
D003: Waste Reactive material

Waste from residues / unused products
Dispersion recommendations are based on material as supplied. Dispersion must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

Contaminated packaging
Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT
UN number UN1739
UN proper shipping name Benzyl chloroformate, MARINE POLLUTANT
Transport hazard class(es) 8
Subsidiary class(es) Not available.
Packing group I
Special precautions for user Not available.
Labels required A3, A6, B4, N41, T10, TP2, TP12, TP13
Special provisions None
Packaging exceptions None
Packaging non bulk 201
Packaging bulk 243

IATA
UN number UN1739
UN proper shipping name Benzyl chloroformate
Transport hazard class(es) 8
Subsidiary class(es) -
Packing group I
Environmental hazards Yes
Labels required 8
ERG Code 8L
Special precautions for user Read safety instructions, MSDS and emergency procedures before handling.

IMDG
UN number UN1739
| UN proper shipping name                  | BENZYL CHLOROFORMATE, MARINE POLLUTANT |
| Transport hazard class(es)              | 8                                      |
| Subsidiary class(es)                    | -                                      |
| Packaging group                         | I                                      |
| Environmental hazards                   |                                        |
| Marine pollutant                        | Yes                                    |
| Labels required                         | 8                                      |
| EmS                                     | F-A, S-B                               |
| Special precautions for user            | Read safety instructions, MSDS and emergency procedures before handling. |
| Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code | No information available. |

### 15. Regulatory information

#### US federal regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

- **TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)**
  - Not regulated.

  - Not on regulatory list.

- **CERCLA Hazardous Substance List (40 CFR 302.4)**
  - Benzyl chloride (CAS 100-44-7) LISTED

- **Superfund Amendments and Reauthorization Act of 1986 (SARA)**
  - **Hazard categories**
    - Immediate Hazard - Yes
    - Delayed Hazard - Yes
    - Fire Hazard - No
    - Pressure Hazard - No
    - Reactivity Hazard - Yes
  - **SARA 302 Extremely hazardous substance**
    - No
  - **SARA 311/312 Hazardous chemical**
    - Yes

#### Other federal regulations

- **Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List**
  - Benzyl chloride (CAS 100-44-7)

- **Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)**
  - Not regulated.

- **Safe Drinking Water Act (SDWA)**
  - Not regulated.

- **Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number**
  - Benzyl chloride (CAS 100-44-7) 8570

- **Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))**
  - Benzyl chloride (CAS 100-44-7) 20 %WV

- **DEA Exempt Chemical Mixtures Code Number**
  - Benzyl chloride (CAS 100-44-7) 8568

- **Food and Drug Administration (FDA)**
  - Not regulated.

#### US state regulations

- **US. Massachusetts RTK - Substance List**
  - Benzyl chloride (CAS 100-44-7)

- **US. New Jersey Worker and Community Right-to-Know Act**
  - Benzyl chloride (CAS 100-44-7) 500 LBS

- **US. Pennsylvania RTK - Hazardous Substances**
  - Benzyl chloride (CAS 100-44-7)

- **US. Rhode Island RTK**
  - Benzyl chloride (CAS 100-44-7)
US. California Proposition 65
US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance
Benzyl chloride (CAS 100-44-7)

International Inventories

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
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<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
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<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>Yes</td>
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<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
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<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
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<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Yes</td>
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<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*A “Yes” indicates this product complies with the inventory requirements administered by the governing country(s)

16. Other information, including date of preparation or last version

Issue date 10-12-2012
Revision date 10-12-2012
Version # 03
Further information Not available.
References ECHA CHEM
International Chemical Safety Cards (ICSC)
GESTIS Substance Database

Disclaimer This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.