Material Safety Data Sheet
MSC3 Electrolyte

1. Product and company identification

<table>
<thead>
<tr>
<th>Product name</th>
<th>MSC3 Electrolyte</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade name</td>
<td>Electrolyte Formula MSC3</td>
</tr>
<tr>
<td>Material uses</td>
<td>Electrolyte solution.</td>
</tr>
<tr>
<td>Code</td>
<td>MSC3</td>
</tr>
</tbody>
</table>
| Supplier/Manufacturer | Marking Methods, Inc.  
301 S. Raymond Avenue  
Alhambra, CA 91803-1531  
Tel: (626)282-8823 |
| MSDS authored by      | KMK Regulatory Services Inc. |
| In case of emergency  | CHEMTREC, U.S. : 1-800-424-9300     International: +1-703-527-3887 |

2. Hazards identification

Emergency overview

<table>
<thead>
<tr>
<th>Physical state</th>
<th>Liquid.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Clear.</td>
</tr>
<tr>
<td>Odor</td>
<td>Not available.</td>
</tr>
<tr>
<td>Signal word</td>
<td>DANGER!</td>
</tr>
<tr>
<td>Hazard statements</td>
<td>OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION. MAY BE HARMFUL IF SWALLOWED. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.</td>
</tr>
</tbody>
</table>

Precautionary measures

Keep away from combustible material. Do not breathe vapor or mist. Do not ingest. Do not get in eyes. Avoid contact with eyes, skin and clothing. Use only with adequate ventilation. Keep container tightly closed. Wash thoroughly after handling.

OSHA/HCS status

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Routes of entry

Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects

**Inhalation**

Irritating to respiratory system. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

**Ingestion**

May be harmful if swallowed.

**Skin**

Irritating to skin.

**Eyes**

Severely irritating to eyes. Risk of serious damage to eyes.

Potential chronic health effects

**Chronic effects**

Contains material that may cause target organ damage, based on animal data.

**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.
2. Hazards identification

**Target organs**: Contains material which may cause damage to the following organs: blood, upper respiratory tract.

**Over-exposure signs/symptoms**

**Inhalation**: Adverse symptoms may include the following:
- respiratory tract irritation
- coughing

**Ingestion**: No specific data.

**Skin**: Adverse symptoms may include the following:
- irritation
- redness

**Eyes**: Adverse symptoms may include the following:
- pain or irritation
- watering
- redness

**Medical conditions aggravated by overexposure**: Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (Section 11)

3. Composition/information on ingredients

**United States**

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>6484-52-2</td>
<td>10 - 30</td>
</tr>
<tr>
<td>Citric acid</td>
<td>77-92-9</td>
<td>5 - 10</td>
</tr>
</tbody>
</table>

**Canada**

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
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<td>5 - 10</td>
</tr>
</tbody>
</table>

**Mexico**

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS number</th>
<th>UN number</th>
<th>%</th>
<th>IDLH</th>
<th>H</th>
<th>F</th>
<th>R</th>
<th>Special</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>6484-52-2</td>
<td>UN1942</td>
<td>10 - 30</td>
<td>-</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>OX</td>
</tr>
<tr>
<td>Citric acid</td>
<td>77-92-9</td>
<td>Not regulated.</td>
<td>5 - 10</td>
<td>-</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

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.

4. First aid measures

**Eye contact**: Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 20 minutes, occasionally lifting the upper and lower eyelids.

**Skin contact**: In case of contact, immediately flush skin with plenty of water for at least 20 minutes. Get medical attention if symptoms occur.

**Inhalation**: Move exposed person to fresh air. Get medical attention if symptoms occur.

**Ingestion**: Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Call medical doctor or poison control center immediately.

**Notes to physician**: No specific treatment. Treat symptomatically.
5. Fire-fighting measures

**Flammability of the product**: Contact with combustible material may cause fire. This material increases the risk of fire and may aid combustion.

**Extinguishing media**
- **Suitable**: Use an extinguishing agent suitable for the surrounding fire.
- **Not suitable**: None known.

**Special exposure hazards**: Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

**Hazardous thermal decomposition products**: Decomposition products may include the following materials: carbon dioxide, carbon monoxide, nitrogen oxides.

**Special protective equipment for fire-fighters**: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental release measures

**Personal precautions**: Shut off all ignition sources. No flares, smoking or flames in hazard area. Provide adequate ventilation. Put on appropriate personal protective equipment (see Section 8).

**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 or air).

**Methods for cleaning up**
- **Spill**: 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). Do not absorb in sawdust or other combustible material. It may lead to a fire risk when it dries out. Use spark-proof tools and explosion-proof equipment. Dispose 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.

7. Handling and storage

**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. Avoid contact with eyes, skin and clothing. Use only with adequate ventilation. Keep away from combustible material. Empty containers retain product residue and can be hazardous.

**Storage**: See NFPA 430, Code for the Storage of Liquid and Solid Oxidizers. Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Separate from reducing agents and combustible materials. 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 unlabeled containers. Use appropriate containment to avoid environmental contamination.
8. Exposure controls/personal protection

Canada

Occupational exposure limits
No exposure limit value known.

Mexico

Occupational exposure limits
No exposure limit value known.

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures: Personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures: No special ventilation requirements. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

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. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory: Not required under normal conditions of use. 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. Ensure a MSHA/NIOSH-approved respirator or equivalent is used.

Hands: Use gloves appropriate for work or task being performed. Recommended: Natural rubber (latex).

Eyes: Safety eyewear should be used when there is a likelihood of exposure. Recommended: Safety glasses with side shields.

Skin: 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: Lab Coat.

Environmental exposure controls: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

9. Physical and chemical properties

Physical state: Liquid.
Flash point: Not available.
Burning time: Not applicable.
Burning rate: Not applicable.
Auto-ignition temperature: Not available.
Flammable limits: Not available.
Color: Clear.
Odor: Not available.
Taste: Not available.
Molecular weight: Not applicable.
Molecular formula: Not applicable.
pH: 1.5 to 3
Boiling/condensation point: 100°C (212°F)
Melting/freezing point: 0°C (32°F)
Critical temperature: Not available.
Relative density: 1.1
9. Physical and chemical properties

**Vapor pressure**: Not available.
**Vapor density**: >1 [Air = 1]
**Vocality**: 0% (v/v)
**Odor threshold**: Not available.
**Evaporation rate**: Not available.
**SADT**: Not available.
**Viscosity**: Not available.
**Ionicity (in water)**: Not available.
**Dispersibility properties**: Not available.
**Solubility**: Complete.
**Physical/chemical properties comments**: Not available.

10. Stability and reactivity

**Chemical stability**: The product is stable.
**Conditions to avoid**: Drying on clothing or other combustible materials may cause fire.
**Incompatible materials**: Reactive or incompatible with the following materials: oxidizing materials, reducing materials, organic materials and alkalis.
**Hazardous decomposition products**: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
**Possibility of hazardous reactions**: Hazardous reactions or instability may occur under certain conditions of storage or use. Conditions may include the following: contact with combustible materials. Reactions may include the following: risk of causing or intensifying fire.

11. Toxicological information

**Acute toxicity**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Dose</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>LD50 Oral</td>
<td>Rat</td>
<td>2217 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Citric acid</td>
<td>LD50 Oral</td>
<td>Rat</td>
<td>3 g/kg</td>
<td></td>
</tr>
</tbody>
</table>

**Chronic toxicity**

There is no data available.

**Irritation/Corrosion**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Score</th>
<th>Exposure</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citric acid</td>
<td>Eyes - Severe irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 750 μg</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Skin - Moderate irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>0.5 mL</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Skin - Mild irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 500 mg</td>
<td>-</td>
</tr>
</tbody>
</table>

**Sensitizer**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Score</th>
<th>Exposure</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Skin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Respiratory</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Carcinogenicity**

There is no data available.

**Mutagenicity**

There is no data available.

**Teratogenicity**

There is no data available.
11. Toxicological information

**Reproductive toxicity**
There is no data available.

12. Ecological information

**Ecotoxicity**: No known significant effects or critical hazards.

**Aquatic ecotoxicity**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>LC50 &gt;9100 mg/l</td>
<td>Fish</td>
<td>96 hours</td>
</tr>
<tr>
<td></td>
<td>Chronic NOEC &gt;6 mg/L</td>
<td>Fish</td>
<td>96 hours</td>
</tr>
<tr>
<td></td>
<td>Fresh water</td>
<td>Cladocera</td>
<td>96 hours</td>
</tr>
<tr>
<td></td>
<td>Acute LC50 160000 ug/L</td>
<td>Crustaceans - Carcinus maenas - Adult</td>
<td>96 hours</td>
</tr>
</tbody>
</table>

**Persistence/degradability**
There is no data available.

13. Disposal considerations

**Waste disposal**: 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. 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 empty 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.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14. Transport information

<table>
<thead>
<tr>
<th>Regulatory information</th>
<th>UN number</th>
<th>Proper shipping name</th>
<th>Classes</th>
<th>PG*</th>
<th>Label</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOT Classification</td>
<td>UN3098</td>
<td>OXIDIZING LIQUID, CORROSIVE, N.O.S. (Ammonium nitrate, Citric acid)</td>
<td>5.1 (8)</td>
<td>II</td>
<td>![ ]</td>
<td>-</td>
</tr>
<tr>
<td>TDG Classification</td>
<td>UN3098</td>
<td>OXIDIZING LIQUID, CORROSIVE, N.O.S. (Ammonium nitrate, Citric acid)</td>
<td>5.1 (8)</td>
<td>II</td>
<td>![ ]</td>
<td>-</td>
</tr>
</tbody>
</table>
14. Transport information

| Mexico Classification | UN3098 | OXIDIZING LIQUID, CORROSIVE, N.O.S. (Ammonium nitrate, Citric acid) | 5.1 (8) | II | - |
| IMDG Class | UN3098 | OXIDIZING LIQUID, CORROSIVE, N.O.S. (Ammonium nitrate, Citric acid) | 5.1 (8) | II | - |
| IATA-DGR Class | UN3098 | OXIDIZING LIQUID, CORROSIVE, N.O.S. (Ammonium nitrate, Citric acid) | 5.1 (8) | II | - |

PG*: Packing group Exemption to the above classification may apply.  
AERG: 140

15. Regulatory information

United States

HCS Classification: Oxidizing material  
Irritating material  
Target organ effects

U.S. Federal regulations:  
TSCA 8(a) IUR Exempt/Partial exemption: Not determined  
United States inventory (TSCA 8b): All components are listed or exempted.  
SARA 302/304/311/312 extremely hazardous substances: No products were found.  
SARA 302/304 emergency planning and notification: No products were found.  
SARA 302/304/311/312 hazardous chemicals: Ammonium nitrate; Citric acid  
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Ammonium nitrate: Fire hazard, reactive; Citric acid: Immediate (acute) health hazard

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs): Not listed

Clean Air Act Section 602 Class I Substances: Not listed

Clean Air Act Section 602 Class II Substances: Not listed

DEA List I Chemicals (Precursor Chemicals): Not listed

DEA List II Chemicals (Essential Chemicals): Not listed

SARA 313
15. Regulatory information

<table>
<thead>
<tr>
<th>Product name</th>
<th>CAS number</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form R - Reporting requirements</td>
<td>Ammonium nitrate</td>
<td>6484-52-2</td>
</tr>
<tr>
<td>Supplier notification</td>
<td>Ammonium nitrate</td>
<td>6484-52-2</td>
</tr>
</tbody>
</table>

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations

- **Massachusetts**: The following components are listed: Ammonium nitrate
- **New York**: None of the components are listed.
- **New Jersey**: The following components are listed: Ammonium nitrate
- **Pennsylvania**: The following components are listed: Ammonium nitrate
- **California Prop. 65**: No products were found.

**Canada**

- **WHMIS (Canada)**: Class C: Oxidizing material.
  - Class E: Corrosive material

**Canadian lists**

- **Canadian NPR**: The following components are listed: Ammonium nitrate
- **CEPA Toxic substances**: None of the components are listed.
- **Canada inventory**: All components are listed or exempted.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

**Mexico**

- Classification: [Health 3, Flammability 0, Reactivity 0, Physical hazards 1, Special OX]

16. Other information

**Label requirements**: OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION. MAY BE HARMFUL IF SWALLOWED. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

- **Hazardous Material Information System (U.S.A.)**: Health: 3 * Flammability: 0 Physical hazards: 1

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

- **National Fire Protection Association (U.S.A.)**: Health: 3 Flammability: 0 Instability: 1 Special: OX

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MSC3 Electrolyte

16. Other information

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Canada

WHMIS (Canada) :

History

Date of issue mm/dd/yyyy : 05/15/2012
Date of previous issue : 03/15/2011
Version : 3

Notice to reader
To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.