MATERIAL SAFETY DATA SHEET
ALUMINIUM CHLOROHYDRATE
POLY ALUMINIUM CHLORIDE
ULTRAFLOC 3000
MSDS 002/R5
2015-11-30

Section 1  PRODUCT AND COMPANY IDENTIFICATION

PRODUCT IDENTIFIER  Aluminium Chlorohydrate, Poly Aluminium Chloride
PRODUCT DESCRIPTION  ULTRAFLOC 3000, U3000 (Trade Names)
ACTIVE INGREDIENT  Aluminium Chlorohydrate
PRODUCT TYPE  Liquid
PRODUCT USE  A liquid, cationic aluminium chlorohydrate coagulant. Provides excellent coagulation for clarification of raw waste and water.

SUPPLIER DETAILS
NCP Chlorchem (Pty) Ltd
Cnr Allandale Road & Chloor Road
Chloorkop, Kempton Park
Tel No.: +27 11 921 3111
Fax No.: +27 11 976 3305

EMERGENCY NUMBER  +27 11 976 2115

SECTION 2  HAZARD IDENTIFICATION

CLASSIFICATION  Skin Corrosion/Irritant

SANS 10234: 2007 (GHS) label elements
SIGNAL WORD  Corrosive
HAZARD STATEMENTS  Causes mild skin irritation.

PRECAUTIONARY STATEMENTS

General  Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.
Response  If skin irritation occurs: Get medical attention.
Storage & Disposal  Refer to sections 7 & 13 respectively

HAZARDOUS COMPONENTS  Aluminium Chlorohydrate

RISK PHRASES  R34 (Causes burns)
R36 Irritating to eyes.
R37 Irritating to respiratory system.
R38 Irritating to skin.
SAFETY PHRASES

S1/2 (Keep locked up and out of reach of children)
S7/8 (Keep container tightly closed and dry)
S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S27 Immediately take off any contaminated clothing
S28 (After contact with skin, wash immediately with plenty of water).
S37 Wear suitable gloves
S38 In case of insufficient ventilation wear suitable respiratory equipment
S39 Wear suitable gloves and eye/face protection
S45 In case of accident or if you feel unwell, seek medical advice.
Immediately show label where possible

SECTION 3 COMPOSITION AND INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>Aluminium Chlorohydrate</th>
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<tbody>
<tr>
<td>CHEMICAL FAMILY</td>
<td>Polynuclear inorganic salt, Cationic flocculants</td>
</tr>
<tr>
<td>SYNONYMS</td>
<td>Aluminium Hydroxychloride, Poly Aluminium Chloride</td>
</tr>
<tr>
<td>SYNONYMS</td>
<td>Aluminium Hydroxychloride, Poly Aluminium Chloride, Aluminum Chlorohydrates</td>
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<tr>
<td>CHEMICAL FORMULA</td>
<td>Mixture$\text{Al}_x(\text{OH})<em>y\text{Cl}</em>{6-x}$ with $0&lt;x&lt;6$</td>
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<tr>
<td>CHEMICAL ABSTRACTS No.</td>
<td>12042-91-0</td>
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<td>EINECS No</td>
<td>234-933-1</td>
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<tr>
<td>UN No.</td>
<td>1760 (SANS 50883: 2007)</td>
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<tr>
<td>HAZCHEM CODE</td>
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There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

SECTION 4 FIRST AID MEASURES

PRODUCT IN EYE

Immediately flush the contaminated eye(s) with gently flowing water for 20-30 minutes, by the clock, while holding the eyelid(s) open. Check for and remove any contact lenses. Neutral saline solution may be used as soon as it is available. If irritation persists transport victim to an emergency care facility.

PRODUCT ON SKIN

Remove contaminated clothing and wash skin with plenty of running water for at least 20-30 minutes. If irritation persists transport victim to an emergency care facility. Wash contaminated clothing before re-use. Discard shoes and leather goods if these cannot be decontaminated by washing with water.

PRODUCT INGESTED

NEVER give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Remove denatures if any. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 240 to 300 ml of water. If vomiting occurs naturally, rinse mouth and repeat administration of water. Quickly transport victim to an emergency care facility for attention.
PRODUCT INHALED

Remove victim to fresh air and keep at rest in a position to aid in breathing. If breathing is difficult, oxygen may be beneficial if administered by trained personnel, preferably on a doctor's advice. Immediately transport victim to an emergency care facility.

NOTES TO PHYSICIAN

Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

PROTECTION OF FIRST-AIDERS

No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

SECTION 5 FIRE FIGHTING MEASURES

FIRE HAZARD SUMMARY

Aluminium chlorohydrate solutions will not burn or support combustion. Heating concentrated solutions may produce corrosive hydrogen chloride gas and hydrochloric acid. Well-sealed containers may rupture violently when exposed to fire or excessive heat for sufficient time.

EXTINGUISHING MEDIA

Aluminium chlorohydrate solutions will not burn or support combustion. Use extinguishing media appropriate for the surrounding fire.

FIRE FIGHTING INSTRUCTIONS

Evacuate area and fight fire from a safe distance. Approach the fire from upwind to avoid hazardous vapours and toxic decomposition products. Closed containers may rupture violently when exposed to the heat of the fire. If possible, isolate materials not yet involved in the fire, and move containers from the fire area if this can be done without risk, and protect personnel. Fire-exposed containers or tanks should be cooled by application of water spray. Take care not to get water inside container. Apply water from the side and from a safe distance until well after the fire is out. For a massive fire under these circumstances, it may be prudent to use unmanned hose holders or monitor nozzles.

PROTECTIVE CLOTHING

The decomposition products of aluminium chlorohydrate are corrosive. Chemical resistant clothing (e.g. chemical splash suit) and positive pressure self-contained breathing apparatus must be used.

SECTION 6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES

FOR NON-EMERGENCY PERSONNEL

No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
FOR EMERGENCY RESPONDERS

If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

ENVIRONMENTAL PRECAUTIONS

Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil and air).

METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP

LARGE SPILL: Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

SMALL SPILL: Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

SECTION 7 HANDLING AND STORAGE

PRECAUTIONS FOR SAFE HANDLING

Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapour or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse containers.

CONDITIONS FOR SAFE STORAGE INCLUDING ANY INCOMPATIBILITIES

STORAGE REQUIREMENTS

Store in cool place out of direct sun in rubber lined, plastic or FRP containers and avoid sources of potential contamination. Avoid temperatures above 40 ºC. Do not allow product to freeze. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

SUITABLE MATERIALS

PVC, HDPE, PP, PTFE, most rubbers

UNSUITABLE MATERIALS

Mild steel, iron, copper, aluminium and their alloys.
SECTION 8  EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS

NIOSH REL (USA)  TWA: 2 mg/m³ (10 Hours)

Appropriate engineering controls  No special ventilation requirements. Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

INDIVIDUAL PROTECTION MEASURES

Hygiene measures
Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations andsafety showers are close to the workstation location.

Eye/face protection
Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. Recommended: safety glasses with side-shields.

Hand protection
Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. 0 - 8 hours (breakthrough time): neoprene rubber.

Body protection
Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Recommended: Chemical/ Acid resistant overalls

Other skin protection
Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Recommended: Wear rubber boots or safety shoes.

Respiratory protection
Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

SECTION 9  PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE  Clear to slightly hazy colourless liquid.
ODOUR  Mild
pH  3.0 - 4.5
BOILING POINT/RANGE  > 110°C
FLASH POINT  Not flammable
FLAMMABILITY  Not applicable
EXPLOSIVE PROPERTIES  Not applicable
OXIDISING PROPERTIES  None
VAPOUR PRESSURE: Similar to water
SPECIFIC GRAVITY: 1.3 - 1.4
VISCOSITY: 40 - 100 cps @ 25°C
% ALUMINIUM CONTENT: 23-24% expressed in Al₂O₃
% VOLATILE BY VOLUME: ~50
SOLUBILITY - WATER: Complete

SECTION 10  STABILITY AND REACTIVITY

STABILITY

Stable

CONDITIONS TO AVOID

Heat, alkalis and metals.

INCOMPATIBLE MATERIALS

Strong oxidizing agent. Will corrode iron, copper and aluminium. Avoid contact with chlorite, hypochlorites, sulfites and strong alkalis.

HAZARDOUS POLYMERIZATION

Does not occur

HAZARDOUS DECOMPOSITION PRODUCTS

Thermal decomposition may liberate hydrogen gas and hydrogen chloride gas. Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11  TOXICOLOGICAL INFORMATION

POTENTIAL ACUTE HEALTH EFFECTS

Skin contact: Causes mild skin irritation.
Eye contact: Causes eye irritation.
Inhalation: No known significant effects or critical hazards.
Ingestion: Irritating to mouth, throat and stomach.

SYMPTOMS RELATED TO THE PHYSICAL, CHEMICAL AND TOXICOLOGICAL CHARACTERISTICS

Eye contact: Adverse symptoms may include pain or irritation, watering or redness
Inhalation: No specific data.
Skin Contact: Adverse symptoms may include irritation and redness
Ingestion: No specific data
DELAYED AND IMMEDIATE EFFECTS AND ALSO CHRONIC EFFECTS FROM SHORT AND LONG TERM EXPOSURE

Short term exposure
Potential delayed effects: No data available.
Potential immediate effects: No data available.

Long term exposure
Potential immediate effects: No data available.
Potential delayed effects: No data available.

POTENTIAL CHRONIC HEALTH EFFECTS

General: No known significant effects or critical hazards.
Carcinogenicity: No known significant effects or critical hazards.
Mutagenicity: No known significant effects or critical hazards.
Teratogenicity: No known significant effects or critical hazards.
Developmental effects: No known significant effects or critical hazards.
Fertility effects: No known significant effects or critical hazards.

NUMERICAL MEASURES OF TOXICITY

Acute toxicity estimates: No specific data available

SECTION 12 ECOLOGICAL INFORMATION

| AQUATIC TOXICITY - FISH          | Fish: Rainbow Trout 96 Hour LC50: 405 mg/L |
| AQUATIC TOXICITY - DAPHNIA      | Daphnia magna: 48 Hour LC50: 233.2 mg/L    |
| AQUATIC TOXICITY - ALGAE       | No data available                          |
| BIODEGRADABILITY               | No data available                          |
| BIO-ACCUMULATION               | No data available                          |
| MOBILITY                       | No data available                          |

SECTION 13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
The generation of waste should be avoided or minimized wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

DISPOSAL OF PACKAGING
Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
SECTION 14  TRANSPORT INFORMATION

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<th>UN No.</th>
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SECTION 15  REGULATORY INFORMATION

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<tr>
<td>SA NATIONAL STANDARDS</td>
<td>SANS 50883 : 2007 : Chemicals used for the treatment of water intended for human consumption – Polyaluminium Chloride Hydroxide</td>
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<td>SANS 11014 : 2010 : Safety Data Sheets for chemical Products</td>
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<td>SANS 10234 : Globally Harmonized System of classification and labelling of chemicals (GHS)</td>
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<td>SANS 10228 : Identification and Classification of Dangerous Goods for Transport by Road and Rail</td>
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SECTION 16  OTHER INFORMATION

<table>
<thead>
<tr>
<th>ABBREVIATIONS</th>
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<tr>
<td>GHS = Globally Harmonized System of Classification and Labelling of Chemicals</td>
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<tr>
<td>IATA = International Air Transport Association</td>
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<td>IBC = Intermediate Bulk Container</td>
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<td>IMDG = International Maritime Dangerous Goods</td>
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<tr>
<td>RID = The Regulations concerning the International Carriage of Dangerous Goods by Rail</td>
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<td>UN = United Nations</td>
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<tr>
<td>FRP = Fiberglass Reinforced Plastic (FRP)</td>
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<tr>
<td>PVC = Polyvinyl chloride</td>
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<tr>
<td>PP = Polypropylene</td>
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<tr>
<td>HDPE = High-density polyethylene</td>
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<tr>
<td>SS = Stainless steel</td>
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</table>
REFERENCES
1. Precious versions of the Hazard Data Sheet of this substance.
2. Material Safety Data Sheets & CHEMINFO; CCOHS
3. MSDS - Canadian Centre for Occupational Health and Safety Record No. 1790335 and references contained therein.
4. Supplier Safety Data Sheet : Toxnet
5. MSDS provided by external consultant
6. Identified SANS Standards

APPENDIX : APPROVALS

<table>
<thead>
<tr>
<th>MSDS REVISION DATE</th>
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<tr>
<td>2003-08-14</td>
<td>D D LIEBENBERG</td>
<td>MSDS 002/R2</td>
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<td>2009-05-28</td>
<td>H.H. MARINGA</td>
<td>MSDS 002/R3</td>
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<tr>
<td>2012-02-23</td>
<td>H.H. MARINGA</td>
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APPROVED BY         | VICTOR VAN ZYL – MANUFACTURING DIRECTOR |
DATE OF APPROVAL    | 2012-02-27                     |
| MSDS REVISION DATE | 2015-11-30                    |
| REVISED BY         | PAT GOVENDER                  |
| MOC No.            | MPQ/71/2015                   |

APPROVED BY         | RSV COLE – TECHNICAL DIRECTOR |
DATE OF APPROVAL    | 2015 – 12 – 02                |
“All information and instructions provided in this Material Safety Data Sheet (“MSDS”) in respect of the substance is given solely in terms of the provisions of the Occupational Health and Safety Act No 85 of 1993 and Regulations (“the Act”), is based on scientific and technical knowledge as at the date indicated on this MSDS, and is presented in good faith to be correct.

The information and instructions provided in this MSDS apply only to the substance in its present form and not to any formulation or mix, in which event it is the sole responsibility of the user of the substance as formulated and/or mixed to investigate and establish any danger which may arise out of its use, wherever such user may be situated.

It is the sole responsibility of the person in receipt of this MSDS, wherever such recipient may be situated, to ensure that the information provided is communicated to and understood by any person who may come in contact with the substance in any place and in any manner whatsoever. If such recipient produces formulations or mixes using the substance, then it is such recipient’s sole responsibility to comply with the provisions of the Act in respect of the provision of the necessary MSDS, or to comply with any other applicable legislation.”