Material Safety Data Sheet
According to OSHA and ANSI

1 Identification of the substance/mixture and of the company/undertaking

Product identifier

Product name: Chloramine-T trihydrate
Stock number: A12044, L03286
CAS Number: 7080-50-4
EINECS Number: 204-854-7

Relevant identified uses of the substance or mixture and uses advised against.
Sector of Use SU24 Scientific research and development

Details of the supplier of the safety data sheet
Manufacturer/Supplier:
Alfa Aesar, A Johnson Matthey Company
Johnson Matthey Catalog Company, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757
Email: tech@alfa.com
www.alfa.com

Information Department: Health, Safety and Environmental Department
Emergency telephone number:
During normal hours the Health, Safety and Environmental Department at (800) 343-0660. After normal hours call Carechem 24 at (866) 928-0789.

2 Hazards identification

Classification of the substance or mixture

<table>
<thead>
<tr>
<th>GHS06 Skull and crossbones</th>
</tr>
</thead>
<tbody>
<tr>
<td>H330 Fatal if inhaled.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GHS08 Health hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GHS05 Corrosion</th>
</tr>
</thead>
<tbody>
<tr>
<td>H314 Causes severe skin burns and eye damage.</td>
</tr>
<tr>
<td>H318 Causes serious eye damage.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GHS07</th>
</tr>
</thead>
<tbody>
<tr>
<td>H302 Harmful if swallowed.</td>
</tr>
</tbody>
</table>

Classification according to Directive 67/548/EEC or Directive 1999/45/EC

<table>
<thead>
<tr>
<th>R34: Causes burns.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Xn: Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>R22-42: Harmful if swallowed. May cause sensitization by inhalation.</td>
</tr>
<tr>
<td>R31: Contact with acids liberates toxic gas.</td>
</tr>
</tbody>
</table>

Label elements

Labelling according to EU guidelines:
Code letter and hazard designation of product:
C Corrosive

Risk phrases:
22 Harmful if swallowed.
31 Contact with acids liberates toxic gas.
34 Causes burns.
42 May cause sensitization by inhalation.

(Contd. on page 2)
Safety phrases:
7 Keep container tightly closed.
22 Do not breathe dust.
26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
45 In case of accident or if you feel unwell, seek medical advice immediately.

Hazard description:

WMIS classification

Classification system
WMIS ratings (scale 0-4)
(Hazardous Materials Identification System)

| HEALTH      |  | Health (acute effects) = 2 |
|-------------|  | Flammability = 1 |
| REACTIVITY  |  | Reactivity = 1 |

Other hazards
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

3 Composition/information on ingredients

Chemical characterization: Substances
(CAS#) Description:
Chloramine-T trihydrate (CAS# 7080-50-4)
Identification number(s):
EINECS Number: 204-854-7

4 First aid measures

Description of first aid measures
General information Immediately remove any clothing soiled by the product.
After inhalation Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
After skin contact Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.
After eye contact Rinse opened eye for several minutes under running water. Then consult a doctor.
After swallowing Seek immediate medical advice.

5 Firefighting measures

Extinguishing media
Suitable extinguishing agents
Carbon dioxide, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
Special hazards arising from the substance or mixture
In case of fire, the following can be released:
Carbon monoxide and carbon dioxide
Nitrogen oxides (NOx)
 Possibly Hydrogen cyanide (HCN)
Sulfur oxides (SOx)
Hydrogen chloride (HCl)
Sodium oxide
Advice for firefighters
Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.
5 Accidental release measures

Personal precautions, protective equipment and emergency procedures
Mount respiratory protective device.
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
Environmental precautions:
Do not allow material to be released to the environment without proper governmental permits.
Methods and material for containment and cleaning up:
Use neutralizing agent.
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
Reference to other sections
See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

Handling
Precautions for safe handling
Handle under protective gas.
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Prevent formation of dust.
Information about protection against explosions and fires: Keep ignition sources away.
Conditions for safe storage, including any incompatibilities
Storage
Requirements to be met by storerooms and receptacles: No special requirements
Information about storage in one common storage facility:
Do not store together with acids.
Store away from oxidizing agents.
Store away from air.
Further information about storage conditions:
Store under inert gas.
Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers.

8 Exposure controls/personal protection

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.
Control parameters
Components with limit values that require monitoring at the workplace: Not required.
Additional information: No data

Exposure controls
Personal protective equipment
General protective and hygienic measures
The usual precautionary measures for handling chemicals should be followed.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Avoid contact with the eyes and skin.
Breathing equipment: Use suitable respirator when high concentrations are present.
Protection of hands:
Impervious gloves
Check protective gloves prior to each use for their proper condition.
Material of gloves
The selection of suitable gloves not only depends on the material, but also on quality.
Quality will vary from manufacturer to manufacturer.
Eye protection:
Safety glasses
Tightly sealed goggles
Full face protection
Body protection: Protective work clothing.
Material Safety Data Sheet
According to OSHA and ANSI

Printing date 06/01/2011
Reviewed on 04/22/2010

Product name: Chloramine-T trihydrate

9 Physical and chemical properties

Information on basic physical and chemical properties

General Information

Appearance:

Form: Crystalline powder

Color: White

Odor: Chlorine-like

Odour threshold: Not determined.

pH-value (50 g/l) at 20°C (68 °F): 8-10

Change in condition

Melting point/Melting range: ca 170°C (ca 338 °F) (dec)

Boiling point/Boiling range: Not determined

Sublimation temperature / start: Not determined

Flash point: 192°C (378 °F)

Flammability (solid, gaseous) Not determined.

Ignition temperature: Not determined

Decomposition temperature: >50°C (>140 °F)

Auto igniting: Not determined.

Danger of explosion: Product does not present an explosion hazard.

Explosion limits:

Lower: Not determined

Upper: Not determined

Vapor pressure: Not applicable.

Density: Not determined

Relative density Not determined.

Vapour density Not applicable.

Evaporation rate Not applicable.

Solubility in / Miscibility with

Water at 20°C (68 °F): 150 g/l

Segregation coefficient (n-octanol/water): Not determined.

Viscosity:

dynamic: Not applicable.

kinematic: Not applicable.

Other information No further relevant information available.

10 Stability and reactivity

Reactivity

Chemical stability:

Thermal decomposition / conditions to be avoided:

To avoid thermal decomposition do not overheat.

Decomposition will not occur if used and stored according to specifications.

Possibility of hazardous reactions Reacts with acids releasing chlorine

Incompatible materials:

Acids

Oxidizing agents

Heat

Hazardous decomposition products:

Carbon monoxide and carbon dioxide

Hydrogen chloride (HCl)

Chlorine

Nitrogen oxides

Possibly Hydrogen cyanide (HCN)

Sulfur oxides (SOx)

Sodium oxide

11 Toxicological information

Information on toxicological effects

Acute toxicity:

LD/LOSO values that are relevant for classification:

Oral LD50 935 mg/kg (rat)

(Contd. on page 2)
Material Safety Data Sheet
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Printing date 06/01/2011
Reviewed on 04/22/2010

Product name: Chloramine-T trihydrate

Inhalative LC50/4H >275 mg/m3/4H (rat)
Primary irritant effect:
on the skin: Corrosive effect on skin and mucous membranes.
on the eye: Strong corrosive effect.
Sensitization: Sensitization possible through inhalation.
Subacute to chronic toxicity:
Corrosive materials are acutely destructive to the respiratory tract, eyes, skin and
digestive tract. Eye contact may result in permanent damage and complete vision loss.
Inhalation may result in respiratory effects such as inflammation, edema, and chemical
pneumonitis. May cause coughing, wheezing, laryngitis, shortness of breath, headache, nausea
and vomiting. Ingestion may cause damage to the mouth, throat and esophagus. May cause skin
burns or irritation depending on the severity of the exposure.
Absorption into the body may lead to the formation of methemoglobin, producing cyanosis, and
marked fall in blood pressure leading to collapse, coma and possibly death. Onset may be
delayed 2-4 hours or longer.
Additional toxicological information:
To the best of our knowledge the acute and chronic toxicity of this substance is not fully
known.
Swallowing will lead to a strong corrosive effect on mouth and throat and to the danger of
perforation of esophagus and stomach.
No classification data on carcinogenic properties of this material is available from the EPA,
IARC, NTP, OSHA or ACGIH.

12 Ecological information
Toxicity
Acute toxicity: No further relevant information available.
Persistence and degradability No further relevant information available.
Behavior in environmental systems:
Bioaccumulative potential No further relevant information available.
Mobility in soil No further relevant information available.
Additional ecological information:
General notes:
Do not allow undiluted product or large quantities of it to reach ground water, water course
or sewage system.
Do not allow material to be released to the environment without proper governmental permits.
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.
Other adverse effects No further relevant information available.

13 Disposal considerations
Waste treatment methods
Recommendation Consult state, local or national regulations to ensure proper disposal.
Uncleaned packagings:
Recommendation: Disposal must be made according to official regulations.

14 Transport information
DOT regulations:

| Hazard class: | 8 |
| Identification number: | UN1263 |
| Packing group: | III |
| Proper shipping name (technical name): | CORROSIVE SOLID, BASIC, ORGANIC, N.O.S. (Chloramine-T trihydrate) |
| Label | 8 |
Material Safety Data Sheet
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Product name: Chloramine-T trihydrate

Land transport ADR/RID (cross-border)

ADR/RID class: 8 (C8) Corrosive substances
Danger code (Kamlet): 80
UN-Number: 3263
Packaging group: III
UN proper shipping name: 3263 CORROSIVE SOLID, BASIC, ORGANIC, N.O.S. (Chloramine-T trihydrate)

Maritime transport INDG:

INDG Class: 8
UN Number: 3263
Label 8
Package group: III
Marine pollutant: No
Segregation groups: Alkalis
Proper shipping name: CORROSIVE SOLID, BASIC, ORGANIC, N.O.S. (Chloramine-T trihydrate)

Air transport ICAO-TI and IATA-DGR:

ICAO/IATA Class: 8
UN/ID Number: 3263
Label 8
Package group: III
Proper shipping name: CORROSIVE SOLID, BASIC, ORGANIC, N.O.S. (Chloramine-T trihydrate)

UN "Model Regulations": UN3263, CORROSIVE SOLID, BASIC, ORGANIC, N.O.S., 8, III
Special precautions for user Warning: Corrosive substances
Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code Not applicable.

15 Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture

Product related hazard information:

Hazard symbols:
C Corrosive

Risk phrases:
22 Harmful if swallowed.
31 Contact with acids liberates toxic gas.
34 Causes burns.
43 May cause sensitization by inhalation.

Safety phrases:
7 Keep container tightly closed.
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National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.

(Cont'd on page 7)
Product name: Chloramine-T trihydrate

Some or all of the components of this product are not listed on the Canadian Domestic Substances List (DSL) or the Canadian Non-Domestic Substances List (NDSL).

Information about limitation of use: For use only by technically qualified individuals.

Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

If Other information

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgment of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Department issuing MSDS: Health, Safety and Environmental Department.

Contact:
Zachariah C. Holt
Global EHS Manager

Abbreviations and acronyms:
ADR: Accord européen sur le transport des marchandises dangereuses par route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
IATA-DGR: Dangerous Goods Regulations by the "International Air Transport Association" (IATA)
ICAO: International Civil Aviation Organization
ICAO-TI: Technical Instructions by the "International Civil Aviation Organization" (ICAO)
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (Division of the American Chemical Society)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
LD50: Lethal dose, 50 percent