SAFETY DATA SHEET

1. Identification

Product identifier: ISOPROPENYLMAGNESIUM BROMIDE, in ETHYL ETHER

Other means of identification

Product code: 5292

Recommended use: professional, scientific and technical activities: scientific research and development

Recommended restrictions: None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name: GFS Chemicals, Inc.
Address: P.O. Box 245
Powell, OH 43065
United States

Telephone
Phone: 740-881-5501
Toll Free: 800-858-9682
Fax: 740-881-5989

Website: www.gfschemicals.com

E-mail: service@gfschemicals.com

Emergency phone number: Emergency Assistance Chemtrec 800-424-9300

2. Hazard(s) identification

Physical hazards: Flammable liquids Category 1
Substances and mixtures which, in contact with water, emit flammable gases Category 1

Health hazards: Acute toxicity, oral Category 4
Skin corrosion/irritation Category 1B
Serious eye damage/eye irritation Category 1
Specific target organ toxicity, single exposure Category 3 narcotic effects

Environmental hazards: Not classified.

OSHA defined hazards: Not classified.

Label elements

Signal word: Danger

Hazard statement: Extremely flammable liquid and vapor. In contact with water releases flammable gases which may ignite spontaneously. Harmful if swallowed. Causes severe skin burns and eye damage. Causes serious eye damage. May cause drowsiness or dizziness.

Precautionary statement

Prevention: Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Handle under inert gas. Protect from moisture. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Do not breathe mist or vapor. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.

Response: In case of fire: Use appropriate media to extinguish. Wash contaminated clothing before reuse.


Disposal: Dispose of contents/container to an approved incineration plant.

Hazard(s) not otherwise classified (HNOC): None known.

Supplemental information: 13.5% of the mixture consists of component(s) of unknown acute oral toxicity.
3. Composition/information on ingredients

Mixtures

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETHYL ETHER</td>
<td>DIETHYL ETHER Ether</td>
<td>60-29-7</td>
<td>86.5</td>
</tr>
<tr>
<td>ISOPROPENYLMAGNESIUM</td>
<td>BROMIDE</td>
<td>13291-18-4</td>
<td>13.5</td>
</tr>
</tbody>
</table>

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. First-aid measures

Inhalation
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.

Skin contact
Rinse skin with water/shower. Call a physician or poison control center immediately. Wash clothing separately before reuse.

Eye contact
Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Call a physician or poison control center immediately. Continue rinsing.

Ingestion
Call a physician or poison control center immediately. Rinse mouth. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Most important symptoms/effects, acute and delayed
Burning pain and severe corrosive skin damage. May cause drowsiness and dizziness. Headache. Nausea, vomiting. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Upper respiratory tract irritation.

Indication of immediate medical attention and special treatment needed
Provide general supportive measures and treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

General information
Take off all contaminated clothing immediately. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media
Alcohol resistant foam. Dry chemical powder. Carbon dioxide (CO2).

Unsuitable extinguishing media
Water. Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical
Vapors may form explosive mixtures with air. Vapors may travel considerable distance to a source of ignition and flash back. In contact with water releases flammable gases which may ignite spontaneously. During fire, gases hazardous to health may be formed.

Special protective equipment and precautions for firefighters
Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire fighting equipment/instructions
In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk. Do not get water inside container.

Specific methods
Use standard firefighting procedures and consider the hazards of other involved materials.

General fire hazards
Extremely flammable liquid and vapor.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures
Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep out of low areas. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist or vapor. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up

Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Take precautionary measures against static discharge. Use only non-sparking tools. Keep combustibles (wood, paper, oil, etc.) away from spilled material.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Do not get water on spilled substance or inside containers. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water.

Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Clean surface thoroughly to remove residual contamination.

Environmental precautions

Avoid return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

7. Handling and storage

Precautions for safe handling

Keep away from any possible contact with water, because of violent reaction and possible flash fire. Handle under inert gas. Do not handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Explosion-proof general and local exhaust ventilation. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. Do not taste or swallow. When using, do not eat, drink or smoke. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Store locked up. Keep away from heat, sparks and open flame. Prevent electrostatic charge build-up by using common bonding and grounding techniques. Store in a cool, dry place out of direct sunlight. Store in a well-ventilated place. Never allow product to get in contact with water during storage.

8. Exposure controls/personal protection

Occupational exposure limits

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETHYL ETHER (CAS 60-29-7)</td>
<td>PEL</td>
<td>1200 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>400 ppm</td>
</tr>
</tbody>
</table>

US. ACGIH Threshold Limit Values

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETHYL ETHER (CAS 60-29-7)</td>
<td>STEL</td>
<td>500 ppm</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>400 ppm</td>
</tr>
</tbody>
</table>

Biological limit values

No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls

Explosion-proof general and local exhaust ventilation. Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear safety glasses with side shields (or goggles) and a face shield.

Skin protection

Hand protection

Wear appropriate chemical resistant gloves.

Other

Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection

If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Chemical respirator with organic vapor cartridge.

General hygiene considerations

When using do not smoke. Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.
9. Physical and chemical properties

Appearance
Cloudy.

Physical state
Liquid.

Form
Liquid.

Color
amber or grey

Odor
Ether-like.

Odor threshold
Not available.

pH
Not available.

Melting point/freezing point
Not available.

Initial boiling point and boiling range
94.28 °F (34.6 °C) estimated

Flash point
-49.0 °F (-45.0 °C) estimated

Evaporation rate
Not available.

Flammability (solid, gas)
Not available.

Upper/lower flammability or explosive limits

Flammability limit - lower (%)
1.9 % estimated

Flammability limit - upper (%)
Not available.

Explosive limit - lower (%)
Not available.

Explosive limit - upper (%)
Not available.

Vapor pressure
717.28 hPa estimated

Vapor density
Not available.

Relative density
Not available.

Solubility(ies)

Solubility (water)
Not available.

Partition coefficient (n-octanol/water)
Not available.

Auto-ignition temperature
320 °F (160 °C) estimated

Decomposition temperature
Not available.

Viscosity
Not available.

Other information

Density
0.78 g/cm³ estimated

Flammability class
Flammable IA estimated

Molecular formula
C₃H₅BrMg

Molecular weight
157.29 g/mol

Percent volatile
86.5 % estimated

Specific gravity
0.78 estimated

VOC (Weight %)
86.5 % estimated

10. Stability and reactivity

Reactivity
The product is stable and non-reactive under normal conditions of use, storage and transport.

Chemical stability
Material is stable under normal conditions.

Possibility of hazardous reactions
No dangerous reaction known under conditions of normal use.

Conditions to avoid
Avoid heat, sparks, open flames and other ignition sources. Moisture. Contact with water liberates flammable gas. Avoid temperatures exceeding the flash point. Contact with incompatible materials.

Incompatible materials
Strong oxidizing agents.

Hazardous decomposition products
No hazardous decomposition products are known.
11. Toxicological information

Information on likely routes of exposure

**Inhalation**
May cause drowsiness and dizziness. Headache. Nausea, vomiting. May cause irritation to the respiratory system. Prolonged inhalation may be harmful.

**Skin contact**
Causes severe skin burns.

**Eye contact**
Causes serious eye damage.

**Ingestion**
Causes digestive tract burns. Harmful if swallowed.

**Symptoms related to the physical, chemical and toxicological characteristics**
Burning pain and severe corrosive skin damage. May cause drowsiness and dizziness. Headache. Nausea, vomiting. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Upper respiratory tract irritation.

Information on toxicological effects

**Acute toxicity**
In high concentrations, vapors are anesthetic and may cause headache, fatigue, dizziness and central nervous system effects. Harmful if swallowed. Narcotic effects.

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ISOPROPENYLMAGNESIUM BROMIDE, in ETHYL ETHER (CAS Mixture)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acute</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inhalation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC50</td>
<td>Rat</td>
<td>36994.2188 ppm, 4 Hours estimated</td>
</tr>
<tr>
<td>LD50</td>
<td>Rat</td>
<td>36994.2188 mg/l, 4 Hours estimated</td>
</tr>
<tr>
<td><strong>Oral</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50</td>
<td>Rat</td>
<td>3734.104 mg/kg estimated</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50</td>
<td>Mouse</td>
<td>1151.4451 mg/kg estimated</td>
</tr>
<tr>
<td></td>
<td>Rabbit</td>
<td>23.1214 ml/kg estimated</td>
</tr>
</tbody>
</table>

| **Components** | | |
| **ETHYL ETHER (CAS 60-29-7)** | | |
| **Acute** | | |
| **Inhalation** | | |
| LC50 | Rat | 32000 ppm, 4 Hours |
| LD50 | Rat | 32000 mg/l, 4 Hours |
| **Oral** | | |
| LD50 | Rat | 3230 - 3920 mg/kg |
| | | 3230 - 3920 mg/kg |
| **Other** | | |
| LD50 | Mouse | 2420 mg/kg |
| | Rabbit | 996 mg/kg |
| | | 20 ml/kg |

* Estimates for product may be based on additional component data not shown.

**Skin corrosion/irritation**
Causes severe skin burns and eye damage.

**Serious eye damage/eye irritation**
Causes serious eye damage.

**Respiratory or skin sensitization**

**Respiratory sensitization**
Not available.

**Skin sensitization**
This product is not expected to cause skin sensitization.

**Germ cell mutagenicity**
No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

**Carcinogenicity**
This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

**Reproductive toxicity**
This product is not expected to cause reproductive or developmental effects.

**Specific target organ toxicity**

- **single exposure**
May cause drowsiness and dizziness.

- **repeated exposure**
Not classified.
12. Ecological information

**Ecotoxicity**
The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

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<tr>
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<th>Species</th>
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<tbody>
<tr>
<td>ISOPROPENYLMAGNESIUM BROMIDE, in ETHYL ETHER (CAS Mixture)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Aquatic</strong></td>
<td><strong>Fish</strong></td>
<td>LC50</td>
</tr>
<tr>
<td><strong>Components</strong></td>
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<td></td>
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<tr>
<td>ETHYL ETHER (CAS 60-29-7)</td>
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<td></td>
</tr>
<tr>
<td><strong>Aquatic</strong></td>
<td><strong>Fish</strong></td>
<td>LC50</td>
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</tbody>
</table>

* Estimates for product may be based on additional component data not shown.

**Persistence and degradability**
No data is available on the degradability of this product.

**Bioaccumulative potential**
No data available.

**Partition coefficient n-octanol / water (log Kow)**
ETHYL ETHER 0.89

**Mobility in soil**
No data available.

**Other adverse effects**
No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

**Disposal instructions**
Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.

**Local disposal regulations**
Dispose in accordance with all applicable regulations.

**Hazardous waste code**
The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

**Waste from residues / unused products**
Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

**Contaminated packaging**
Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

**DOT**

<table>
<thead>
<tr>
<th>UN number</th>
<th>UN proper shipping name</th>
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</thead>
<tbody>
<tr>
<td>UN3399</td>
<td>Organometallic substance, liquid, water-reactive, flammable (ISOPROPENYLMAGNESIUM BROMIDE, ETHYL ETHER RQ = 116 LBS)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transport hazard class(es)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>4.3</td>
</tr>
<tr>
<td>Subsidiary risk</td>
<td>3</td>
</tr>
<tr>
<td>Label(s)</td>
<td>4.3, 3</td>
</tr>
<tr>
<td>Packing group</td>
<td>1</td>
</tr>
<tr>
<td>Special precautions for user</td>
<td>Read safety instructions, SDS and emergency procedures before handling.</td>
</tr>
<tr>
<td>Special provisions</td>
<td>T13, TP2, TP7, TP36</td>
</tr>
<tr>
<td>Packaging exceptions</td>
<td>None</td>
</tr>
<tr>
<td>Packaging non bulk</td>
<td>201</td>
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<tr>
<td>Packaging bulk</td>
<td>244</td>
</tr>
</tbody>
</table>
IATA

UN number UN3399
UN proper shipping name Organometallic substance, liquid, water-reactive, flammable (ISOPROPENYLMAGNESIUM BROMIDE, ETHYL ETHER)

Transport hazard class(es)
Class 4.3
Subsidiary risk 3
Packing group I
Environmental hazards No.
ERG Code 4FW

Other information
Passenger and cargo aircraft Forbidden
Cargo aircraft only Allowed.

IMDG

UN number UN3399
UN proper shipping name ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE (ISOPROPENYLMAGNESIUM BROMIDE, ETHYL ETHER)

Transport hazard class(es)
Class 4.3
Subsidiary risk 3
Packing group I

Environmental hazards
Marine pollutant No.
EmS F-G, S-N

Special precautions for user
Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not established.

15. Regulatory information

US federal regulations
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
One or more components are not listed on TSCA.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D) Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4) ETHYL ETHER (CAS 60-29-7) Listed.
SARA 304 Emergency release notification
Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - Yes
Pressure Hazard - No
Reactivity Hazard - Yes

SARA 302 Extremely hazardous substance
Not listed.

SARA 311/312
Hazardous chemical
No

SARA 313 (TRI reporting)
Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

ETHYL ETHER (CAS 60-29-7)

Safe Drinking Water Act (SDWA)
Not regulated.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number
ETHYL ETHER (CAS 60-29-7) 6584

Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))
ETHYL ETHER (CAS 60-29-7) 35 %WV

DEA Exempt Chemical Mixtures Code Number
ETHYL ETHER (CAS 60-29-7) 6584

US state regulations

US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)
Not listed.

US. Massachusetts RTK - Substance List
ETHYL ETHER (CAS 60-29-7)

US. New Jersey Worker and Community Right-to-Know Act
ETHYL ETHER (CAS 60-29-7)

US. Pennsylvania Worker and Community Right-to-Know Law
ETHYL ETHER (CAS 60-29-7)

US. Rhode Island RTK
ETHYL ETHER (CAS 60-29-7)

US. California Proposition 65
California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>No</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>No</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>No</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>No</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
</tr>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>No</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>No</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
<td>No</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>No</td>
</tr>
</tbody>
</table>

Material name: ISOPROPENYMAGNESIUM BROMIDE, in ETHYL ETHER
Country(s) or region  | Inventory name | On inventory (yes/no)*
--- | --- | ---
United States & Puerto Rico | Toxic Substances Control Act (TSCA) Inventory | No

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

**Issue date** | September-24-2014
--- | ---
**Revision date** | October-03-2014
**Version #** | 02

**Disclaimer**
GFS Chemicals cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user’s responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.