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

1.1. Product identifier

Product form: Substance
Physical state: Liquid
Substance name: DIMETHYLALUMINUM CHLORIDE
Product code: OMAL024
Formula: C2H6AlCl
Synonyms:
- DIMETHYLCHLOROALANE
- CHLORODIMETHYLALUMINUM
- DIMETHYLCHLOROALUMINUM

Chemical family: METAL ALKYL

1.2. Relevant identified uses of the substance or mixture and uses advised against

1.2.1. Relevant identified uses

Use of the substance/mixture: Chemical intermediate

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

GELEST, INC.
11 East Steel Road
Morrisville, PA 19067
USA
T 215-547-1015 - F 215-547-2484 - (M-F): 8:00 AM - 5:30 PM EST
info@gelest.com - www.gelest.com

GELEST INC.
Fritz-Klatte-Strasse 8
65933 Frankfurt
Germany
T +49 (0) 69 3535106-500 - F +49 (0) 69 3535106-501 - (M-F): 8:00 AM - 4:00 PM
info@gelestde.com - www.gelestde.com

1.4. Emergency telephone number

Emergency number: CHEMTREC: 1-800-424-9300 (USA); +1 703-527-3887 (International)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

- Flammable liquids, Category 2: H225
- Pyrophoric Liquids, Category 1: H250
- Substances and Mixtures which, in contact with water, emit flammable gases, Category 1: H260
- Skin corrosion/irritation, Category 1B: H314
- Serious eye damage/eye irritation, Category 1: H318

Adverse physicochemical, human health and environmental effects

No additional information available
2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP):

- GHS02
- GHS05

Signal word (CLP): Danger

Hazard statements (CLP):
- H225 - Highly flammable liquid and vapour.
- H250 - Catches fire spontaneously if exposed to air.
- H280 - In contact with water releases flammable gases which may ignite spontaneously.
- H314 - Causes severe skin burns and eye damage.

Precautionary statements (CLP):
- P280 - Wear protective gloves/protective clothing/eye protection/face protection.
- P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- P222 - Do not allow contact with air.
- P223 - Do not allow contact with water.
- P231+P232 - Handle and store contents under inert gas. Protect from moisture.
- P240 - Ground and bond container and receiving equipment.

2.3. Other hazards

No additional information available

SECTION 3: Composition/information on ingredients

3.1. Substances

Substance type: Mono-constituent
Name: DIMETHYLALUMINUM CHLORIDE
CAS-No.: 1184-58-3
EC-No.: 214-668-8

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>Classification according to Regulation (EC) No. 1272/2008 [CLP]</th>
</tr>
</thead>
</table>

Full text of H-statements: see section 16

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general: Remove contaminated clothing and shoes. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). If possible show this sheet; if not available show packaging or label.

First-aid measures after inhalation: Remove person to fresh air and keep comfortable for breathing. If you feel unwell, seek medical advice.

First-aid measures after skin contact: Wash with plenty of water/…. Get immediate medical advice/attention.

First-aid measures after eye contact: Immediately flush eyes thoroughly with water for at least 15 minutes. Get immediate medical advice/attention.

First-aid measures after ingestion: Never give anything by mouth to an unconscious person. Get medical advice/attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/effects: Causes severe skin burns and eye damage.
Symptoms/effects after inhalation: Direct respiratory contact is usually not possible, but will cause burns. Inhalation of combustion products can cause irritation.
Symptoms/effects after skin contact: Causes (severe) skin burns.
Symptoms/effects after eye contact: Causes serious eye damage.
Symptoms/effects after ingestion: May be harmful if swallowed.
SECTION 5: Firefighting measures

5.1. Extinguishing media
Suitable extinguishing media: Dry chemical powder followed by sand or dolomite.
Unsuitable extinguishing media: Water.

5.2. Special hazards arising from the substance or mixture
Fire hazard: Pyrophoric liquid. Highly flammable liquid and vapour. Catches fire spontaneously if exposed to air. In contact with water releases flammable gases which may ignite spontaneously.
Explosion hazard: Container explosion may occur during fire conditions. May form flammable/explosive vapour-air mixture.

5.3. Advice for firefighters
Firefighting instructions: If material is ignited, allow to burn. Exercise caution when fighting any chemical fire. In case of fire: stop leak if safe to do so.
Protection during firefighting: Do not enter fire area without proper protective equipment, including respiratory protection. Avoid all eye and skin contact and do not breathe vapour and mist.
Other information: Concentrate containment efforts to adjacent combustibles. Fumes, self-heating on exposure to air, may ignite spontaneously in contact with.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
General measures: Eliminate every possible source of ignition. Use special care to avoid static electric charges.

6.1.1. For non-emergency personnel
Protective equipment: Wear protective equipment as described in Section 8.
Emergency procedures: Evacuate unnecessary personnel.

6.1.2. For emergency responders
Protective equipment: Do not attempt to take action without suitable protective equipment. Equip cleanup crew with proper protection. For further information refer to section 8: “Exposure controls/personal protection”.
Emergency procedures: Stop release.

6.2. Environmental precautions
Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3. Methods and material for containment and cleaning up
For containment: Concentrate containment efforts to adjacent combustibles.
Methods for cleaning up: Cover with dry chemical extinguishing powder, lime, sand or soda ash. Do not use water. Remove combustible materials in the vicinity of the spill. Allow time for decomposition or fire to burn out, then sweep material and transfer to a suitable container for disposal. Use only non-sparking tools.

6.4. Reference to other sections
See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Additional hazards when processed: Catches fire spontaneously if exposed to air. Handle empty containers with care because residual vapours are flammable. Do not allow contact with water.
Precautions for safe handling: Avoid all eye and skin contact and do not breathe vapour and mist. Do not allow contact with air. Do not allow contact with water. Ground/bond container and receiving equipment. Handle under inert gas. Protect from moisture. Handle only in sealed purged systems. Take precautionary measures against static discharge. Use only non-sparking tools. Use only outdoors or in a well-ventilated area.
Hygiene measures: Wash contaminated clothing before reuse. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

7.2. Conditions for safe storage, including any incompatibilities
Technical measures: Laboratory and production areas must be equipped with special fire-extinguishing media for organometallics. Proper grounding procedures to avoid static electricity should be followed. Use explosion-proof electrical equipment.
DIMETHYLALUMINUM CHLORIDE
Safety Data Sheet

7.3. Specific end use(s)
No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters
Dimethylaluminium chloride (1184-58-3)

<table>
<thead>
<tr>
<th>Country</th>
<th>Control parameter</th>
<th>Limit Value (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy - Portugal</td>
<td>ACGIH TWA</td>
<td>2 mg/m³ aluminum alkyls as Al</td>
</tr>
<tr>
<td>USA OSHA</td>
<td>OSHA PEL (TWA) (mg/m³)</td>
<td>2 mg/m³ aluminum alkyls as Al</td>
</tr>
</tbody>
</table>

8.2. Exposure controls
Appropriate engineering controls:
Glove box or sealed system under inert atmosphere is required. Provide local exhaust or general room ventilation.

Personal protective equipment:
Avoid all unnecessary exposure. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Hand protection:
Neoprene or nitrile rubber gloves

Eye protection:
Full face shield with chemical workers goggles. Contact lenses should not be worn

Skin and body protection:
Wear suitable protective clothing. Fire resistant laboratory jacket or apron should be worn.

Respiratory protection:
Where exposure through inhalation may occur from use, respiratory protection equipment is recommended. NIOSH-certified combination organic vapor/acid gas (yellow cartridge) respirator.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Appearance</td>
<td>Clear liquid. Ignites on exposure to air.</td>
</tr>
<tr>
<td>Molecular mass</td>
<td>92.51 g/mol</td>
</tr>
<tr>
<td>Colour</td>
<td>Colourless.</td>
</tr>
<tr>
<td>Odour</td>
<td>No data available</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>Refractive index</td>
<td>No additional information available</td>
</tr>
<tr>
<td>pH</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting point</td>
<td>15 °C</td>
</tr>
<tr>
<td>Freezing point</td>
<td>No data available</td>
</tr>
<tr>
<td>Boiling point</td>
<td>126 - 127 °C</td>
</tr>
<tr>
<td>Flash point</td>
<td>-18 °C</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Pyrophoric liquid. Highly flammable liquid and vapour. Catches fire spontaneously if exposed to air. In contact with water releases flammable gases which may ignite spontaneously.</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative vapour density at 20 °C</td>
<td>&gt; 1</td>
</tr>
<tr>
<td>Relative density</td>
<td>0.996 @ 25°C</td>
</tr>
<tr>
<td>Solubility</td>
<td>Reacts violently with water.</td>
</tr>
<tr>
<td>Log Pow</td>
<td>No data available</td>
</tr>
<tr>
<td>Log Kow</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity, kinematic</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity, dynamic</td>
<td>No data available</td>
</tr>
</tbody>
</table>
DIMETHYLALUMINUM CHLORIDE
Safety Data Sheet

Explosive properties : No data available
Oxidising properties : No data available
Explosive limits : No data available

9.2. Other information
No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity
No additional information available

10.2. Chemical stability
Stable in sealed containers stored under a dry inert atmosphere.

10.3. Possibility of hazardous reactions
Catches fire spontaneously if exposed to air.

10.4. Conditions to avoid
Heat. Sparks. Open flame. Do not allow contact with air.

10.5. Incompatible materials

10.6. Hazardous decomposition products

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute toxicity : Not classified
Skin corrosion/irritation : Causes severe skin burns and eye damage.
Serious eye damage/irritation : Causes serious eye damage.
Respiratory or skin sensitisation : Not classified
Germ cell mutagenicity : Not classified
Carcinogenicity : Not classified

Reproductive toxicity : Not classified
STOT-single exposure : Not classified
STOT-repeated exposure : Not classified
Aspiration hazard : Not classified
Symptoms/effects after inhalation : Direct respiratory contact is usually not possible, but will cause burns. Inhalation of combustion products can cause irritation.
Symptoms/effects after skin contact : Causes (severe) skin burns.
Symptoms/effects after eye contact : Causes serious eye damage.
Symptoms/effects after ingestion : May be harmful if swallowed.

SECTION 12: Ecological information

12.1. Toxicity
Acute aquatic toxicity : Not classified
Chronic aquatic toxicity : Not classified

12.2. Persistence and degradability
No additional information available

12.3. Bioaccumulative potential
No additional information available

12.4. Mobility in soil
No additional information available

12.5. Results of PBT and vPvB assessment
No additional information available

12.6. Other adverse effects
Other adverse effects : This substance may be hazardous to the environment.
SECTION 13: Disposal considerations

13.1. Waste treatment methods

Sewage disposal recommendations: Do not dispose of waste into sewer.

Product/Packaging disposal recommendations: Incinerate. Dispose in a safe manner in accordance with local/national regulations. Dispose of contents/container to licensed waste disposal facility. This is a RCRA hazardous waste: 40 CFR 261.21 (i.e. ignitable) 40 CFR 261.23 (i.e. reactive).

Additional information: Handle empty containers with care because residual vapours are flammable.

Ecology - waste materials: Avoid release to the environment.

SECTION 14: Transport information

14.1. UN number

In accordance with ADR / RID / IMDG / IATA / ADN

14.1. UN number

UN-No. (ADR) : 3394
UN-No. (IMDG) : 3394
UN-No. (IATA) : 3394
UN-No. (ADN) : 3394
UN-No. (RID) : 3394

14.2. UN proper shipping name

Proper Shipping Name (ADR) : ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC, WATER-REACTIVE
Proper Shipping Name (IMDG) : ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC, WATER-REACTIVE
Proper Shipping Name (IATA) : Organometallic substance, liquid, pyrophoric, water-reactive
Proper Shipping Name (ADN) : ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC, WATER-REACTIVE
Proper Shipping Name (RID) : ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC, WATER-REACTIVE

Transport document description (ADR) : UN 3394 ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC, WATER-REACTIVE (DIMETHYLALUMINUM CHLORIDE), 4.2 (4.3), I, (B/E)
Transport document description (IMDG) : UN 3394 ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC, WATER-REACTIVE (DIMETHYLALUMINUM CHLORIDE), 4.2 (4.3), I
Transport document description (IATA) : UN 3394 Organometallic substance, liquid, pyrophoric, water-reactive (DIMETHYLALUMINUM CHLORIDE), 4.2
Transport document description (ADN) : UN 3394 ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC, WATER-REACTIVE (DIMETHYLALUMINUM CHLORIDE), 4.2 (4.3), I
Transport document description (RID) : UN 3394 ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC, WATER-REACTIVE (DIMETHYLALUMINUM CHLORIDE), 4.2 (4.3), I

14.3. Transport hazard class(es)

ADR
Transport hazard class(es) (ADR) : 4.2 (4.3)
Danger labels (ADR) : 4.2, 4.3

IMDG
Transport hazard class(es) (IMDG) : 4.2 (4.3)
Danger labels (IMDG) : 4.2, 4.3

IATA
Transport hazard class(es) (IATA) : 4.2 (4.3)

ADN
Transport hazard class(es) (ADN) : 4.2 (4.3)
DIMETHYLALUMINUM CHLORIDE
Safety Data Sheet

Danger labels (ADN) : 4.2, 4.3

RID
Transport hazard class(es) (RID) : 4.2 (4.3)
Danger labels (RID) : 4.2, 4.3

14.4. Packing group
Packing group (ADR) : I
Packing group (IMDG) : I
Packing group (IATA) : Not applicable
Packing group (ADN) : I
Packing group (RID) : I

14.5. Environmental hazards
Dangerous for the environment : No
Marine pollutant : No
Other information : No supplementary information available

14.6. Special precautions for user
- Overland transport
Classification code (ADR) : SW
Special provisions (ADR) : 274
Limited quantities (ADR) : 0
Excepted quantities (ADR) : E0
Packing instructions (ADR) : P400
Special packing provisions (ADR) : PP86
Mixed packing provisions (ADR) : MP2
Portable tank and bulk container instructions (ADR) : T21
Portable tank and bulk container special provisions (ADR) : TP2, TP7, TP36, TP41
Tank code (ADR) : L21DH
Tank special provisions (ADR) : TU4, TU14, TU22, TC1, TE21, TM1
Vehicle for tank carriage : AT
Transport category (ADR) : 0
Special provisions for carriage - Packages (ADR) : V1
Special provisions for carriage - Operation (ADR) : S20
Hazard identification number (Kemler No.) : X333
Orange plates : T333 3394

Tunnel restriction code (ADR) : B/E
EAC code : 4W

- Transport by sea
Special provisions (IMDG) : 274
DIMETHYLALUMINUM CHLORIDE
Safety Data Sheet

Limited quantities (IMDG) : 0
 Excepted quantities (IMDG) : E0
 Packing instructions (IMDG) : P400
 Special packing provisions (IMDG) : PP86
 Tank instructions (IMDG) : T21
 Tank special provisions (IMDG) : TP2, TP7, TP36, TP41
 EmS-No. (Fire) : F-G
 EmS-No. (Spillage) : S-M
 Stowage category (IMDG) : D
 Stowage and handling (IMDG) : H1
 Segregation (IMDG) : SG35, SG63, SG26

- Air transport
 PCA Limited quantities (IATA) : Forbidden
 PCA limited quantity max net quantity (IATA) : Forbidden
 PCA packing instructions (IATA) : Forbidden
 PCA max net quantity (IATA) : Forbidden
 CAO packing instructions (IATA) : Forbidden
 CAO max net quantity (IATA) : Forbidden
 ERG code (IATA) : 4W

- Inland waterway transport
 Classification code (ADN) : SW
 Special provisions (ADN) : 274
 Limited quantities (ADN) : 0
 Excepted quantities (ADN) : E0
 Equipment required (ADN) : PP, EX, A
 Ventilation (ADN) : VE01
 Number of blue cones/lights (ADN) : 0

- Rail transport
 Classification code (RID) : SW
 Special provisions (RID) : 274
 Limited quantities (RID) : 0
 Excepted quantities (RID) : E0
 Packing instructions (RID) : P400
 Special packing provisions (RID) : PP86
 Mixed packing provisions (RID) : MP2
 Portable tank and bulk container instructions (RID) : T21
 Portable tank and bulk container special provisions (RID) : TP2, TP7, TP36
 Tank codes for RID tanks (RID) : L21DH
 Special provisions for RID tanks (RID) : TU4, TU14, TU22, TU38, TC1, TE21, TE22, TE25, TM1
 Transport category (RID) : 0
 Special provisions for carriage – Packages (RID) : W1
 Hazard identification number (RID) : X333

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code
Not applicable

SECTION 15: Regulatory information

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

15.1.1. EU-Regulations
No REACH Annex XVII restrictions
DIMETHYLALUMINUM CHLORIDE is not on the REACH Candidate List
DIMETHYLALUMINUM CHLORIDE is not on the REACH Annex XIV List
DIMETHYLALUMINUM CHLORIDE is not subject to REGULATION (EU) No 649/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 concerning the export and import of hazardous chemicals.

15.1.2. National regulations

**Germany**

Reference to AwSV : Water hazard class (WGK) 1, Slightly hazardous to water (Classification according to VwVwS, Annex 3; ID No. 3590)

12th Ordinance Implementing the Federal Immission Control Act - 12.BImSchV : Is not subject of the 12. BlmSchV (Hazardous Incident Ordinance)

**Netherlands**

SZW-lijst van kankerverwekkende stoffen : The substance is not listed

SZW-lijst van mutagene stoffen : The substance is not listed

NIET-limitatieve lijst van voor de voortplanting gifige stoffen – Borstvoeding : The substance is not listed

NIET-limitatieve lijst van voor de voortplanting gifige stoffen – Vruchtbaarheid : The substance is not listed

NIET-limitatieve lijst van voor de voortplanting gifige stoffen – Ontwikkeling : The substance is not listed

**Denmark**

Classification remarks : Emergency management guidelines for the storage of flammable liquids must be followed

Danish National Regulations : Young people below the age of 18 years are not allowed to use the product

15.2. Chemical safety assessment

No additional information available

**SECTION 16: Other information**

Abbreviations and acronyms:

| Abbreviations: ND: Not Determined, No Data; NA: Not Applicable; LD: Lethal Dose; LC: Lethal Concentration; ATE: Acute Toxicity Estimates; H: hour; °: °C unless otherwise stated; mm: millimeters Hg, torr; PEL: permissible exposure level; TWA: time weighted average; TLV: threshold limit value; TG: Test Guideline; NIOSH: National Institute for Occupational Safety and Health; IARC: International Agency for Research on Cancer; NTP: National Toxicology Program; HMIS: Hazardous Material Information System; CAS No.: Chemical Abstract Service Registration Number; EC No.: European Commission Registration Number; EC Index No.: European Commission Index Number; OECD: The Organisation for Economic Co-operation and Development, GHS: The Globally Harmonized System of Classification and Labelling, APF: Assigned Protection Factor |

Other information : Prepared by safety and environmental affairs.

Full text of H- and EUH-statements:

| Eye Dam. 1 | Serious eye damage/eye irritation, Category 1 |
| Flam. Liq. 2 | Flammable liquids, Category 2 |
| Pyr. Liq. 1B | Pyrophoric Liquids, Category 1 |
| Skin Corr. 1B | Skin corrosion/irritation, Category 1B |
| Water-react. 1 | Substances and Mixtures which, in contact with water, emit flammable gases, Category 1 |
| H225 | Highly flammable liquid and vapour. |
| H250 | Catches fire spontaneously if exposed to air. |
| H260 | In contact with water releases flammable gases which may ignite spontaneously. |
| H314 | Causes severe skin burns and eye damage. |
| H318 | Causes serious eye damage. |

**SDS EU (REACH Annex II) - Custom**

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EN (English) SDS ID: OMAL024 9/9