SECTION 1. IDENTIFICATION

Product name : Monomethylamine 40% aqueous solution (MMA40)

Product code : 51008-00, P5100814, P5100803, P5100819

Manufacturer or supplier's details
Company name of supplier : Eastman Chemical Company
Address : 200 South Wilcox Drive
           Kingsport TN 37660-5280
Telephone : (423) 229-2000
Emergency telephone : CHEMTREC: +1-800-424-9300, +1-703-527-3887 CCN7321

Recommended use of the chemical and restrictions on use
Recommended use : Chemical intermediate
Restrictions on use : None known.

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification
- Flammable liquids : Category 2
- Acute toxicity (Oral) : Category 4
- Acute toxicity (Inhalation) : Category 4
- Skin corrosion : Category 1B
- Serious eye damage : Category 1
- Specific target organ systemic toxicity - single exposure : Category 3 (Respiratory system)

GHS label elements
- Hazard pictograms
- Signal Word : Danger
Hazard Statements : H225 Highly flammable liquid and vapor.
H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.
H332 Harmful if inhaled.
H335 May cause respiratory irritation.

Precautionary Statements : Prevention:
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ventilating/lighting/equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P261 Avoid breathing dust/fume/gas/mist/vapors/spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/protective clothing/eye protection/face protection.

Response:
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
P363 Wash contaminated clothing before reuse.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

Storage:
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.

Disposal:
P501 Dispose of contents/container to an approved waste disposal plant.

Other hazards
None known.
Monomethylamine 40% aqueous solution (MMA40)

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Ingredients</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>monomethylamine</td>
<td>74-89-5</td>
<td>&gt;= &lt;=</td>
</tr>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>&gt;= &lt;=</td>
</tr>
</tbody>
</table>

SECTION 4. FIRST AID MEASURES

General advice: Show this material safety data sheet to the doctor in attendance.
Call a physician immediately.

If inhaled: Move to fresh air.
If symptoms persist, call a physician.

In case of skin contact: Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes.
Wash off immediately with plenty of water for at least 15 minutes.
Wash contaminated clothing before re-use.

In case of eye contact: Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
Remove contact lenses, if present and easy to do. Continue rinsing.

If swallowed: Clean mouth with water and drink afterwards plenty of water.
Do not induce vomiting without medical advice.
Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed:
- Pneumonia
- Lung edema
- Superficial burning sensation
- Lachrymation
- Shortness of breath
- Suffocation
- Eye disease
- Harmful if swallowed.
- Causes serious eye damage.
- Harmful if inhaled.
- May cause respiratory irritation.
- Causes severe burns.

Notes to physician: Treat symptomatically.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media: Carbon dioxide (CO2)
**SAFETY DATA SHEET**

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**Revision Date**: 04/21/2017  
**SDS Number**: 15000103184  
**Date of last issue**: -  
**Date of first issue**: 09/06/2016

**SECTION 6. ACCIDENTAL RELEASE MEASURES**

| Personal precautions, protective equipment and emergency procedures | Wear appropriate personal protective equipment.  
| Environmental precautions | Avoid release to the environment.  
| Methods and materials for containment and cleaning up | Evacuate personnel to safe areas. Prevent further leakage or spillage if safe to do so.

**SECTION 7. HANDLING AND STORAGE**

| Advice on protection against fire and explosion | Take precautionary measures against static discharges.  
| Advice on safe handling | Avoid contact with skin, eyes and clothing. Ensure adequate ventilation. Wash thoroughly after handling. Sudden Release of Pressure Hazard Use equipment rated for cylinder pressure. Protect container from physical shock.  

Unsuitable extinguishing media: Do not use a solid water stream as it may scatter and spread fire. Do NOT use water jet.

Specific hazards during fire fighting: May displace oxygen and cause rapid suffocation. The product will float on water and can be reignited on surface water. Flash back possible over considerable distance.

Hazardous combustion products: Nitrogen oxides (NOx) Carbon monoxide

Further information: In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion. Flammable gas, may cause flash fire. Cool containers/tanks with water spray. If the product release cannot be shut off safely, allow the product to burn itself out. Do not allow run-off from fire fighting to enter drains or water courses.

Special protective equipment for fire-fighters: Wear an approved positive pressure self-contained breathing apparatus in addition to standard fire fighting gear.
Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pierce or burn, even after use. May displace oxygen and cause rapid suffocation.

Conditions for safe storage: Keep containers tightly closed in a cool, well-ventilated place. Do not enter areas where used or stored until adequately ventilated. Do not store together with oxidizing and self-igniting products. Protect from sunlight. Keep away from heat and sources of ignition. Store in upright position only. Store locked up.

**SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

**Ingredients with workplace control parameters**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS-No.</th>
<th>Value type (Form of exposure)</th>
<th>Control parameters / Permissible concentration</th>
<th>Basis</th>
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</thead>
<tbody>
<tr>
<td>monomethylamine</td>
<td>74-89-5</td>
<td>TWA</td>
<td>5 ppm</td>
<td>ACGIH</td>
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<td></td>
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<td></td>
<td></td>
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<td>10 ppm</td>
<td>NIOSH REL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>10 ppm</td>
<td>OSHA Z-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>10 ppm</td>
<td>OSHA P0</td>
</tr>
</tbody>
</table>

**Engineering measures**: 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.

**Personal protective equipment**

**Respiratory protection**: Wear a positive-pressure supplied-air respirator.

**Hand protection**

**Remarks**: Nitrile rubber Neoprene gloves Protective gloves against cold. The selected protective gloves have to satisfy the specifications of EU Directive 89/689/EEC and the standard EN 374 derived from it. The break through time depends amongst other things from the material, the thickness and the type of glove and therefore has to be measured for each case.
Eye protection: Safety glasses with side-shields
Face-shield
Always wear eye protection when the potential for inadvertent eye contact with the product cannot be excluded.

Skin and body protection: Complete suit protecting against chemicals

Protective measures: Remove respiratory and skin/eye protection only after vapors have been cleared from the area.
Ensure that eye flushing systems and safety showers are located close to the working place.
Use personal protective equipment as required.

Hygiene measures: Handle in accordance with good industrial hygiene and safety practice.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: liquid
Color: colorless
Odor: ammoniacal
pH: 11.2

Boiling Point (boils with decomposition): 49.3 °C

Flash point: -10 °C

Upper explosion limit: 20.7 % (V)
Lower explosion limit: 4.9 % (V)

Vapor pressure: 32 kPa (20 °C)
117 kPa (50 °C)

Relative vapor density: 1.07 (20 °C)
(Air = 1.0)

Relative density: 0.9014 (20 °C)

Density: 0.9014 g/cm³ (20 °C)

Solubility(ies):
Water solubility: completely soluble

Partition coefficient: n-octanol/water log Pow: -0.57
Autoignition temperature : 430 °C
Viscosity
  Viscosity, dynamic : 1.50 mPa.s
Oxidizing properties : The substance or mixture is not classified as oxidizing.
Surface tension : 19.2 mN/m, 20 °C
Molecular weight : 31.06 g/mol

SECTION 10. STABILITY AND REACTIVITY

Reactivity : None reasonably foreseeable.
Chemical stability : Stable under normal conditions.
Possibility of hazardous reactions : Hazardous decomposition products formed under fire conditions.
Conditions to avoid : Protect container from physical shock. Heat. Exposure to sunlight.
Incompatible materials : Mercury
  Strong acids and oxidizing agents
  Halogenated compounds
Hazardous decomposition products : Carbon dioxide (CO2)
  Carbon monoxide
  Nitrogen oxides (NOx)

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Product:
Acute oral toxicity : LD50 Oral (Rat): 698 mg/kg
Acute inhalation toxicity : LC50 (Rat): > 2 mg/l

Skin corrosion/irritation

Product:
Result: Corrosive

Ingredients:
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monomethylamine:  
Result: Corrosive

Serious eye damage/eye irritation  

Product:  
Result: Corrosive

Ingredients:  
monomethylamine:  
Result: Corrosive

Germ cell mutagenicity  

Product:  
Germ cell mutagenicity - Assessment: Did not show mutagenic effects in animal experiments.

Carcinogenicity  

Product:  
Remarks: This product does not contain any carcinogens or potential carcinogens as listed by OSHA, IARC or NTP.

IARC  
No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA  
No ingredient of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

NTP  
No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity  

Product:  
Reproductive toxicity - Assessment: No toxicity to reproduction

STOT-single exposure  

Product:  
Target Organs: Eyes, Respiratory system, Skin
Monomethylamine 40% aqueous solution (MMA40)

Information on likely routes of exposure

**Product:**

**Inhalation:**
Remarks: Harmful if inhaled. May cause respiratory irritation.

**Skin contact:**
Remarks: Causes severe skin burns.

**Eye contact:**
Remarks: Causes severe eye burns.

**Ingestion:**
Remarks: Harmful if swallowed.

SECTION 12. ECOLOGICAL INFORMATION

**Ecotoxicity**

**Product:**

Toxicity to fish:
LC50 (Leuciscus idus (Golden orfe)): 970 mg/l
Exposure time: 48 h

Toxicity to daphnia and other aquatic invertebrates:
EC50 (Daphnia magna (Water flea)): 163 mg/l
Exposure time: 48 h

Toxicity to bacteria:
EC20 (Bacteria): 240 mg/l
Exposure time: 0.5 h

**Persistence and degradability**

**Product:**

Biodegradability:
Result: Readily biodegradable.

**Bioaccumulative potential**

**Product:**

Bioaccumulation:
Bioconcentration factor (BCF): 3.16

**Mobility in soil**

**Product:**

Distribution among environmental compartments:
Koc: 10.74, log Koc: 1.03

**Other adverse effects**
No data available
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SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods
Waste from residues: Dispose of in accordance with local regulations.
Contaminated packaging: Empty containers should be taken to an approved waste handling site for recycling or disposal.

SECTION 14. TRANSPORT INFORMATION

International Regulations

IATA-DGR
UN/ID No.: UN 1235
Proper shipping name: Methylamine, aqueous solution
Class: 3
Subsidiary risk: 8
Packing group: II
Labels: Flammable Liquids, Corrosive
Packing instruction (cargo aircraft): 363
Packing instruction (passenger aircraft): 352

IMDG-Code
UN number: UN 1235
Proper shipping name: METHYLAMINE, AQUEOUS SOLUTION
Class: 3
Subsidiary risk: 8
Packing group: II
Labels: 3 (8)
EmS Code: F-E, S-C
Marine pollutant: no

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable for product as supplied.

Domestic regulation

49 CFR
UN/ID/NA number: UN 1235
Proper shipping name: METHYLAMINE, AQUEOUS SOLUTION
Class: 3
Subsidiary risk: 8
Packing group: II
Labels: Class 3 - Flammable Liquid, Class 8 - Corrosive
ERG Code: 132
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SDSUS / PRD / 0001

Marine pollutant : no

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know

SARA 311/312 Hazards : Fire Hazard
: Acute Health Hazard

SARA 302 : No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

The ingredients of this product are reported in the following inventories:

CH INV : On the inventory, or in compliance with the inventory
DSL : On the inventory, or in compliance with the inventory
AICS : On the inventory, or in compliance with the inventory
NZIoC : On the inventory, or in compliance with the inventory
ENCS : On the inventory, or in compliance with the inventory
ISHL : On the inventory, or in compliance with the inventory
KECI : On the inventory, or in compliance with the inventory
PICCS : On the inventory, or in compliance with the inventory
IECSC : On the inventory, or in compliance with the inventory
TCSI : On the inventory, or in compliance with the inventory
TSCA : On the inventory, or in compliance with the inventory

TSCA list
No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16. OTHER INFORMATION
SAFETY DATA SHEET

Monomethylamine 40% aqueous solution (MMA40)

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Full text of other abbreviations

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Further information

NFPA:

Flammability

Health Instability

Special hazard.

HMIS® IV:

HEALTH

FLAMMABILITY

PHYSICAL HAZARD

HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks.
The information provided in this Material Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.