SAFETY DATA SHEET

1. IDENTIFICATION

Product identifier

Product code: F1002
Product Name: FERRIC AMMONIUM OXALATE, GRANULAR

Other means of identification

Synonyms:
- Ethanedioic acid, ammonium iron(3+) salt (3:3:1), trihydrate
- Ethanedioic acid, iron (3+) ammonium salt, hydrate (3:1:3:3)
- Oxalic acid, ammonium iron (3+) salt (3:3:1), trihydrate
- Iron ammonium oxalate, (NH4)3Fe(C2O4)3, trihydrate
- Ammonium iron oxalate, (NH4)3Fe(C2O4)3, trihydrate

CAS #:
- 13268-42-3

RTECS #:
- LJ8932000 (for anhydrous form CAS no. 14221-47-7)

CI#:
- Not available

Recommended use of the chemical and restrictions on use

Recommended use:
- In photography. blueprints. Coloring of aluminum and aluminum alloys.

Uses advised against:
- No information available

Supplier:
- Spectrum Chemical Mfg. Corp
  14422 South San Pedro St.
  Gardena, CA  90248
  (310) 516-8000

Order Online At:
- https://www.spectrumchemical.com

Emergency telephone number
- Chemtrec 1-800-424-9300
Contact Person: Martin LaBenz (West Coast)
Contact Person: Ibad Tirmiz (East Coast)

2. HAZARDS IDENTIFICATION

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

<table>
<thead>
<tr>
<th>Hazard Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute toxicity - Oral</td>
<td>Category 4</td>
</tr>
<tr>
<td>Acute toxicity - Dermal</td>
<td>Category 4</td>
</tr>
<tr>
<td>Skin corrosion/irritation</td>
<td>Category 2</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation</td>
<td>Category 2</td>
</tr>
<tr>
<td>Specific target organ toxicity (single exposure)</td>
<td>Category 3</td>
</tr>
</tbody>
</table>

Label elements
Warning

Hazard statements
Harmful if swallowed
Harmful in contact with skin
Causes skin irritation
Causes serious eye irritation
May cause respiratory irritation

Precautionary Statements - Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection

Precautionary Statements - Response
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
IF ON SKIN: Wash with plenty of soap and water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash before reuse
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth

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

Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferric Ammonium Oxalate</td>
<td>13268-42-3</td>
<td>100</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES
4. FIRST AID MEASURES

First aid measures

General Advice:
Poison information centers in each State capital city can provide additional assistance for scheduled poisons (13 1126).

Skin Contact:
Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. Get medical attention. If skin irritation persists, call a physician.

Eye Contact:
Flush eyes with water for 15 minutes. Get medical attention.

Inhalation:
Move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:
Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Obtain medical attention.

Most important symptoms and effects, both acute and delayed

Symptoms
Causes serious eye irritation. Causes skin irritation. May cause central nervous system effects. May affect the liver (hepatotoxin). May affect the cardiovascular system. Irritating to mouth, throat and stomach. Burning sensation in the mouth and stomach. Irritating to respiratory system. May cause brownish discoloration of the eye lens.

Indication of any immediate medical attention and special treatment needed

Notes to Physician: Treat symptomatically

Protection of first-aiders

First-Aid Providers: Avoid exposure to blood or body fluids. Wear gloves and other necessary protective clothing. Dispose of contaminated clothing and equipment as bio-hazardous waste.

5. FIRE-FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media:
Dry chemical. Carbon dioxide (CO2). Water spray, mist, or foam.

Unsuitable Extinguishing Media:
No information available.

Specific hazards arising from the chemical

Hazardous Combustion Products:
Ammonia, carbon monoxide, nitrogen oxides

Specific hazards:
May be combustible at high temperatures

Special Protective Actions for Firefighters

Specific Methods:
No information available.

Special Protective Equipment for Firefighters:
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.
6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal Precautions: Ensure adequate ventilation. Keep people away from and upwind of spill/leak. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Avoid contact with skin, eyes and clothing. Use personal protective equipment.

Environmental precautions Prevent further leakage or spillage if safe to do so. Prevent product from entering drains. Prevent entry into waterways, sewers, basements or confined areas.

Methods and material for containment and cleaning up

Methods for containment Stop leak if you can do it without risk. Cover with plastic sheet to prevent spreading.

Methods for cleaning up Sweep up and shovel into suitable containers for disposal. Clean contaminated surface thoroughly.

7. HANDLING AND STORAGE

Precautions for safe handling

Technical Measures/Precautions: Provide sufficient air exchange and/or exhaust in work rooms. Keep away from incompatible materials.

Safe Handling Advice Wear personal protective equipment. Avoid contact with skin, eyes and clothing. Do not ingest. Do not breathe vapours/dust. Handle in accordance with good industrial hygiene and safety practice.

Conditions for safe storage, including any incompatibilities


8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

National occupational exposure limits

United States

<table>
<thead>
<tr>
<th>Components</th>
<th>OSHA</th>
<th>NIOSH</th>
<th>ACGIH</th>
<th>AIHA WHEEL</th>
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<tbody>
<tr>
<td>Ferric Ammonium Oxalate 13268-42-3</td>
<td>None</td>
<td>None</td>
<td>1 mg/m³ TWA (as Fe)</td>
<td>None</td>
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</tbody>
</table>

Canada

<table>
<thead>
<tr>
<th>Components</th>
<th>Alberta</th>
<th>British Columbia</th>
<th>Ontario</th>
<th>Quebec</th>
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<tbody>
<tr>
<td>Ferric Ammonium Oxalate 13268-42-3</td>
<td>None</td>
<td>None</td>
<td>1 mg/m³ TWA (as Fe)</td>
<td>1 mg/m³ TWAEV (as Fe)</td>
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Australia and Mexico

<table>
<thead>
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<th>Components</th>
<th>Australia</th>
<th>Mexico</th>
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</thead>
<tbody>
<tr>
<td>Ferric Ammonium Oxalate 13268-42-3</td>
<td>1 mg/m³ TWA (as Fe)</td>
<td>1 mg/m³ TWA (as Fe)</td>
</tr>
</tbody>
</table>

Product code: F1002
Product name: FERRIC AMMONIUM OXALATE, GRANULAR
Appropriate engineering controls

Engineering measures to reduce exposure: Ensure adequate ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Individual protection measures, such as personal protective equipment

Personal Protective Equipment

Eye protection: Goggles. or. Safety glasses with side-shields.

Skin and body protection: Chemical resistant apron. Gloves. Long sleeved clothing.

Respiratory protection: Effective dust mask.

Hygiene measures: Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. When using, do not eat, drink or smoke.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Solid</td>
</tr>
<tr>
<td>Appearance</td>
<td>Granular. Crystals.</td>
</tr>
<tr>
<td>Color</td>
<td>Green. Yellow-green.</td>
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<tr>
<td>Odor</td>
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</tr>
<tr>
<td>Taste</td>
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<tr>
<td>Formula</td>
<td>(NH4)3Fe(C2O4)3.3H2O</td>
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<tr>
<td>Upper Explosion Limit (%)</td>
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<td>Melting point/range(°C/°F)</td>
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<tr>
<td>Boiling point/range(°C/°F)</td>
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<tr>
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<tr>
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<tr>
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</tr>
<tr>
<td>Vapor pressure @ 20°C (kPa)</td>
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</tr>
<tr>
<td>Evaporation rate</td>
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</tr>
<tr>
<td>VOC content (g/L)</td>
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</tr>
<tr>
<td>Odor threshold (ppm)</td>
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</tr>
<tr>
<td>Viscosity</td>
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</tr>
<tr>
<td>Miscibility</td>
<td>No information available</td>
</tr>
<tr>
<td>Partition coefficient (n-octanol/water)</td>
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</tr>
<tr>
<td>Flashpoint Tested according to</td>
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<tr>
<td>Autoignition Temperature (°C/°F):</td>
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<tr>
<td>Lower Explosion Limit (%)</td>
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<tr>
<td>Upper Explosion Limit (%)</td>
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<tr>
<td>Boiling point/range(°C/°F)</td>
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<tr>
<td>Flashpoint Tested according to</td>
<td>No available</td>
</tr>
<tr>
<td>Autoignition Temperature (°C/°F):</td>
<td>No information available</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Reactivity
React with oxidizing agents
React with strong acids

Product code: F1002  Product name: FERRIC AMMONIUM OXALATE, GRANULAR
Chemical stability
Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: Hazardous polymerization does not occur


Other Information
Corrosivity: No information available

Special Remarks on Corrosivity: No information available

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Principal Routes of Exposure:
Ingestion. Inhalation. Skin.

Acute Toxicity

Component Information

_Ferric Ammonium Oxalate - 13268-42-3_

LD50/oral/rat = No information available
LD50/oral/mouse = No information available
LD50/dermal/rat = No information available
LD50/dermal/rabbit = No information available
LC50/inhalation/rat = No information available
LC50/inhalation/mouse = No information available
Other LD50 or LC50 information = No information available

Product Information

LD50/oral/rat = VALUE- Acute Tox Oral = No information available
LD50/oral/mouse = Value - Acute Tox Oral = No information available
LD50/dermal/rabbit
VALUE-Acute Tox Dermal = No information available
LD50/dermal/rat
VALUE -Acute Tox Dermal = No information available
LC50/inhalation/rat
VALUE-Vapor = No information available
VALUE-Gas = No information available
VALUE-Dust/Mist = No information available

Product code: F1002
Product name: FERRIC AMMONIUM OXALATE, GRANULAR
LC50/Inhalation/mouse
VALUE-Vapor = No information available
VALUE - Gas = No information available
VALUE - Dust/Mist = No information available

Symptoms

Skin Contact: Harmful in contact with skin. Causes skin irritation.

Eye Contact: Causes serious eye irritation.

Inhalation Irritating to respiratory system. Symptoms may include coughing and wheezing.

Ingestion Harmful if swallowed. Causes digestive (gastrointestinal) tract irritation. Symptoms may include a burning sensation in the mouth, throat, and stomach. May cause vomiting. May cause purging. May cause muscle cramps. May cause central nervous system effects (affect behavior). May cause headache. May affect the cardiovascular system. It may affect the cardiovascular system (weak and irregular pulse).

Aspiration hazard No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Chronic Toxicity Prolonged eye contact may cause a brownish discoloration of the eyes
Prolonged or repeated ingestion may affect the liver
Prolonged or repeated inhalation may affect the liver

Sensitization: No information available

Mutagenic Effects: No information available

Carcinogenic effects: No considered carcinogenic

<table>
<thead>
<tr>
<th>Components</th>
<th>IARC</th>
<th>ACGIH - Carcinogens</th>
<th>NTP</th>
<th>OSHA HCS - Carcinogens</th>
<th>Australia - Notifiable Carcinogenic Substances</th>
<th>Australia - Prohibited Carcinogenic Substances</th>
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</thead>
<tbody>
<tr>
<td>Ferric Ammonium Oxalate</td>
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<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
</tbody>
</table>

Reproductive toxicity No data is available

Reproductive Effects: No information available
Developmental Effects: No information available
Teratogenic Effects: No information available

Specific Target Organ Toxicity

STOT - single exposure Respiratory Tract.
STOT - repeated exposure No information available
Target Organs: Liver. Eyes.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Product code: F1002 Product name: FERRIC AMMONIUM OXALATE, GRANULAR
12. ECOLOGICAL INFORMATION

Ecotoxicity effects: No data available.
Persistence and degradability: No information available
Bioaccumulative potential: No information available
Mobility: No information available

13. DISPOSAL CONSIDERATIONS

Disposal Methods

Waste from residues / unused products:
Waste must be disposed of in accordance with Federal, State and Local regulation.

Contaminated packaging:
Empty containers should be taken for local recycling, recovery or waste disposal

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferric Ammonium Oxalate</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

14. TRANSPORT INFORMATION

DOT
UN-No: Not Regulated
Proper Shipping Name: No information available
Hazard Class: No information available
Subsidiary Risk: No information available
Packing Group: None
ERG No: No information available
Marine Pollutant: No data available
DOT RQ (lbs): 1000 lbs./454 kg

TDG (Canada)
UN-No: Not Regulated
Proper Shipping Name: No information available
Hazard Class: No information available
Subsidiary Risk: No information available
Packing Group: No information available
Description: No information available

ADR
UN-No: Not Regulated
Proper Shipping Name: No information available
Hazard Class: No information available
Packing Group: No information available
Subsidiary Risk: No information available
Classification Code: No information available
Description: No information available
CEFIC Tremcard No: No information available

Product code: F1002 Product name: FERRIC AMMONIUM OXALATE, GRANULAR
14. TRANSPORT INFORMATION

IMO / IMDG
- UN-No: Not Regulated
- Proper Shipping Name: No information available
- Hazard Class: No information available
- Subsidiary Risk: No information available
- Packing Group: No information available
- Description: No information available
- IMDG Page: No information available
- Marine Pollutant: No information available
- MFAG: No information available
- Maximum Quantity: No information available

RID
- UN-No: Not Regulated
- Proper Shipping Name: No information available
- Hazard Class: No information available
- Subsidiary Risk: No information available
- Packing Group: No information available
- Classification Code: No information available
- Description: No information available

ICAO
- UN-No: Not Regulated
- Proper Shipping Name: No information available
- Hazard Class: No information available
- Subsidiary Risk: No information available
- Packing Group: No information available
- Description: No information available

IATA
- UN-No: Not Regulated
- Proper Shipping Name: No information available
- Hazard Class: No information available
- Subsidiary Risk: No information available
- Packing Group: No information available
- Description: No information available

15. REGULATORY INFORMATION

International Inventories

<table>
<thead>
<tr>
<th>Components</th>
<th>U.S. TSCA</th>
<th>KOREA KECL</th>
<th>Philippines (PICCS)</th>
<th>Japan ENCS</th>
<th>CHINA</th>
<th>Australia (AICS)</th>
<th>EINECS-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferric Ammonium Oxalate</td>
<td>Not Listed</td>
<td>Not present</td>
<td>Not present</td>
<td>Not present</td>
<td>Not present</td>
<td>Present</td>
<td>Not present</td>
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</tbody>
</table>

U.S. Regulations

Ferric Ammonium Oxalate
- Massachusetts RTK: Present
- New Jersey RTK Hazardous Substance List: sn 0919
- New Jersey - Discharge Prevention - List of Hazardous Substances: Present
- Pennsylvanıa RTK: Present (iron salts)
- Pennsylvanıa RTK - Environmental Hazard List: Present (iron salts)
- Minnesota - Hazardous Substance List: Present (iron soluble salts)

Product code: F1002  Product name: FERRIC AMMONIUM OXALATE, GRANULAR

9 / 11

Chemicals Known to the State of California to Cause Cancer:
This product does not contain a chemical requiring a warning under California Prop. 65. (See table below)

Chemicals Known to the State of California to Cause Reproductive Toxicity:
This product does not contain a chemical requiring a warning under California Prop. 65. (See table below)

<table>
<thead>
<tr>
<th>Components</th>
<th>Carcinogen</th>
<th>Developmental Toxicity</th>
<th>Male Reproductive Toxicity</th>
<th>Female Reproductive Toxicity</th>
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<tbody>
<tr>
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<td>Not Listed</td>
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</table>

CERCLA/SARA

<table>
<thead>
<tr>
<th>Components</th>
<th>CERCLA - Hazardous Substances and their Reportable Quantities</th>
<th>Section 302 Extremely Hazardous Substances and TPQs</th>
<th>Section 302 Extremely Hazardous Substances and RQs</th>
<th>Section 313 - Chemical Category</th>
<th>Section 313 - Reporting de minimis</th>
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<tr>
<td>Ferric Ammonium Oxalate</td>
<td>1000 lbs./454 kg</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
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</table>

U.S. TSCA

<table>
<thead>
<tr>
<th>Components</th>
<th>TSCA Section 5(a)2 - Chemicals With Significant New Use Rules (SNURS)</th>
<th>TSCA 8(d) - Health and Safety Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferric Ammonium Oxalate</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
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</tbody>
</table>

Canada

WHMIS hazard class:
D2B Toxic materials

Canada Controlled Products Regulation:
This product has been classified according to the hazard criteria of the CPR (Controlled Products Regulation) and the MSDS contains all of the information required by the CPR.

Inventory

<table>
<thead>
<tr>
<th>Components</th>
<th>Canada (DSL)</th>
<th>Canada (NDSL)</th>
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</thead>
<tbody>
<tr>
<td>Ferric Ammonium Oxalate</td>
<td>Not Listed</td>
<td>Not Listed</td>
</tr>
</tbody>
</table>

EU Classification

R-phrase(s)
R21 - Harmful in contact with skin.
R22 - Harmful if swallowed.

Product code: F1002
Product name: FERRIC AMMONIUM OXALATE, GRANULAR
Avoid contact with skin and eyes.

<table>
<thead>
<tr>
<th>Components</th>
<th>Classification</th>
<th>Concentration Limits:</th>
<th>Safety Phrases</th>
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</thead>
<tbody>
<tr>
<td>Ferric Ammonium Oxalate</td>
<td></td>
<td>No information</td>
<td></td>
</tr>
</tbody>
</table>

The product is classified in accordance with Annex VI to Directive 67/548/EEC

Indication of danger:
Xn - Harmful.

Disclaimer:
All chemicals may pose unknown hazards and should be used with caution. This Safety Data Sheet (SDS) applies only to the material as packaged. If this product is combined with other materials, deteriorates, or becomes contaminated, it may pose hazards not mentioned in this SDS. The physical properties reported in this SDS are obtained from the literature and do not constitute product specifications. Information contained herein does not constitute a warranty, whether expressed or implied, as to the safety, merchantability or fitness of the goods for a particular purpose. Spectrum Chemicals & Laboratory Products, Inc. assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits, arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied. It shall be the user’s responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. While this SDS is based on technical data judged to be reliable, Spectrum assumes no responsibility for the completeness or accuracy of the information contained herein.

End of Safety Data Sheet