SAFETY DATA SHEET

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

1.1 Product identifiers

Product name: Trimethyl orthoformate
Product Number: 305472
Brand: Aldrich
CAS-No.: 149-73-5

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

Identified uses: Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO  63103
UNITED STATES

Telephone: +1 314 771-5765
Fax: +1 800 325-5052

1.4 Emergency telephone

Emergency Phone #: 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Eye irritation (Category 2A), H319

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)
H225: Highly flammable liquid and vapor.
H319: Causes serious eye irritation.
Precautionary statement(s)
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.
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235 Store in a well-ventilated place. Keep cool.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients
3.1 Substances
Synonyms: Trimethoxymethane
Formula: C_4H_{10}O_3
Molecular weight: 106.12 g/mol
CAS-No.: 149-73-5
EC-No.: 205-745-7

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>trimethyl orthoformate</td>
<td>Flam. Liq. 2; Eye Irrit. 2A; H225, H319</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures
4.1 Description of first-aid measures
General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air.
**In case of skin contact**
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/shower.

**In case of eye contact**
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

**If swallowed**
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 **Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.

4.3 **Indication of any immediate medical attention and special treatment needed**
No data available

SECTION 5: Firefighting measures

5.1 **Extinguishing media**
- Suitable extinguishing media
  - Carbon dioxide (CO2)
  - Foam
  - Dry powder
- Unsuitable extinguishing media
  - For this substance/mixture no limitations of extinguishing agents are given.

5.2 **Special hazards arising from the substance or mixture**
- Carbon oxides
- Combustible.
- Pay attention to flashback.
- Vapors are heavier than air and may spread along floors.
- Development of hazardous combustion gases or vapours possible in the event of fire.
- Forms explosive mixtures with air at ambient temperatures.

5.3 **Advice for firefighters**
In the event of fire, wear self-contained breathing apparatus.

5.4 **Further information**
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 **Personal precautions, protective equipment and emergency procedures**
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert. For personal protection see section 8.

6.2 **Environmental precautions**
Do not let product enter drains. Risk of explosion.
6.3 **Methods and materials for containment and cleaning up**
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 **Reference to other sections**
For disposal see section 13.

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**SECTION 7: Handling and storage**

7.1 **Precautions for safe handling**

*Advice on protection against fire and explosion*
Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.

*Hygiene measures*
Change contaminated clothing. Wash hands after working with substance.
For precautions see section 2.2.

7.2 **Conditions for safe storage, including any incompatibilities**

*Storage conditions*
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.
Storage class (TRGS 510): 3: Flammable liquids

7.3 **Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

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**SECTION 8: Exposure controls/personal protection**

8.1 **Control parameters**

*Ingredients with workplace control parameters*
Contains no substances with occupational exposure limit values.

8.2 **Exposure controls**

*Appropriate engineering controls*
Change contaminated clothing. Wash hands after working with substance.

*Personal protective equipment*

*Eye/face protection*
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

*Body Protection*
Flame retardant antistatic protective clothing.

*Respiratory protection*
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.
Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1  Information on basic physical and chemical properties

a) Appearance  Form: clear, liquid  
               Color: colorless
b) Odor  pungent
c) Odor Threshold  No data available
d) pH  No data available
e) Melting point/freezing point  Melting point: -53 °C (-63 °F) at ca.1,013.25 hPa
f) Initial boiling point and boiling range  101 - 102 °C 214 - 216 °F - lit.
g) Flash point  13 °C (55 °F) at ca.1,013.25 hPa - closed cup - DIN 51755 Part 1
h) Evaporation rate  No data available
i) Flammability (solid, gas)  No data available
j) Upper/lower flammability or explosive limits  Upper explosion limit: 44.6 %(V)  
               Lower explosion limit: 1.4 %(V)
k) Vapor pressure  10 hPa at 7 °C (45 °F)
l) Vapor density  3.66 - (Air = 1.0)
m) Density  0.97 g/cm3 at 25 °C (77 °F) - lit.  
               Relative density  ca.0.97 at 20 °C (68 °F) - DIN 51757
n) Water solubility  10 g/l at 20 °C (68 °F)
o) Partition coefficient: n-octanol/water  log Pow: 0.09 at 20 °C (68 °F) - Bioaccumulation is not expected.
p) Autoignition temperature  255 °C (491 °F) at 1,013.25 hPa - DIN 51794
q) Decomposition temperature  No data available
r) Viscosity  No data available
s) Explosive properties  No data available
t) Oxidizing properties  No data available

9.2  Other safety information

Relative vapor density  3.66 - (Air = 1.0)
SECTION 10: Stability and reactivity

10.1 Reactivity
Vapors may form explosive mixture with air.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature).

10.3 Possibility of hazardous reactions
Violent reactions possible with:
- Strong oxidizing agents
- Water
- Acids

10.4 Conditions to avoid
- Avoid moisture.
- Warming.

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

**Acute toxicity**
- LD50 Oral - Rat: 3,130 mg/kg
- Symptoms: Irritations of mucous membranes in the mouth, pharynx, oesophagus and gastrointestinal tract.
- Remarks: (Lit.)

**LC50 Inhalation - Rat - male: 4 h - 40 mg/l**
- Symptoms: Possible damages: mucosal irritations
- Remarks: (ECHA)

**Dermal**
- No data available

**Skin corrosion/irritation**
- Skin - Rabbit
- Result: No skin irritation
  (OECD Test Guideline 404)

**Serious eye damage/eye irritation**
- Eyes - Rabbit
- Result: Eye irritation
  (OECD Test Guideline 405)

**Respiratory or skin sensitization**
- Maximization Test - Guinea pig
- Result: negative
  (OECD Test Guideline 406)

**Germ cell mutagenicity**
- Test Type: Ames test
- Test system: Salmonella typhimurium
- Metabolic activation: with and without metabolic activation
Result: negative
Remarks: (ECHA)

Test Type: Micronucleus test
Species: Mouse

Method: OECD Test Guideline 474
Result: negative

Carcinogenicity
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.
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.
OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA’s list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: RM6650000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Other dangerous properties can not be excluded.
Handle in accordance with good industrial hygiene and safety practice.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish
static test LC50 - Leuciscus idus (Golden orfe) - 412 mg/l - 48 h (DIN 38412 T15)

Toxicity to bacteria

12.2 Persistence and degradability
Biodegradability aerobic - Exposure time 13 d
Result: 97 % - Readily biodegradable.
Remarks: (ECHA)
12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 3272  Class: 3  Packing group: II
Proper shipping name: Esters, n.o.s.
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 3272  Class: 3  Packing group: II  EMS-No: F-E, S-D
Proper shipping name: ESTERS, N.O.S. (trimethyl orthoformate)

IATA
UN number: 3272  Class: 3  Packing group: II
Proper shipping name: Esters, n.o.s. (trimethyl orthoformate)

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
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.

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.
No components are subject to the Massachusetts Right to Know Act.

**Pennsylvania Right To Know Components**
trimethyl orthoformate  
CAS-No. 149-73-5

**New Jersey Right To Know Components**
trimethyl orthoformate  
CAS-No. 149-73-5

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**SECTION 16: Other information**

**Further information**
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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