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

1.1 Product identifier.

Product Name: 4-Chlorobutanol
Product Code: 103600
Chemical Name: 4-Chlorobutanol
CAS No: 928-51-8
EC No: 213-175-5
Registration No: N/D

1.2 Relevant identified uses of the substance and uses advised against.

For manufacturing, processing, laboratory or repacking use only

Uses advised against:
Uses other than those recommended.

1.3 Details of the supplier of the safety data sheet.

Company: DC FINE CHEMICALS Ltd.
Address: Hill Top, 88
City: NW11 6DY London (United Kingdom)
Telephone: +44 (20) 7586 6800
Fax: +44 (20) 7504 1701
E-mail: info@dcfinechemicals.com
Web: www.dcfinechemicals.com

1.4 Emergency telephone number: (Only available during office hours)

SECTION 2: HAZARDS IDENTIFICATION.

2.1 Classification of the substance.
In accordance with Regulation (EU) No 1272/2008:
Flam. Liq. 3 : Flammable liquid and vapour.

2.2 Label elements.

Labelling in accordance with Regulation (EU) No 1272/2008:
Pictograms:

Signal Word: Warning
H statements: H226 Flammable liquid and vapour.

P statements:
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ventilating/lighting equipment.
P370+P378 In case of fire: Use appropriate elements to extinction.
P403+P235 Store in a well-ventilated place. Keep cool.
P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

Contains:
4-Chlorobutanol

2.3 Other hazards.
In normal use conditions and in its original form, the product itself does not involve any other risk for health and the environment.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS.

3.1 Substances.
Chemical Name: 4-Chlorobutanol
CAS No: 928-51-8
CE No: 213-175-5
Registration No: N/D

3.2 Mixtures.
Not Applicable.

SECTION 4: FIRST AID MEASURES.

4.1 Description of first aid measures.
In case of doubt or when symptoms of feeling unwell persist, get medical attention. Never administer anything orally to persons who are unconscious.

Inhalation.
If wearing contact lenses, remove them. If breathing is irregular or stops, perform artificial respiration. Do not administer anything orally. If unconscious, place them in a suitable position and seek medical assistance.

Eye contact.
If wearing contact lenses, remove them. Wash eyes with plenty of clean and cool water for at least 10 minutes while pulling eyelids up, and seek medical assistance.

Skin contact.
Remove contaminated clothing. Wash skin vigorously with water and soap or a suitable skin cleaner. NEVER use solvents or thinners.

Ingestion.
If accidentally ingested, seek immediate medical attention. Keep calm. NEVER induce vomiting.

4.2 Most important symptoms and effects, both acute and delayed.
No known acute or delayed effects from exposure to the product.

4.3 Indication of any immediate medical attention and special treatment needed.
In case of doubt or when symptoms of feeling unwell persist, get medical attention. Never administer anything orally to persons who are unconscious.

SECTION 5: FIREFIGHTING MEASURES.

Flammable product, the necessary prevention measures should be taken in order to avoid risks. In case of fire, the following measures are recommended:

5.1 Extinguishing media.
Recommended extinguishing methods.
Extinguisher powder or CO2. In case of more serious fires, also alcohol-resistant foam and water spray. Do not use a direct stream of water to extinguish.

5.2 Special hazards arising from the substance.
Special risks.
Fire can cause thick, black smoke. As a result of thermal decomposition, dangerous products can form: carbon monoxide, carbon dioxide. Exposure to combustion or decomposition products can be harmful to your health.

5.3 Advice for firefighters.
Use water to cool tanks, cisterns, or containers close to the heat source or fire. Take wind direction into account. Prevent the products used to fight the fire from going into drains, sewers, or waterways.

-Continued on next page.-
Fire protection equipment. According to the size of the fire, it may be necessary to use protective suits against the heat, individual breathing equipment, gloves, protective goggles or facemasks, and gloves.

**SECTION 6: ACCIDENTAL RELEASE MEASURES.**

6.1 Personal precautions, protective equipment and emergency procedures.
Eliminate possible ignition points and ventilate the area. Avoid breathing fumes. For exposure control and individual protection measures, see section 8.

6.2 Environmental precautions.
Prevent the contamination of drains, surface or subterranean waters, and the ground.

6.3 Methods and material for containment and cleaning up.
Pick up the spill with non-combustible absorbent materials (soil, sand, vermiculite, diatomite, etc.). Pour the product and the absorbent in an appropriate container. The contaminated area should be immediately cleaned with an appropriate de-contaminator. Pour the decontaminator on the remains in an opened container and let it act various days until no further reaction is produced.

6.4 Reference to other sections.
For exposure control and individual protection measures, see section 8. For later elimination of waste, follow the recommendations under section 13.

**SECTION 7: HANDLING AND STORAGE.**

7.1 Precautions for safe handling.
The fumes are heavier than air and can spread across the ground. They can form explosive mixtures with air. Prevent the creation of flammable or explosive fume concentrations in the air; prevent fume concentrations above work exposure limits. The product must only be used in areas where all unprotected flames and other ignition points have been eliminated. Electrical equipment has to be protected according to applicable standards.
The product can be electrostatically charged: always use earth grounds when transferring the product. Operators must use anti-static footwear and clothing, and floors must be conductors.
Keep the container tightly closed and isolated from heat sources, sparks, and fire. Do not use tools that can cause sparks. For personal protection, see section 8. Never use pressure to empty the containers. They are not pressure-resistant containers.
In the application area, smoking, eating, and drinking must be prohibited.
Follow legislation on occupational health and safety.
Keep the product in containers made of a material identical to the original.

7.2 Conditions for safe storage, including any incompatibilities.
Store according to local legislation. Observe indications on the label. Recommended storage temperature: +2 - +8ºC. Keep far from sources of heat and direct solar light. Keep far away from ignition points. Keep away from oxidising agents and from highly acidic or alkaline materials. Do not smoke. Prevent the entry of non-authorised persons. Once the containers are open, they must be carefully closed and placed vertically to prevent spills.
Classification and threshold amount of storage in accordance with Annex I to Directive 2012/18/EU (SEVESO III):

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Lower-tier requirements</th>
<th>Upper-tier requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>P5b</td>
<td>FLAMMABLE LIQUIDS</td>
<td>50</td>
<td>200</td>
</tr>
</tbody>
</table>

7.3 Specific end use(s).

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

8.1 Control parameters.

-Continued on next page.-
The product does NOT contain substances with Professional Exposure Environmental Limit Values. The product does NOT contain substances with Biological Limit Values.

8.2 Exposure controls.

Measures of a technical nature: Provide adequate ventilation, which can be achieved by using good local exhaust-ventilation and a good general exhaust system.

### Concentration:

<table>
<thead>
<tr>
<th>Uses:</th>
<th>For manufacturing, processing, laboratory or repacking use only</th>
</tr>
</thead>
</table>

### Breathing protection:

- If the recommended technical measures are observed, no individual protection equipment is necessary.

#### Hand protection:

- **PPE:** Protective gloves.
- **Characteristics:** «CE» marking, category II.
- **CEN standards:** EN 374-1, EN 374-2, EN 374-3, EN 420
- **Maintenance:** Keep in a dry place, away from any sources of heat, and avoid exposure to sunlight as much as possible. Do not make any changes to the gloves that may alter their resistance, or apply paints, solvents or adhesives.
- **Observations:** Gloves should be of the appropriate size and fit the user's hand well, not being too loose or too tight. Always use with clean, dry hands.

<table>
<thead>
<tr>
<th>Material: PVC (polyvinyl chloride)</th>
<th>Breakthrough time (min.): &gt; 480</th>
<th>Material thickness (mm): 0,35</th>
</tr>
</thead>
</table>

#### Eye protection:

- **PPE:** Face shield.
- **Characteristics:** «CE» marking, category II. Face and eye protector against splashing liquid.
- **CEN standards:** EN 165, EN 166, EN 167, EN 168
- **Maintenance:** Visibility through lenses should be ideal. Therefore, these parts should be cleaned daily. Protectors should be disinfected periodically following the manufacturer's instructions. Make sure that mobile parts move smoothly.
- **Observations:** Face shields should offer a field of vision with a dimension in the central line of, at least, 150 mm vertically once attached to the frame.

#### Skin protection:

- **PPE:** Protective clothing.
- **Characteristics:** «CE» marking, category II. Protective clothing should not be too tight or loose in order not to obstruct the user's movements.
- **CEN standards:** EN 340
- **Maintenance:** In order to guarantee uniform protection, follow the washing and maintenance instructions provided by the manufacturer.
- **Observations:** The protective clothing should offer a level of comfort in line with the level of protection provided in terms of the hazard against which it protects, bearing in mind environmental conditions, the user's level of activity and the expected time of use.

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CEN standards:</strong> EN ISO 13287, EN 20347</td>
<td><strong>Maintenance:</strong> This product adapts to the first user's foot shape. That is why, as well as for hygienic reasons, it should not be used by other people.</td>
</tr>
<tr>
<td><strong>Observations:</strong> Work footwear for professional use includes protection elements aimed at protecting users against any injury resulting from an accident.</td>
<td></td>
</tr>
</tbody>
</table>

### SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES.

9.1 Information on basic physical and chemical properties.

- **Appearance:** Liquid
- **Colour:** N.A./N.A.
- **Odour:** N.A./N.A.
- **Odour threshold:** N.A./N.A.
- **pH:** N.A./N.A.
- **Melting point:** N.A./N.A.
- **Boiling Point:** 52 °C
- **Flash point:** 36 °C
- **Evaporation rate:** N.A./N.A.
SECTION 10: STABILITY AND REACTIVITY.

10.1 Reactivity.
If the storage conditions are satisfied, does not produce dangerous reactions.

10.2 Chemical stability.
Stable under the recommended handling and storage conditions (see section 7).

10.3 Possibility of hazardous reactions.
Flammable liquid and vapour.

10.4 Conditions to avoid.
Avoid the following conditions:
- High temperature.
- Static discharge.
- Contact with incompatible materials.
- Avoid temperatures near or above the flash point. Do not heat closed containers. Avoid direct sunlight and heat, as these may cause a risk of fire.

10.5 Incompatible materials.
Avoid the following materials:
- Explosives materials.
- Toxic materials.
- Oxidizing materials.

10.6 Hazardous decomposition products.
In case of fire, dangerous decomposition products can be generated, such as carbon monoxide and dioxide and nitrogen fumes and oxides.

SECTION 11: TOXICOLOGICAL INFORMATION.

11.1 Information on toxicological effects.
Repeated or prolonged contact with the product can cause the elimination of oil from the skin, giving rise to non-allergic contact dermatitis and absorption of the product through the skin. Splatters in the eyes can cause irritation and reversible damage.

a) acute toxicity;
Not conclusive data for classification.

b) skin corrosion/irritation;
Not conclusive data for classification.

c) serious eye damage/irritation;
Not conclusive data for classification.

d) respiratory or skin sensitisation;
Not conclusive data for classification.

e) germ cell mutagenicity;
Not conclusive data for classification.

f) carcinogenicity;
Not conclusive data for classification.

g) reproductive toxicity;
Not conclusive data for classification.

h) STOT-single exposure;
Not conclusive data for classification.

i) STOT-repeated exposure;
Not conclusive data for classification.

j) aspiration hazard;
Not conclusive data for classification.

SECTION 12: ECOLOGICAL INFORMATION.

12.1 Toxicity.
No information is available regarding the ecotoxicity.

12.2 Persistence and degradability.
No information is available about persistence and degradability of the product.

12.3 Bioaccumulative potencial.
Information about the bioaccumulation.

<table>
<thead>
<tr>
<th>Name</th>
<th>Bioaccumulation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Log Pow</td>
</tr>
<tr>
<td>4-Chlorobutanol</td>
<td>0,85</td>
</tr>
<tr>
<td>N. CAS: 928-51-8 EC No: 213-175-5</td>
<td></td>
</tr>
</tbody>
</table>

12.4 Mobility in soil.
No information is available about the mobility in soil.
The product must not be allowed to go into sewers or waterways.
Prevent penetration into the ground.

12.5 Results of PBT and vPvB assessment.
No information is available about the results of PBT and vPvB assessment of the product.

12.6 Other adverse effects.
No information is available about other adverse effects for the environment.

SECTION 13 DISPOSAL CONSIDERATIONS.

13.1 Waste treatment methods.
Do not dump into sewers or waterways. Waste and empty containers must be handled and eliminated according to current, local/national legislation.

-Continued on next page.-
SECTION 14: TRANSPORT INFORMATION.

Transport following ADR rules for road transport, RID rules for railway, ADN for inner waterways, IMDG for sea, and ICAO/IATA for air transport.

**Land:** Transport by road: ADR, Transport by rail: RID.
Transport documentation: Consignment note and written instructions

**Sea:** Transport by ship: IMDG.
Transport documentation: Bill of lading

**Air:** Transport by plane: ICAO/IATA.
Transport document: Airway bill.

14.1 UN number.
UN No: UN1993

14.2 UN proper shipping name.
Description: UN 1993, FLAMMABLE LIQUID, N.O.S. (CONTAINS 4-CHLOROBUTANOL), 3, PG III, (D/E)

14.3 Transport hazard class(es).
Class(es): 3

14.4 Packing group.
Packing group: III

14.5 Environmental hazards.
Marine pollutant: No

14.6 Special precautions for user.
Labels: 3

Hazard number: 30
ADR LQ: 5 L

Provisions concerning carriage in bulk ADR: Not authorized carriage in bulk in accordance with ADR.
Transport by ship, FEm – Emergency sheets (F – Fire, S - Spills): F-E,S-E
Proceed in accordance with point 6.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code.
The product is not transported in bulk.

SECTION 15: REGULATORY INFORMATION.

15.1 Safety, health and environmental regulations/legislation specific for the substance.
Product classification according to Annex I of Directive 2012/18/EU (SEVESO III): P5b
The product is not affected by Regulation (EU) No 528/2012 concerning the making available on the market and use of biocidal products.
The product is not affected by the procedure established Regulation (EU) No 649/2012, concerning the export and import of dangerous chemicals.

15.2 Chemical safety assessment.
There has been no evaluation a chemical safety assessment of the product.
SECTION 16: OTHER INFORMATION.

Classification codes:

Flam. Liq. 3 : Flammable liquid, Category 3

Sections changed compared with the previous version:

1,2,14,16

It is advisable to carry out basic training with regard to health and safety at work in order to handle this product correctly.

Labelling in accordance with Directive 67/548/EEC:

R Phrases:
R10 Flammable.

Abbreviations and acronyms used:

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road.
BCF: Bioconcentration factor.
CEN: European Committee for Standardization.
EC50: Half maximal effective concentration.
PPE: Personal protection equipment.
IATA: International Air Transport Association.
LC50: Lethal concentration, 50%.
LD50: Lethal dose, 50%.
Log Pow: Logarithm of the partition octanol-water.
NOEC: No observed effect concentration.
RID: Regulations Concerning the International Transport of Dangerous Goods by Rail.

Key literature references and sources for data:
http://eur-lex.europa.eu/homepage.html
http://echa.europa.eu/


The information in this Safety Data Sheet on the Preparation is based on current knowledge and on current EC and national laws, as far as the working conditions of the users is beyond our knowledge and control. The product must not be used for purposes other than those that are specified without first having written instructions on how to handle. It is always the responsibility of the user to take the appropriate measures in order to comply with the requirements established by current legislation. The information contained in this Safety Sheet only states a description of the safety requirements for the preparation, and it must not be considered as a guarantee of its properties.