SAFETY DATA SHEET

SECTION 1: IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier:
2-ethylhexyl chloroformate

Synonym: Chloroformic acid 2-ethylhexyl ester
CAS number: 24468-13-1
EU number: 246-278-9
Registration number: 01-2119472148-35-0003; Transported isolated intermediate.

1.2. Relevant identified uses of the substance and uses advised against:
Organic synthesis intermediate for industrial use.

1.3. Details of the supplier of the safety data sheet:
FRAMOCHEM FRENCH-HUNGARIAN FINE CHEMICALS LTD.
3700 Kazincbarcika,
Szerviz str. 5., POB. 504
Telephone: +36 (48) 311-991
Fax: +36 (48) 512-162

1.3.1. Responsible person:
E-mail: info@framochem.hu

1.4. Emergency telephone number:
Public Toxicological Health Service (ETTSZ)
1096 Budapest, Nagyvárad tér 2.
Tel.: 06 1 476 6464, 06 80 201 199 (0-24 h)

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance:
Classification according to Regulation 1272/2008/EC (CLP):
Skin Irrit. 2 - H315
Eye Irrit. 2 - H319
Acute Tox. 1(inhalative) - H330
STOT SE 3 - H335

Warning H statements:
H315 – Causes skin irritation.
H319 – Causes serious eye irritation.
H330 – Fatal if inhaled.
H335 – May cause respiratory irritation.

Classification according to Directive 67/548/EEC:
T+; Very toxic – R26
Xi; Irritant - R 36/37/38

R phrases referring to the hazards/risks:
R 26 - Very toxic by inhalation
R 36/37/38 - Irritating to eyes, respiratory system and skin.

2.2. Label elements
IUPAC name: 2-ethylhexyl chloroformate
CAS number: 24468-13-1
FRAMOCHM FRENCH-HUNGARIAN FINE CHEMICALS LTD.
- Immediately remove the contaminated clothes.
- Immediately wash the contaminated area with plenty of flowing water and soap (for 15 minutes).
- If symptoms occur, obtain immediate medical attention and show him the label.

**IN CASE OF EYE CONTACT:**

**Measures:**
- Flush with plenty of flowing water for 15 minutes holding eyelids apart (for at least 15 minutes).
- In case of persistent symptoms, obtain medical help and show him the label.

4.2. **Most important symptoms and effects, both acute and delayed:**
See section 11 for information on health effects and symptoms.

4.3. **Indication of any immediate medical attention and special treatment needed:**
See section 11 for information on health effects and symptoms.

**SECTION 5: FIRE-FIGHTING MEASURES**

5.1. **Extinguishing media:**
5.1.1. Suitable extinguishing media:
Powder, carbon dioxide, foam.
5.1.2. Unsuitable extinguishing media:
Water.
5.2. **Special hazards arising from the substance or mixture:**
In case of fire, smoke and other combustion products (hydrochloric acid) may be formed, the inhalation of such combustion products can have serious adverse effects on health.

5.3. **Advise for firefighters**
Wear appropriate full protective clothing and self-contained breathing apparatus (self-rescue breathing apparatus). These means can protect from the skin and eye contact and from the inhalation of the hazardous gases and smoke.

**SECTION 6: ACCIDENTAL RELEASE MEASURES**

6.1. **Personal precautions, protective equipment and emergency procedures:**
6.1.1. For non-emergency personnel:
Keep unprotected people away, allow only well trained experts wearing suitable protective clothing to abide in the field of accident.
6.1.2. For emergency responders:
Evacuate the unauthorized persons for the place of the accident. Remove all ignition sources from the affected area. Close the designated area. Ensure adequate ventilation.

6.2. **Environmental precautions:**
Dispose of spillage and waste (product/packaging) in accordance with all applicable environmental laws. Do not allow the substance and the resulting waste to enter sewers/soil/surface or ground water. Notify the respective authorities in accordance with local law in the case of environmental pollution immediately.

6.3. **Methods and material for containment and cleaning up:**
Collect the spilled material with inert, non-combustible, mineral absorbent (sand, earth, perlite), then place into a suitable, closed, properly labelled chemical waste container till removal/disposal. During the collection/placement/disposal of the hazardous waste use appropriate personal protective equipment.

6.4. **Reference to other sections:**
For further and detailed information see section 8 and 13.

**SECTION 7: HANDLING AND STORAGE**

7.1. **Precautions for safe handling:**
Observe conventional hygiene precautions. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing, avoid inhalation. Do not eat, drink and smoke in the workplace. Use adequate personal protective equipment (see section 8). The contaminated clothes should be removed immediately and should be cleaned before re-use. After the handling of the product and before breaks or before eating wash your hands, after the work hours thorough washing (warm water hand washing and showering with soap) is required.

**Technical measures:**
Ensure adequate ventilation. Precautions against fire and explosion: No special measures required.

7.2. **Conditions for safe storage, including any incompatibilities:**

**FRAMOCHEM FRENCH-HUNGARIAN FINE CHEMICALS LTD.**

2-ethylhexyl chloroformate
Technical measures and storage condition:
- Keep in original, closed and appropriately labelled container.
- The place of storage has to be properly ventilated and cleanable.
- Store in cool and dry place.
- Follow all instructions on the label.
- Keep away from moisture.
- Incompatible materials: water, alcohols, amines, bases.
- Packaging material: Metal container lined with polyethylene, with inert material or polyethylene container.

7.3. Specific end use(s):
No specific instructions available.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters:

Exposure limit values:
The substance is not regulated with exposure limit value.

### DNEL

<table>
<thead>
<tr>
<th>Routes of exposure</th>
<th>Exposure frequency</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worker</td>
<td>Consumer</td>
<td></td>
</tr>
<tr>
<td>no data available</td>
<td>no data available</td>
<td>Dermal</td>
</tr>
<tr>
<td>no data available</td>
<td>no data available</td>
<td>Inhalative</td>
</tr>
<tr>
<td>no data available</td>
<td>no data available</td>
<td>Oral</td>
</tr>
</tbody>
</table>

### PNEC

<table>
<thead>
<tr>
<th>Exposure frequency:</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td></td>
</tr>
<tr>
<td>no data available</td>
<td>no data available</td>
</tr>
<tr>
<td>no data available</td>
<td>no data available</td>
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<tr>
<td>no data available</td>
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<td>no data available</td>
<td>no data available</td>
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<tr>
<td>no data available</td>
<td>no data available</td>
</tr>
</tbody>
</table>

8.2. Exposure controls:

In case of a hazardous material with no controlled concentration limit it is the employer’s duty to keep concentration levels down to a minimum achievable by existing scientific and technological means, where the hazardous substance poses no harm to workers.

8.2.1. Appropriate engineering controls

In pursuance of work is proper foresight needed to avoid spilling onto clothes and floors and to avoid contact with eyes and skin. Do not inhale the vapours.

Ensure adequate ventilation, especially in closed areas.

Do not eat or smoke during the processing.

Before the breaks and after the work hours wash thoroughly (hand and body).

In the vicinity of the workplace safety shower and eye wash fountain has to be installed.

The contaminated clothes should be removed immediately and should be cleaned before re-use.

8.2.2. Individual protection measures, such as personal protective equipment:

1. Eye/face protection: use appropriate protective glasses/protective mask according to EN 166.
2. Skin protection:
   a. Hand protection: use appropriate protective gloves according to EN 374.
   b. Other: use appropriate, acid resistant protective clothes according to EN ISO 6529.
3. Respiratory protection: use adequate respirator (for organic vapours) according to EN 136, EN 141.
4. Thermal hazard: None known.

8.2.3. Environmental exposure controls:
No special measures required.
The requirements detailed in Section 8 assume skilled work under normal conditions and usage of the product for appropriate aims. If conditions differ from normal or work is carried out under extreme conditions an expert’s advice should be sought out before deciding upon further protective measures.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test method</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Appearance:</td>
<td>colourless liquid</td>
<td></td>
</tr>
<tr>
<td>2. Odour:</td>
<td>unpleasant</td>
<td></td>
</tr>
<tr>
<td>3. Odour threshold:</td>
<td>no data available</td>
<td></td>
</tr>
<tr>
<td>4. pH value:</td>
<td>hydrolyses aqueous solution</td>
<td></td>
</tr>
<tr>
<td>5. Melting point/ freezing point:</td>
<td>&lt;-55 °C</td>
<td></td>
</tr>
<tr>
<td>6. Initial boiling point/boiling range:</td>
<td>degrades before boiling</td>
<td></td>
</tr>
<tr>
<td>7. Flash point:</td>
<td>86 °C /101 kPa closed cup</td>
<td></td>
</tr>
<tr>
<td>8. Evaporation rate:</td>
<td>no data available</td>
<td></td>
</tr>
<tr>
<td>9. Flammability:</td>
<td>no data available</td>
<td></td>
</tr>
<tr>
<td>10. Upper/lower flammability or explosive limits:</td>
<td>no data available</td>
<td></td>
</tr>
<tr>
<td>11. Vapour pressure:</td>
<td>20 °C: 0.21 x 10² Pa; 44 °C: 1 x 10² Pa</td>
<td></td>
</tr>
<tr>
<td>12. Vapour density:</td>
<td>6.6</td>
<td>air = 1</td>
</tr>
<tr>
<td>13. Relative density:</td>
<td>no data available</td>
<td></td>
</tr>
<tr>
<td>16. Self-ignition temperature:</td>
<td>235°C</td>
<td></td>
</tr>
<tr>
<td>17. Degradation temperature:</td>
<td>135 °C (ATD)</td>
<td>E = 250 J/G</td>
</tr>
<tr>
<td>18. Viscosity:</td>
<td>1.774mPaS (20 °C)</td>
<td></td>
</tr>
<tr>
<td>19. Explosive properties:</td>
<td>no data available</td>
<td></td>
</tr>
<tr>
<td>20. Oxidizing properties:</td>
<td>no data available</td>
<td></td>
</tr>
</tbody>
</table>

9.2. Other information:
Density (20 °C): 0.984 (water = 1)

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity:
At normal temperature, under 70 °C: stable at general conditions of work.

10.2. Chemical stability:
Stable at room temperature.

10.3. Possibility of hazardous reactions:
Reacts violently with water.

10.4. Conditions to avoid:
Contact with water. Strong heating.

10.5. Incompatible materials:
Bases, water, amines and alcohol.

10.6. Hazardous decomposition products:
In case of thermal decomposition: carbon dioxide, in case of hydrolysis: hydrochloric acid, carbon dioxide, and 2-ethylhexanol is formed.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects:
Acute toxicity: fatal if inhaled.
Skin corrosion/irritation: causes skin irritation.
Serious eye damage/eye irritation: causes serious eye irritation.
Respiratory or skin sensitisation: some chlorformates may cause sensitization.
Germ cell mutagenicity: none known.
Carcenogenity: the substance is not listed in the list of carcinogen substances.

2-ethylhexyl chloroformate
Reproductive toxicity: none known.
STOT—single exposure: may cause respiratory irritation.
STOT—repeated exposure: none known.
Aspiration hazard: none known.

11.1.1. For substances subject to registration, brief summaries of the information derived from the test conducted:
No data available.

11.1.2. Relevant toxicological properties of the hazardous substances:
LD50 (oral, rat) value: 5400 mg/kg.
LC50 (inhalative, rat): 0.27 mg/l/4h

11.1.3. Information on likely routes of exposure:
Ingestion, inhalation, skin contact, eye contact.

11.1.4. Symptoms related to the physical, chemical and toxicological characteristics:
Acute effects:
Ingestion: no data available.
Inhalation: toxic if inhaled.
Skin contact: irritating.
Eye contact: irritating to eyes.

11.1.5. Delayed and immediate effects as well as chronic effects from short and long-term exposure:
Causes skin irritation.
Causes serious eye irritation.
Fatal if inhaled.
May cause respiratory irritation.

11.1.6. Interactive effects:
No data available.

11.1.7. Absence of specific data:
No information.

11.1.8. Other information:
No data available.

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity:
No data available.

12.2. Persistence and degradability:
No data available about the substance.
The 2-ethylhexyl alcohol is slightly biodegradable.

12.3. Bioaccumulation potential:
No data available.

12.4. Mobility in soil:
No data available.

12.5. Results of PBT and vPvB assessment:
This substance does not meet the criteria of PBT or vPvB.

12.6. Other adverse effects:
No data available.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods:
Disposal according to the local regulations.

13.1.1. Information regarding the disposal of the product:
The product can be incinerated in a chemical incinerator equipped with an afterburner and scrubber.
European Waste Code:
No appropriate EWC code can be given for the substance, since the identification of the proper code can be done with the method of use defined by the user of the substance. The European waste code number has to be determined after a discussion with a specialist dealing with waste disposal.

13.1.2. Information regarding the disposal of the packaging:
Dispose according to the relevant regulations. The contaminated packaging should be cleaned with alkaline solution.

13.1.3. Physical/chemical properties that may affect waste treatment options shall be specified:
None known.
13.1.4. Sewage disposal:  
None known.

13.1.5. Special precautions for any recommended waste treatment:  
No data available.

SECTION 14: TRANSPORT INFORMATION

14.1. UN Number:  
2748

14.2. UN proper shipping name:  
2-ETHYLHEXYL CHLOROFORMATE

14.3. Transport hazard class(es):  
ADR/RID: 6.1. TC1  
IMDG: 6.1  
IATA: 6.1

14.4. Packaging group  
II

14.5. Environmental hazard  
ADR/RID: no  
IMDG: no  
IATA: no

14.6. Special precautions for user:  
Labels: 6.1+8

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code:  
Not applicable.

SECTION 15: REGULATORY INFORMATION

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


15.2. Chemical safety assessment: no information available.

SECTION 16: OTHER INFORMATION

Information regarding the revision of the safety data sheet:  
The safety data sheet has been revised according to Regulation 453/2010/EU (Section 1-16).  
The classification has been amended according to Regulation 1272/2008/EC (CLP) and its amendments.  
Full text of the abbreviations in the safety data sheet:  
DNEL: Derived no effect level.  
PNEC: Predicted no effect concentration.  
CMR effects: carcinogetnicity, mutagenicity and toxicity for reproduction.  
PBT: Persistent, bioaccumulative and toxic.  
PvPvB: very persistent and very bioaccumulative.  
n.d.: not defined.  
n.a.: not applicable.  
Data sources: n.d

Relevant R-Phrases (number and full text) of Section 2 and 3:
R 26 - Very toxic by inhalation
R 36/37/38 - Irritating to eyes, respiratory system and skin.

Relevant H-Phrases (number and full text) of Section 2 and 3:
H315 – Causes skin irritation.
H319 – Causes serious eye irritation.
H330 – Fatal if inhaled.
H335 – May cause respiratory irritation.

Training instructions: n.d.

This safety data sheet had been prepared on the basis of information provided by the manufacturer/supplier and conform to the relevant regulations. The information, data and recommendations contained herein are provided in good faith, obtained from reliable sources and believed to be true and accurate as of the date issued; however, no representation is made as to the comprehensiveness of the information. The SDS shall be used only as a guide for handling the product; in the course of handling and using the product other considerations may arise or be required. Users are cautioned to determine the appropriateness and applicability of the above information to their particular circumstances and purposes and assume all risk associated with the use of this product. It is the responsibility of the user to fully comply with local, national and international regulations concerning the use of this product.

Safety data sheet was prepared by: ToxInfo Kft.
Professional help regarding the explanation of the safety data sheet:
+36 70 335 8480; msds@msds-europe.com
Download of safety data sheet: