Scientific Documentation

MA110, Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP

Not appropriate for regulatory submission. Please visit www.spectrumchemical.com or contact Tech Services for the most up-to-date information contained in this information package.

Spectrum Chemical Mfg Corp
769 Jersey Avenue
New Brunswick, NJ 08901
Phone 732.214.1300

Ver4.04 18.September.2019
Dear Customer,

Thank you for your interest in Spectrum’s quality products and services.

Spectrum has been proudly serving the scientific community for over 45 years. It is our mission to manufacture and distribute fine chemicals and laboratory products with Quality and delivery you can count on every time.

To accomplish our mission, Spectrum utilizes our sourcing leverage and supplier qualification expertise in offering one of the industry’s most comprehensive line of fine chemical products under one brand, in packaging configurations designed to meet your research and production requirements. Our product grades include: USP, NF, BP, EP, JP, FCC, ACS, KSA, Reagent grade, as well as DEA controlled substances. We operate facilities in the United States on the East Coast, West Coast, as well as in Shanghai, China in order to provide the best logistical support for our customers.

At Spectrum, Quality is priority number one. Suppliers with the best qualifications are preferred and we employ full-functioning in-house analytical laboratories at each of our facilities. Our facilities and systems are USFDA registered and ISO certified. We frequently host customer audits and cherish opportunities for improvements. Quality is engrained into our culture. Quality is priority number one.

In the following pages, we have designed and prepared documented scientific information to aid you in your initial qualification or your continual use of our products. Please do not hesitate to contact us if further information or the most up-to-date documentation is desired from any of the covered areas.

We appreciate your business and we look forward to hearing from you.

Sincerely,

Michael Dang
Director, Quality Systems & GMP Compliance
mdang@spectrumchemical.com

18. September. 2019
MA110, Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP

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## Specification for Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP (MA110)

<table>
<thead>
<tr>
<th>Item Number</th>
<th>MA110</th>
</tr>
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<tr>
<td>Item</td>
<td>Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP</td>
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<tr>
<td>CAS Number</td>
<td>7791-18-6</td>
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<td>Molecular Formula</td>
<td>MgCl₂·6H₂O</td>
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<tr>
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<table>
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<td>BARIUM</td>
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<td>POTASSIUM</td>
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<td>ELEMENTAL IMPURITIES</td>
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<td>IRON</td>
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<td>IDENTIFICATION</td>
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<td>RESIDUAL SOLVENTS</td>
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*Spectrum Chemical Mfg Corp*

**Corporate Headquarters:**
769 Jersey Ave.
New Brunswick, NJ 08901
732.214.1300

**West Coast Facility:**
14422 S. San Pedro St.
Gardena, CA 90248
310.516.8000
SAFETY DATA SHEET

Product code: MA110
Product Name: MAGNESIUM CHLORIDE, HEXAHYDRATE, CRYSTAL, USP, EP, BP

2. HAZARDS IDENTIFICATION

Classification
This chemical is not considered hazardous according to the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)
Not a dangerous substance or mixture according to the Globally Harmonized System (GHS)

Label elements
Not classified

Hazards not otherwise classified (HNOC)
Not Applicable

Other hazards
May be harmful if inhaled
3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Weight %</th>
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<tbody>
<tr>
<td>Magnesium Chloride, Hexahydrate</td>
<td>7791-18-6</td>
<td>100</td>
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</tbody>
</table>

4. FIRST AID MEASURES

First aid measures

General Advice: National Capital Poison Center in the United States can provide assistance if you have a poison emergency and need to talk to a poison specialist. Call 1-800-222-1222.

Skin Contact: Wash off immediately with soap and plenty of water removing all contaminated clothing and shoes. Get medical attention if irritation develops. Consult a physician if necessary.

Eye Contact: Flush eyes with water for 15 minutes. Get medical attention if irritation occurs. If symptoms persist, call a physician.

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. Consult a physician if necessary.

Most important symptoms and effects, both acute and delayed

Symptoms
- May cause eye/skin/respiratory tract irritation
- May cause diarrhea
- May cause loss of appetite
- May affect the cardiovascular system
- May cause central nervous system effects

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: The product is not flammable. If it is involved in a fire, extinguish the fire using an agent suitable for the type of surrounding fire.

Unsuitable Extinguishing Media: No information available.

Specific hazards arising from the chemical

Hazardous Combustion Products: No information available.

Specific hazards: When heated to decomposition it emits toxic fumes.
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. Use personal protective equipment. Avoid contact with skin, eyes and clothing.

Environmental precautions: Prevent further leakage or spillage if safe to do so. Prevent product from entering drains.

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 dust. Handle in accordance with good industrial hygiene and safety practice.

Conditions for safe storage, including any incompatibilities

Technical Measures/Storage Conditions: Keep container tightly closed in a dry and well-ventilated place. Store at room temperature in the original container. Store away from incompatible materials. Deliquescent.

Incompatible Materials: Oxidizing agents

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

National occupational exposure limits

United States

<table>
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<tr>
<th>Components</th>
<th>CAS-No.</th>
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<th>NIOSH</th>
<th>ACGIH</th>
<th>AIHA WEEL</th>
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Canada

Product code: MA110
Product name: MAGNESIUM CHLORIDE, HEXAHYDRATE, CRYSTAL, USP, EP, BP
<table>
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<th>Components</th>
<th>CAS-No.</th>
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**Australia and Mexico**

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<td>Magnesium Chloride, Hexahydrate</td>
<td>7791-18-6</td>
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<td>None</td>
</tr>
</tbody>
</table>

**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:** Safety glasses with side-shields.

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

**Respiratory protection:** Effective dust mask. Use a dust respirator under conditions where exposure to the substance is apparent (e.g. generation of high concentration of dust (dust clouds) , inadequate ventilation, development of respiratory tract irritation), and engineering controls are not feasible. Be sure to use an approved/certified respirator or equivalent.

**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

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<tr>
<th>Property</th>
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<td>Molecular/Formula weight (g/mole):</td>
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<td>Formula:</td>
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<td>Flammability:</td>
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<td>Flash Point Tested according to:</td>
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<td>Lower Explosion Limit (%):</td>
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<td>Flashpoint (°C/°F):</td>
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<td>Boiling point/range(°C/°F):</td>
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<td>Product code:</td>
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<tr>
<td>Product name:</td>
<td>MAGNESIUM CHLORIDE, HEXAHYDRATE, CRYSTAL, USP, EP, BP</td>
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</tbody>
</table>
10. STABILITY AND REACTIVITY

Reactivity
Reactive with oxidizing agents
Attacks metals in the presence of moisture. Strong oxidizing agents will release chlorine. At 100°C, it loses 2 H2O. At 110°C, it begins to lose some HCl. Absorbs moisture from the air.

Chemical stability

Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: Hazardous polymerization does not occur

Conditions to avoid: Incompatible materials.

Incompatible Materials: Oxidizing agents

Hazardous decomposition products: No information available.

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.

Acute Toxicity

Component Information

Magnesium Chloride, Hexahydrate
CAS-No. 7791-18-6
LD50/oral/rat = 8100 mg/kg Oral LD50 Rat
LD50/oral/mouse = 7600 mg/kg LD50 Oral Mouse
LD50/dermal/rabbit = No information available
LD50/dermal/rat = 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 = 8100 mg/kg

LD50/oral/mouse =
Value - Acute Tox Oral = 7600 mg/kg

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

LC50/Inhalation/mouse
VALUE-Vapor = No information available
VALUE - Gas = No information available
VALUE - Dust/Mist = No information available

Symptoms

Skin Contact: May cause skin irritation.
Eye Contact: May cause eye irritation.
Inhalation May cause irritation of respiratory tract.
Ingestion Low hazard for usual industrial handling. Magnesium salts are absorbed very slowly from the gastrointestinal tract, and normally can be tolerated orally in fairly large amounts with no significant accumulation of magnesium, except in individuals with kidney dysfunction. Symptoms reported from magnesium chloride overdose include diarrhea, loss of appetite, hypotension, cardiac arrhythmias, respiratory depression, neuromuscular impairment, effects on behavior/central nervous system (depression, somnolence, excitement), loss of reflexes, and death in respiratory arrest.

Aspiration hazard No information available.

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

Chronic Toxicity Prolonged or repeated ingestion may have an effect on spleen, pancreas (hypoglycemia), liver, the kidneys, and effects on calcium and potassium levels in the blood based on animal data. Note: If used under conditions generating fumes, there is a risk of developing metal fume fever (a flu-like condition) if the fumes are inhaled. Symptoms of metal fume fever are chills, fever, labored breathing, and
aches and pains which generally develop within a few hours after exposure, and subsides within 24 to 48 hours.

Sensitization:  
No information available.

Mutagenic Effects:  
No information available

Carcinogenic effects:  
Not considered carcinogenic.

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>IARC</th>
<th>ACGIH - Carcinogens</th>
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<th>OSHA HCS - Carcinogens</th>
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</tbody>
</table>

**ACGIH (American Conference of Governmental Industrial Hygienists)**  
**IARC (International Agency for Research on Cancer)**  
**NTP (National Toxicology Program)**  
**OSHA (Occupational Safety and Health Administration of the US Department of Labor)**

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  
No information available.

STOT - repeated exposure  
No information available.

Target Organs:  
No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity

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:

Product code:  MA110

Product name:  Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP
Empty containers should be taken for local recycling, recovery or waste disposal

<table>
<thead>
<tr>
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14. TRANSPORT INFORMATION

**DOT**
- UN-No: Not Regulated
- Proper Shipping Name: No information available
- Hazard Class: No information available
- Subsidiary Class: No information available
- Packing group: No information available
- Emergency Response Guide Number: No information available
- Marine Pollutant: No data available
- DOT RQ (lbs): No information available
- Special Provisions: No Information available
- Symbol(s): No information available
- Description: No information available

**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
- Marine Pollutant: 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

**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
- Marine Pollutant: 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

**ICAO**
- UN-No: Not Regulated
- Proper Shipping Name: No information available

Product code: MA110
Product name: MAGNESIUM CHLORIDE, HEXAHYDRATE, CRYSTAL, USP, EP, BP
Hazard Class: No information available
Subsidiary Risk: No information available
Packing Group: 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
ERG Code: No information available
Special Provisions: No information available

15. REGULATORY INFORMATION

International Inventories

<table>
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<th>Components</th>
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<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>
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<tbody>
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<td>Magnesium Chloride, Hexahydrate</td>
<td>7791-18-6</td>
<td>Not listed. It is exempt from TSCA 8(b) Inventory listing since it is a hydrate. However, the anhydrous form (CAS number 7786-30-3) is listed as ACTIVE in the TSCA 8(b) Inventory.</td>
<td>Not present</td>
<td>Present</td>
<td>Present (1)-233</td>
<td>Present</td>
<td>Present</td>
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</table>

U.S. Regulations


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)

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<th>Components</th>
<th>CAS-No.</th>
<th>Carcinogen</th>
<th>Developmental Toxicity</th>
<th>Male Reproductive Toxicity</th>
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<td>Not Listed</td>
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CERCLA/SARA

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<th>CAS-No.</th>
<th>CERCLA - Hazardous Substances and their Reportable Quantities</th>
<th>Section 302 Extremely Hazardous Substances and TPQs</th>
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<th>Section 313 - Chemical Category</th>
<th>Section 313 - Reporting de minimis</th>
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Product code: MA110
Product name: MAGNESIUM CHLORIDE, HEXAHYDRATE, CRYSTAL, USP, EP, BP
U.S. TSCA

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<th>Components</th>
<th>CAS-No.</th>
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<th>TSCA 8(d) - Health and Safety Reporting</th>
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Canada

WHIMIS 2015 - GHS Classifications

WHIMIS 2015 Hazard Classification Information:

Component | Magnesium Chloride, Hexahydrate | 7791-18-6 (100) |

Canada Hazardous Products Regulation

This product has been classified according to the hazard criteria of the HPR (Hazardous Products Regulation) and the SDS contains all of the information required by the HPR

Inventory

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<th>Components</th>
<th>CAS-No.</th>
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EU Classification

EU GHS - SV - CLP 1272/2008

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<th>CAS-No.</th>
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<td>Magnesium Chloride, Hexahydrate</td>
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EU - CLP (1272/2008)

R-phrase(s)

not determined (not applicable)

S-phrase(s)

none

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<th>Classification</th>
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<th>Safety Phrases</th>
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</table>

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

Indication of danger:

None.

Product code: MA110

Product name: MAGNESIUM CHLORIDE, HEXAHYDRATE, CRYSTAL, USP, EP, BP
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
Manufacturing Process Flowchart

Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP - MA110

Magnesium chloride solution

Tank

Adjustment vessel

Crystallization

Centrifugation

Drying, cooling, protective sieving

Magnesium chloride hexahydrate

Metal detector, packaging

Incoming control (CCP1) Chemical and microbiological

Storage tank

Filtration

Return

Mother liquid

Agglomerates

Labeling, repacking, and palletizing

Final control (CCP2) Chemical and physical

QC
CERTIFICATE
OF REGISTRATION

This is to certify that the management system of:

Spectrum Chemicals and Laboratory Products, Inc.

Main Site: 14422 South San Pedro Street, Gardena, California, 90248, United States
Additional Site: 13915 South Main Street, Los Angeles, California, 90061, United States
See appendix for additional sites and additional site scopes

has been registered by Intertek as conforming to the requirements of:

ISO 9001:2015

The management system is applicable to:

The manufacture and distribution of specialty fine chemicals, solutions, equipment, supplies and products for the laboratory, pharmaceutical, food, healthcare, compounding pharmacy, cosmetic, fragrance, biotechnology, environmental and process industries.

Certificate Number:
94-316m

Initial Certification Date:
27 December 1994

Date of Certification Decision:
22 January 2019

Issuing Date:
22 January 2019

Valid Until:
28 January 2022

Calin Moldovean
President, Business Assurance
Intertek Testing Services NA, Inc.,
300 Chelmsford Street,
Lowell, MA 01851.
USA.
APPENDIX TO
CERTIFICATE OF
REGISTRATION

This appendix identifies the locations covered by the management system of:

Spectrum Chemicals and Laboratory Products, Inc.

This appendix is linked to the Main Certificate # 94-316m and cannot be shown nor reproduced without it.

Spectrum Chemicals and Laboratory Products, Inc.

769 Jersey Avenue,
New Brunswick, New Jersey, 08901, United States

755 Jersey Avenue,
New Brunswick, New Jersey, 08901, United States

777 Jersey Avenue,
New Brunswick, New Jersey, 08901, United States

The manufacture and distribution of specialty fine chemicals, solutions, equipment, supplies and products for the laboratory, pharmaceutical, food, healthcare, compounding pharmacy, cosmetic, fragrance, biotechnology, environmental and process industries.

Spectrum Chemicals and Laboratory Products, Inc.

7400 N. Oracle, Suite 201,
Tucson, Arizona, 85704, United States

The manufacture and distribution of specialty fine chemicals, solutions, equipment, supplies and products for the laboratory, pharmaceutical, food, healthcare, compounding pharmacy, cosmetic, fragrance, biotechnology, environmental and process industries.
兹证明，以下组织：

斯百全化学（上海）有限公司

注册地址：上海市松江区申港路3802号41幢
经营地址：上海市松江区申港路3802弄A20

的管理体系，符合以下标准要求并予以注册：

ISO 9001:2015

此管理体系适用于：
药用辅料销售，化学品销售。

统一社会信用代码：
91310000777627048K

证书编号：
111310001

首次认证日期：
2015年11月17日

认证决定日期：
2018年10月15日

签发日期：
2018年10月15日

有效期限：
2021年11月10日

Calin Moldovean
President, Business Assurance

Intertek Certification Limited, 10A Victory Park, Victory Road, Derby DE24 8ZF, United Kingdom

Intertek Certification Limited
是 UKAS 认可的认证机构，
注册号为 014

对于此证书的签署，Intertek仅对被认证组织承担认证协议所规定的义务，而不对其他组织承担任何义务。此证书的有效性基于被认证组织能够按照Intertek的体系认证要求及其体系得到保持，可通过电子邮件certificate.validation@intertek.com或用智能手机扫描二维码对证书有效性进行确认。此证书的所有权归属Intertek，在必要时证书持有者应按要求归还证书。

获证组织在实施系统有设计修改并书面明确并获得认证机构同意的情况下，可对上述内容的修改或补充。
CERTIFICATE OF REGISTRATION

This is to certify that the management system of:

Spectrum China Ltd.
Registered Address: Building 41, No.3802, Shengang Road, Songjiang District, Shanghai, China
Business Address: Building A20, No.3802, Shengang Road, Songjiang District, Shanghai, China

has been registered by Intertek as conforming to the requirements of:

ISO 9001:2015
The management system is applicable to:
Sales for Pharmaceutical Excipients, Sales for Chemicals.

Unified Social Credit Identifier:
91310000777627048K
Certificate Number:
111310001
Initial Certification Date:
17 November 2015
Date of Certification Decision:
15 October 2018
Issuing Date:
15 October 2018
Valid Until:
10 November 2021

Calin Moldovean
President, Business Assurance
Intertek Certification Limited, 10A Victory Park, Victory Road, Derby DE24 8ZU, United Kingdom

Intertek Certification Limited is a UKAS accredited body under schedule of accreditation no. 014.

In the issuance of this certificate, Intertek assumes no liability to any party other than to the Client, and then only in accordance with the agreed upon Certification Agreement. This certificate's validity is subject to the organisation maintaining their system in accordance with Intertek's requirements for systems certification. Validity may be confirmed via email at certificate.validation@intertek.com or by scanning the code to the right with a smartphone. The certificate remains the property of Intertek, to whom it must be returned upon request.

The annual validity of the certificate can also be checked through the website http://www.cnca.gov.cn of CNCA in China.
January 08, 2019

Certification of Compliance with current Good Manufacturing Practices

Dear Valued Customer:

Spectrum Chemical Mfg Corp certifies that our USP, NF, FCC, EP, BP, JP, and food grade products are produced, processed, packaged and held in compliance with current Good Manufacturing Practices (cGMP) in accordance with the applicable parts of 21 CFR, parts 210 and 211 and parts 110 and 111 of the Code of Federal Regulations, respectively.

Spectrum is an FDA registered and inspected Drug Establishment. Our United States Food and Drug Administration (USFDA) Registration numbers are as follows:

Spectrum Gardena, California: 2020632
Spectrum New Brunswick, New Jersey: 2246824

Thank you for your interest in Spectrum products. Please feel free to contact me at 310-516-8000, extension 5610 or via email at mdang@spectrumchemical.com if I may be of further assistance.

Sincerely,

Michael Dang
Director, Quality Systems & GMP Compliance
September 18, 2019

Certification of Compliance with current Good Manufacturing Practices

Dear Valued Customer:

Spectrum Chemical Mfg Corp certifies that the following product(s) is produced, processed, packaged and held in compliance with current Good Manufacturing Practices (cGMP) in accordance with the applicable parts of 21 CFR, parts 210 and 211 of the Code of Federal Regulations.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Product Name</th>
</tr>
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<tbody>
<tr>
<td>MA110</td>
<td>Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP</td>
</tr>
</tbody>
</table>

Spectrum is an FDA registered and inspected Drug Establishment. Our United States Food and Drug Administration (USFDA) Registration numbers are as follows:

Spectrum-Gardena, CA: 2020632  
Spectrum-New Brunswick, NJ: 2246824

Thank you for your interest in Spectrum products. If we may be of further assistance, please feel free to contact the Quality Assurance department at 310-516-8000 or via email at qualityassurance@spectrumchemical.com

Sincerely,

Oralia Chavez  
Quality Assurance Specialist
September 16, 2019

Re: Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP-MA110

To Whom It May Concern:

Thank you for your interest in Spectrum high quality chemicals.

We at Spectrum Chemical Mfr. Corp. understand the concern regarding Bovine Spongiform Encephalopathy (BSE). Please be assured that the chemical Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP-MA110 is BSE/TSE free.

If you have any further questions, please contact Tech Services at (310) 516-8000 Extension 5471, or by email at techservices@spectrumchemical.com.

Sincerely,

Darlene Dagdag-Lyudmirski
Technical Services
Spectrum Chemical Mfr. Corp.

This document has been produced electronically and is valid without a signature
September 16, 2019

Re: Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP-MA110

To Whom It May Concern:

Thank you for your interest in Spectrum high quality chemicals.

We at Spectrum Chemical Mfr. Corp. understand the concern regarding the presence of allergens in raw materials. Please be assured that the following chemical does not contain (Milk; Egg; Fish; Shellfish; Sulfur dioxide and sulfites at concentrations of more than 10 mg/kg or 10 mg/liter expressed as SO₂; Lupin; Tree nuts; Mollusks; Wheat; Peanuts; Soy; Cereals containing Gluten; Celery; Mustard; Sesame Seed).

Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP-MA110

If you have any further questions, please contact Tech Services at (310) 516-8000 Extension 5471, or by email at techservices@spectrumchemical.com.

Sincerely,

Darlene Dagdag-Lyuimirskiy
Technical Services
Spectrum Chemical Mfr. Corp.

This document has been produced electronically and is valid without a signature
September 16, 2019

Re: Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP-MA110

To Whom It May Concern:

Thank you for your interest in Spectrum high quality chemicals.

We at Spectrum Chemical Mfg. Corp. understand the concern regarding Aflatoxins in raw materials. To the best of our knowledge, the product listed below is not contaminated with Aflatoxins. Aflatoxins are not used in production. The following product does not come in contact with Aflatoxins at any stage of production.

Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP-MA110

If you have any further questions, please contact Tech Services at (310) 516-8000 Extension 5471, or by email at techservices@spectrumchemical.com.

Sincerely,

Darlene Dagdag-Lyudmirskiy
Technical Services
Spectrum Chemical Mfr. Corp.

This document has been produced electronically and is valid without a signature.
## Certificate Of Analysis

<table>
<thead>
<tr>
<th>Item Number</th>
<th>MA110</th>
<th>Lot Number</th>
<th>2IH0119</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS Number</td>
<td>7791-18-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molecular Formula</td>
<td>MgCl$_2$.6H$_2$O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>203.30</td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Test</th>
<th>Specification</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASSAY</strong></td>
<td>98.0</td>
<td>101.0%</td>
</tr>
<tr>
<td><strong>pH OF A 5% SOLUTION @ 25°C</strong></td>
<td>4.5</td>
<td>7.0</td>
</tr>
<tr>
<td><strong>WATER</strong></td>
<td>51.0</td>
<td>55.0%</td>
</tr>
<tr>
<td><strong>INSOLUBLE MATTER</strong></td>
<td>0.005%</td>
<td>&lt;0.005 %</td>
</tr>
<tr>
<td><strong>SULFATE</strong></td>
<td>0.005%</td>
<td>&lt;0.005 %</td>
</tr>
<tr>
<td><strong>BARIUM</strong></td>
<td>TO PASS TEST</td>
<td>PASSES TEST</td>
</tr>
<tr>
<td><strong>CALCIUM</strong></td>
<td>0.01%</td>
<td>&lt;0.01 %</td>
</tr>
<tr>
<td><strong>POTASSIUM</strong></td>
<td>TO PASS TEST</td>
<td>PASSES TEST</td>
</tr>
<tr>
<td><strong>APPEARANCE OF SOLUTION</strong></td>
<td>TO PASS TEST</td>
<td>PASSES TEST</td>
</tr>
<tr>
<td><strong>ELEMENTAL IMPURITIES</strong></td>
<td>AS REPORTED</td>
<td>COMPLIES WITH STANDARD</td>
</tr>
<tr>
<td><strong>ACIDITY OR ALKALINITY</strong></td>
<td>TO PASS TEST</td>
<td>PASSES TEST</td>
</tr>
<tr>
<td><strong>BROMIDES</strong></td>
<td>500 ppm</td>
<td>&lt;500 ppm</td>
</tr>
<tr>
<td><strong>ARSENIC</strong></td>
<td>2 ppm</td>
<td>1.5 ppm</td>
</tr>
<tr>
<td><strong>IRON</strong></td>
<td>10 ppm</td>
<td>&lt;10 ppm</td>
</tr>
<tr>
<td><strong>IDENTIFICATION</strong></td>
<td>TO PASS TEST</td>
<td>PASSES TEST</td>
</tr>
<tr>
<td><strong>CERTIFIED HALAL</strong></td>
<td></td>
<td>CERTIFIED HALAL</td>
</tr>
<tr>
<td>** RETEST DATE**</td>
<td></td>
<td>31-MAR-2021</td>
</tr>
<tr>
<td><strong>DATE OF MANUFACTURE</strong></td>
<td></td>
<td>01-APR-2018</td>
</tr>
<tr>
<td><strong>APPEARANCE</strong></td>
<td></td>
<td>WHITE CRYSTALS</td>
</tr>
<tr>
<td><strong>RESIDUAL SOLVENTS</strong></td>
<td>TO PASS TEST</td>
<td>NO RESIDUAL SOLVENTS USED</td>
</tr>
</tbody>
</table>

Spectrum Chemical Mfg Corp
755 Jersey Avenue
New Brunswick 08901 NJ

All pharmaceutical ingredients are tested using current edition of applicable pharmacopeia.

Read and understand label and SDS before handling any chemicals. All Spectrum's chemicals are for manufacturing, processing, repacking or research purposes by experienced personnel only. It is the customer’s responsibility to provide adequate hazardous material training and ensure that appropriate Personal Protective Equipment (PPE) is used before handling any chemical.
The Elemental Impurities standards implemented by USP and other Pharmaceutical Compendia reflect a growing understanding of the toxicology of trace levels of elemental impurities that can remain in drug substances originating from either raw materials or manufacturing processes. Identifying and quantifying impurities can be critical to predicting the best possible patient outcomes. Elemental Impurities has been a requirement of all products meeting USP/NF, EP and BP monographs since January 1, 2018. More information can be found in USP sections <232> Elemental Impurities – Limits and <233> Elemental Impurities – Procedures. Data for drug substances furnished by Spectrum Chemical Mfg. Corp can be used to ensure that patient daily exposures by oral administration to the selected elements are not exceeded in the formulation of pharmaceutical products.
Label Information

The Spectrum label presents technical and safety information in an easily understood format. Our technical specialists stay abreast of the latest requirements of the Globally Harmonized System for Classification and Labelling of Chemicals (GHS), as well as the Occupational Safety and Health Administration (OSHA), the Food and Drug Administration (FDA) and other government regulatory agencies in order to ensure compliance, accuracy and concise hazard communication.

**USE CARE:** This material has been evaluated per GHS/OSHA criteria and is not classified as hazardous. All chemicals may pose unknown hazards and must be used with caution. Use personal protection and safe handling methods consistent with proper workplace safety practices. Consult SDS for additional properties and precautions. If adverse reaction occurs seek medical attention.

**KEEP FROM CHILDREN**

**MA110**
**2.5 KG**
**Magnesium Chloride Hexahydrate**
**Crystal**
**U.S.P., E.P., B.P.**

**CAS 7791-18-6**

**CAUTION:** For manufacturing, processing or repacking. Not intended for use in hemodialysis. Read and understand the label and Safety Data Sheet (SDS) prior to use.

**WARNING:** This product contains a chemical known to the State of California to cause cancer.

**WARNING:** This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

**DELIQUECENT:** Keep tightly closed.

**MgCl2•6H2O F.W. 203.30**

- **Assay:** 98.0-101.0%
- **pH of a 5% Solution @ 25°C:** 4.5-7.0
- **Water:** 51.0-55.0%

**MAXIMUM LIMITS**

- **Insoluble Matter:** 0.005%
- **Sulfate:** 0.005%
- **Barium:** To pass test
- **Calcium:** 0.01%
- **Potassium:** To pass test
- **Heavy Metals:** 0.001%
- **Appearance of Solution:** To pass test
- **Acidity or Alkalinity:** To pass test
- **Bromides:** 500 ppm
- **Arsenic:** 2 ppm
- **Iron:** 10 ppm
- **Residual Solvents:** To pass test

**WARNING:** This product contains a chemical known to the State of California to cause cancer.

**WARNING:** This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

**DELIQUECENT:** Keep tightly closed.
February 1, 2019

RE: Lot Numbering System

Dear Valued Customer:

This letter is to inform you of Spectrum Chemicals and Laboratory Products’ Lot Numbering System. The system is based on an alpha-numerical sequence which provides the month, year and location of production.

The lot numbering system utilized until 2010 is a sequence of six characters, two letters followed by four numbers. The first letter represents the year, for example, Y denotes 2009 and Z denotes 2010. The second letter represents the month and site, for example, A-L denotes January through December at Spectrum’s Gardena, CA facility, while M-X denotes January through December at the New Brunswick, NJ facility. The following four numbers are sequentially assigned.

Example: ZI0928 = The 928th material produced in California in September 2010

The lot numbering system utilized for 2011 and forward, is a sequence of seven characters. The first character, a number, represents the production facility:

1 = Gardena, CA Facility  
2 = New Brunswick, NJ Facility  
3 = China Facility  
4 = Pharmacy, NJ Facility

The second character, a letter, represents the year. For example, A denotes 2011 and B denotes 2012. The third character, a letter, represents the month, with A denoting January and L denoting December. The following four numbers are sequentially assigned.

Example: 2AA0706 = The 706th material produced in New Jersey in January 2011

Thank you for your interest with Spectrum products. Please feel free to contact us at 310-516-8000 or via email at qualityassurance@spectrumchemical.com if we may be of further assistance.

Sincerely,

Howard Lau,  
Quality Assurance Specialist
Stability – Shelf Life Guidance

Product Covered: MA110, Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP

Spectrum Chemical’s manufacturing partner has assigned the following shelf life guidance for the product listed above.

The product, MA110, Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP, is assigned a 36 months shelf life from date of manufacturing. The quality and integrity of the chemical depends on the handling and storage conditions. Please refer to the Safety Data Sheet for proper storage and handling procedures.

Adan R. Hernandez
Quality Control Manager

Corporate Headquarters
769 Jersey Avenue
New Brunswick, NJ 08901-3605

18.September.2019
This is to certify that the following product(s) have been produced under the supervision of the Islamic Food and Nutrition Council of America (IFANCA). The production facility as well as component ingredients have been reviewed and approved. The product(s) are in compliance with the halal requirements under Islamic laws.

Date: June 18, 2019
Document #: 11205.11209.II191010

Company Name & Address: Spectrum Laboratory Products, Inc. 755-769 Jersey Ave New Brunswick, New Jersey 08901 USA
Plant Name & Address: Spectrum Laboratory Products, Inc. 14422 South San Pedro Street Gardena, California 90248 USA

<table>
<thead>
<tr>
<th>ProductName</th>
<th>Product Code</th>
<th>Halal-ID</th>
<th>Product Certificate #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Magnesium Chloride, Hexahydrate, Crystal, USP, EP, BP</td>
<td>MA110</td>
<td>B94014</td>
<td>HC-19SPVO19</td>
</tr>
</tbody>
</table>

This Certificate is valid until August 31, 2020 and subject to renewal at that time.