



## 4,4-Dimethoxybutan-2-one

### Apollo Scientific

Part Number: OR59432

Version No: 4.4

Safety Data Sheet

Chemwatch Hazard Alert Code: 2

Issue Date: 03/07/2023

Print Date: 03/07/2023

S.GHS.GB-NIR.EN

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

##### Product Identifier

|                               |                                    |
|-------------------------------|------------------------------------|
| Product name                  | 4,4-Dimethoxybutan-2-one           |
| Chemical Name                 | acetylacetaldehyde dimethyl acetal |
| Synonyms                      | Not Available                      |
| Proper shipping name          | KETONES, LIQUID, N.O.S.            |
| Chemical formula              | C6H12O3                            |
| Other means of identification | Not Available                      |
| CAS number                    | 5436-21-5*                         |

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

|                          |               |
|--------------------------|---------------|
| Relevant identified uses | Not Available |
|--------------------------|---------------|

##### Details of the manufacturer or supplier of the safety data sheet

|                         |   |  |
|-------------------------|---|--|
| Registered company name | Apollo Scientific   | Apollo Scientific Ltd  |
| Address                 | Whitefield Road, Bredbury SK62QR United Kingdom                                     | Whitefield Road, Bredbury SK6 2QR United Kingdom (NI)              |
| Telephone               | 01614060505   | +44(0) 161 406 0505  |
| Fax                     | 0161 406 0506   | Not Available  |
| Website                 | <a href="http://www.apolloscientific.co.uk/">http://www.apolloscientific.co.uk/</a> | <a href="http://apolloscientific.co.uk">apolloscientific.co.uk</a> |
| Email                   | sales@apolloscientific.co.uk  | sales@apolloscientific.co.uk                                       |

##### Emergency telephone number

|                                   |               |
|-----------------------------------|---------------|
| Association / Organisation        | Not Available |
| Emergency telephone numbers       | Not Available |
| Other emergency telephone numbers | Not Available |

#### SECTION 2 Hazards identification


##### Classification of the substance or mixture

|   |                                     |
|---|-------------------------------------|
| Classification according to regulation (EC) No 1272/2008 [CLP] and amendments [1] | H226 - Flammable Liquids Category 3 |
|---|-------------------------------------|

**4,4-Dimethoxybutan-2-one**

**Legend:** 1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI

**Label elements**

|                     |   |
|---------------------|---|
| Hazard pictogram(s) |  |
| Signal word         | <b>Warning</b>  |

**Hazard statement(s)**

|             |                              |
|-------------|------------------------------|
| <b>H226</b> | Flammable liquid and vapour. |
|-------------|------------------------------|

**Precautionary statement(s) Prevention**

|             |  |
|-------------|--|
| <b>P210</b> | Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. |
| <b>P233</b> | Keep container tightly closed.   |
| <b>P240</b> | Ground and bond container and receiving equipment.   |
| <b>P241</b> | Use explosion-proof electrical/ventilating/lighting/intrinsically safe equipment.              |
| <b>P242</b> | Use non-sparking tools.  |
| <b>P243</b> | Take action to prevent static discharges.  |
| <b>P280</b> | Wear protective gloves and protective clothing.  |

**Precautionary statement(s) Response**

|                       |  |
|-----------------------|--|
| <b>P370+P378</b>      | In case of fire: Use alcohol resistant foam or normal protein foam to extinguish.                        |
| <b>P303+P361+P353</b> | IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower]. |

**Precautionary statement(s) Storage**

|                  |  |
|------------------|--|
| <b>P403+P235</b> | Store in a well-ventilated place. Keep cool. |
|------------------|--|

**Precautionary statement(s) Disposal**

|             |  |
|-------------|--|
| <b>P501</b> | Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation. |
|-------------|--|

**SECTION 3 Composition / information on ingredients**

**Substances**

| CAS No     | %[weight] | Name                            | Classification according to regulation (EC) No 1272/2008 [CLP] and amendments | SCL / M-Factor |
|------------|-----------|---------------------------------|---|----------------|
| 5436-21-5* | 100       | <u>4,4-Dimethoxybutan-2-one</u> | Flammable Liquids Category 3; H226 <sup>[1]</sup>                             | Not Available  |

**Legend:** 1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 3. Classification drawn from C&L; \* EU IOELVs available; [e] Substance identified as having endocrine disrupting properties

**Mixtures**

See section above for composition of Substances

**SECTION 4 First aid measures**

**Description of first aid measures**

|                     |   |
|---------------------|---|
| <b>Eye Contact</b>  | If this product comes in contact with eyes: <ul style="list-style-type: none"><li>▶ Wash out immediately with water.</li><li>▶ If irritation continues, seek medical attention.</li><li>▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.</li></ul> |
| <b>Skin Contact</b> | If skin or hair contact occurs: <ul style="list-style-type: none"><li>▶ Flush skin and hair with running water (and soap if available).</li><li>▶ Seek medical attention in event of irritation.</li></ul>  |

**4,4-Dimethoxybutan-2-one**

|                   |   |
|-------------------|---|
| <b>Inhalation</b> | <ul style="list-style-type: none"> <li>▸ If fumes, aerosols or combustion products are inhaled remove from contaminated area.</li> <li>▸ Other measures are usually unnecessary.</li> </ul>           |
| <b>Ingestion</b>  | <ul style="list-style-type: none"> <li>▸ Immediately give a glass of water.</li> <li>▸ First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.</li> </ul> |

**Indication of any immediate medical attention and special treatment needed**

Treat symptomatically.  
for simple ketones:

-----  
**BASIC TREATMENT**  
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- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- Monitor and treat, where necessary, for pulmonary oedema .
- Monitor and treat, where necessary, for shock.
- **DO NOT use emetics.** Where ingestion is suspected rinse mouth and give up to 200 ml water (5mL/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.
- Give activated charcoal.

-----  
**ADVANCED TREATMENT**  
-----

- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- Consider intubation at first sign of upper airway obstruction resulting from oedema.
- Positive-pressure ventilation using a bag-valve mask might be of use.
- Monitor and treat, where necessary, for arrhythmias.
- Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.
- Drug therapy should be considered for pulmonary oedema.
- Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.
- Treat seizures with diazepam.
- Proparacaine hydrochloride should be used to assist eye irrigation.

-----  
**EMERGENCY DEPARTMENT**  
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- Laboratory analysis of complete blood count, serum electrolytes, BUN, creatinine, glucose, urinalysis, baseline for serum aminotransferases (ALT and AST), calcium, phosphorus and magnesium, may assist in establishing a treatment regime. Other useful analyses include anion and osmolar gaps, arterial blood gases (ABGs), chest radiographs and electrocardiograph.
- Positive end-expiratory pressure (PEEP)-assisted ventilation may be required for acute parenchymal injury or adult respiratory distress syndrome.
- Consult a toxicologist as necessary.

*BRONSTEIN, A.C. and CURRANCE, P.L.*

*EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994*

**SECTION 5 Firefighting measures****Extinguishing media****Special hazards arising from the substrate or mixture**

|                             |  |
|-----------------------------|--|
| <b>Fire Incompatibility</b> | <ul style="list-style-type: none"> <li>▸ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result</li> </ul> |
|-----------------------------|--|

**Advice for firefighters**

|                              |  |
|------------------------------|--|
| <b>Fire Fighting</b>         |  |
| <b>Fire/Explosion Hazard</b> | <ul style="list-style-type: none"> <li>▸ Liquid and vapour are flammable.</li> <li>▸ Moderate fire hazard when exposed to heat or flame.</li> <li>▸ Vapour forms an explosive mixture with air.</li> <li>▸ Moderate explosion hazard when exposed to heat or flame.</li> <li>▸ Vapour may travel a considerable distance to source of ignition.</li> <li>▸ Heating may cause expansion or decomposition leading to violent rupture of containers.</li> <li>▸ On combustion, may emit toxic/ irritating fumes.</li> </ul> |

**SECTION 6 Accidental release measures****Personal precautions, protective equipment and emergency procedures**

## 4,4-Dimethoxybutan-2-one

See section 8

## Environmental precautions

See section 12

## Methods and material for containment and cleaning up

|                     |   |
|---------------------|---|
| <b>Minor Spills</b> | <ul style="list-style-type: none"> <li>▸ Remove all ignition sources.</li> <li>▸ Clean up all spills immediately.</li> <li>▸ Avoid breathing vapours and contact with skin and eyes.</li> <li>▸ Control personal contact with the substance, by using protective equipment.</li> <li>▸ Contain and absorb small quantities with vermiculite or other absorbent material.</li> <li>▸ Wipe up.</li> <li>▸ Collect residues in a flammable waste container.</li> </ul> |
| <b>Major Spills</b> |   |

Personal Protective Equipment advice is contained in Section 8 of the SDS.

## SECTION 7 Handling and storage

### Precautions for safe handling

|                          |  |
|--------------------------|--|
| <b>Safe handling</b>     | <ul style="list-style-type: none"> <li>▸ Containers, even those that have been emptied, may contain explosive vapours.</li> <li>▸ Do NOT cut, drill, grind, weld or perform similar operations on or near containers.</li> <li>▸ Avoid all personal contact, including inhalation.</li> <li>▸ Wear protective clothing when risk of overexposure occurs.</li> <li>▸ Use in a well-ventilated area.</li> <li>▸ Prevent concentration in hollows and sumps.</li> <li>▸ <b>DO NOT enter confined spaces until atmosphere has been checked.</b></li> <li>▸ Avoid smoking, naked lights or ignition sources.</li> <li>▸ Avoid generation of static electricity.</li> <li>▸ <b>DO NOT use plastic buckets.</b></li> <li>▸ Earth all lines and equipment.</li> <li>▸ Use spark-free tools when handling.</li> <li>▸ Avoid contact with incompatible materials.</li> <li>▸ <b>When handling, DO NOT eat, drink or smoke.</b></li> <li>▸ Keep containers securely sealed when not in use.</li> <li>▸ Avoid physical damage to containers.</li> <li>▸ Always wash hands with soap and water after handling.</li> <li>▸ Work clothes should be laundered separately.</li> <li>▸ Use good occupational work practice.</li> <li>▸ Observe manufacturer's storage and handling recommendations contained within this SDS.</li> <li>▸ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.</li> </ul>   |
| <b>Other information</b> | <ul style="list-style-type: none"> <li>▸ Store in original containers in approved flammable liquid storage area.</li> <li>▸ Store away from incompatible materials in a cool, dry, well-ventilated area.</li> <li>▸ <b>DO NOT store in pits, depressions, basements or areas where vapours may be trapped.</b></li> <li>▸ No smoking, naked lights, heat or ignition sources.</li> <li>▸ Storage areas should be clearly identified, well illuminated, clear of obstruction and accessible only to trained and authorised personnel - adequate security must be provided so that unauthorised personnel do not have access.</li> <li>▸ Store according to applicable regulations for flammable materials for storage tanks, containers, piping, buildings, rooms, cabinets, allowable quantities and minimum storage distances.</li> <li>▸ Use non-sparking ventilation systems, approved explosion proof equipment and intrinsically safe electrical systems.</li> <li>▸ Have appropriate extinguishing capability in storage area (e.g. portable fire extinguishers - dry chemical, foam or carbon dioxide) and flammable gas detectors.</li> <li>▸ Keep adsorbents for leaks and spills readily available.</li> <li>▸ Protect containers against physical damage and check regularly for leaks.</li> <li>▸ Observe manufacturer's storage and handling recommendations contained within this SDS.</li> </ul> <p>In addition, for tank storages (where appropriate):</p> <ul style="list-style-type: none"> <li>▸ Store in grounded, properly designed and approved vessels and away from incompatible materials.</li> <li>▸ For bulk storages, consider use of floating roof or nitrogen blanketed vessels; where venting to atmosphere is possible, equip storage tank vents with flame arrestors; inspect tank vents during winter conditions for vapour/ ice build-up.</li> <li>▸ Storage tanks should be above ground and diked to hold entire contents.</li> </ul> |

### Conditions for safe storage, including any incompatibilities

|                           |  |
|---------------------------|--|
| <b>Suitable container</b> | <ul style="list-style-type: none"> <li>▸ Packing as supplied by manufacturer.</li> <li>▸ Plastic containers may only be used if approved for flammable liquid.</li> <li>▸ Check that containers are clearly labelled and free from leaks.</li> </ul> |
|---------------------------|--|

## 4,4-Dimethoxybutan-2-one

|                                |  |
|--------------------------------|--|
|                                | <ul style="list-style-type: none"> <li>▶ For low viscosity materials (i) : Drums and jerry cans must be of the non-removable head type. (ii) : Where a can is to be used as an inner package, the can must have a screwed enclosure.</li> <li>▶ For materials with a viscosity of at least 2680 cSt. (23 deg. C)</li> <li>▶ For manufactured product having a viscosity of at least 250 cSt. (23 deg. C)</li> <li>▶ Manufactured product that requires stirring before use and having a viscosity of at least 20 cSt (25 deg. C): (i) Removable head packaging; (ii) Cans with friction closures and (iii) low pressure tubes and cartridges may be used.</li> <li>▶ Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages</li> <li>▶ In addition, where inner packagings are glass and contain liquids of packing group I there must be sufficient inert absorbent to absorb any spillage, unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.</li> </ul> |
| <b>Storage incompatibility</b> | ▶ Avoid reaction with oxidising agents   |

## SECTION 8 Exposure controls / personal protection

## Control parameters

## Occupational Exposure Limits (OEL)

## INGREDIENT DATA

Not Available

## Emergency Limits


| Ingredient               | TEEL-1        | TEEL-2        | TEEL-3        |
|--------------------------|---------------|---------------|---------------|
| 4,4-Dimethoxybutan-2-one | Not Available | Not Available | Not Available |

| Ingredient               | Original IDLH | Revised IDLH  |
|--------------------------|---------------|---------------|
| 4,4-Dimethoxybutan-2-one | Not Available | Not Available |

## Exposure controls

| <b>Appropriate engineering controls</b>   | <p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use. Employers may need to use multiple types of controls to prevent employee overexposure.</p> <p>For flammable liquids and flammable gases, local exhaust ventilation or a process enclosure ventilation system may be required. Ventilation equipment should be explosion-resistant.</p> <p>Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.</p> |                                 |   |  |  |   |                                  |  |   |                                  |
|---|---|---------------------------------|---|--|--|---|----------------------------------|--|---|----------------------------------|
|   | <table border="1"> <thead> <tr> <th>Type of Contaminant:</th> <th>Air Speed:</th> </tr> </thead> <tbody> <tr> <td>solvent, vapours, degreasing etc., evaporating from tank (in still air).</td> <td>0.25-0.5 m/s<br/>(50-100 f/min.)</td> </tr> <tr> <td>aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)</td> <td>0.5-1 m/s<br/>(100-200 f/min.)</td> </tr> <tr> <td>direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)</td> <td>1-2.5 m/s<br/>(200-500 f/min.)</td> </tr> </tbody> </table>  | Type of Contaminant:            | Air Speed:  | solvent, vapours, degreasing etc., evaporating from tank (in still air). | 0.25-0.5 m/s<br>(50-100 f/min.)                            | aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation) | 0.5-1 m/s<br>(100-200 f/min.)    | direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion) | 1-2.5 m/s<br>(200-500 f/min.)             |                                  |
|   | Type of Contaminant:  | Air Speed:                      |   |  |  |   |                                  |  |   |                                  |
|   | solvent, vapours, degreasing etc., evaporating from tank (in still air).  | 0.25-0.5 m/s<br>(50-100 f/min.) |   |  |  |   |                                  |  |   |                                  |
| aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)   | 0.5-1 m/s<br>(100-200 f/min.)   |                                 |   |  |  |   |                                  |  |   |                                  |
| direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)  | 1-2.5 m/s<br>(200-500 f/min.)   |                                 |   |  |  |   |                                  |  |   |                                  |
| <p>Within each range the appropriate value depends on:</p> <table border="1"> <thead> <tr> <th>Lower end of the range</th> <th>Upper end of the range</th> </tr> </thead> <tbody> <tr> <td>1: Room air currents minimal or favourable to capture</td> <td>1: Disturbing room air currents</td> </tr> <tr> <td>2: Contaminants of low toxicity or of nuisance value only.</td> <td>2: Contaminants of high toxicity</td> </tr> <tr> <td>3: Intermittent, low production.</td> <td>3: High production, heavy use</td> </tr> <tr> <td>4: Large hood or large air mass in motion</td> <td>4: Small hood-local control only</td> </tr> </tbody> </table> | Lower end of the range  | Upper end of the range          | 1: Room air currents minimal or favourable to capture | 1: Disturbing room air currents  | 2: Contaminants of low toxicity or of nuisance value only. | 2: Contaminants of high toxicity  | 3: Intermittent, low production. | 3: High production, heavy use  | 4: Large hood or large air mass in motion | 4: Small hood-local control only |
| Lower end of the range  | Upper end of the range  |                                 |   |  |  |   |                                  |  |   |                                  |
| 1: Room air currents minimal or favourable to capture   | 1: Disturbing room air currents   |                                 |   |  |  |   |                                  |  |   |                                  |
| 2: Contaminants of low toxicity or of nuisance value only.  | 2: Contaminants of high toxicity  |                                 |   |  |  |   |                                  |  |   |                                  |
| 3: Intermittent, low production.  | 3: High production, heavy use   |                                 |   |  |  |   |                                  |  |   |                                  |
| 4: Large hood or large air mass in motion   | 4: Small hood-local control only  |                                 |   |  |  |   |                                  |  |   |                                  |
| <p>Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the</p>  |   |                                 |   |  |  |   |                                  |  |   |                                  |

## 4,4-Dimethoxybutan-2-one

|   |  |
|---|--|
|   | <p>extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min.) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.</p> <ul style="list-style-type: none"> <li>· Adequate ventilation is typically taken to be that which limits the average concentration to no more than 25% of the LEL within the building, room or enclosure containing the dangerous substance.</li> <li>· Ventilation for plant and machinery is normally considered adequate if it limits the average concentration of any dangerous substance that might potentially be present to no more than 25% of the LEL. However, an increase up to a maximum 50% LEL can be acceptable where additional safeguards are provided to prevent the formation of a hazardous explosive atmosphere. For example, gas detectors linked to emergency shutdown of the process might be used together with maintaining or increasing the exhaust ventilation on solvent evaporating ovens and gas turbine enclosures.</li> <li>· Temporary exhaust ventilation systems may be provided for non-routine higher-risk activities, such as cleaning, repair or maintenance in tanks or other confined spaces or in an emergency after a release. The work procedures for such activities should be carefully considered. The atmosphere should be continuously monitored to ensure that ventilation is adequate and the area remains safe. Where workers will enter the space, the ventilation should ensure that the concentration of the dangerous substance does not exceed 10% of the LEL (irrespective of the provision of suitable breathing apparatus)</li> </ul>   |
| <p><b>Individual protection measures, such as personal protective equipment</b></p> |   |
| <p><b>Eye and face protection</b></p>   | <ul style="list-style-type: none"> <li>▸ Safety glasses with side shields</li> <li>▸ Chemical goggles. [AS/NZS 1337.1, EN166 or national equivalent]</li> <li>▸ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].</li> </ul>  |
| <p><b>Skin protection</b></p>   | <p>See Hand protection below</p>   |
| <p><b>Hands/feet protection</b></p>   | <p>Wear general protective gloves, eg. light weight rubber gloves.</p> <p>The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.</p> <p>The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.</p> <p>Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.</p> <p>Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:</p> <ul style="list-style-type: none"> <li>· frequency and duration of contact,</li> <li>· chemical resistance of glove material,</li> <li>· glove thickness and</li> <li>· dexterity</li> </ul> <p>Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).</p> <ul style="list-style-type: none"> <li>· When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.</li> <li>· When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.</li> <li>· Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use.</li> <li>· Contaminated gloves should be replaced.</li> </ul> <p>As defined in ASTM F-739-96 in any application, gloves are rated as:</p> <ul style="list-style-type: none"> <li>· Excellent when breakthrough time &gt; 480 min</li> <li>· Good when breakthrough time &gt; 20 min</li> <li>· Fair when breakthrough time &lt; 20 min</li> <li>· Poor when glove material degrades</li> </ul> <p>For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended.</p> <p>It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times.</p> <p>Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers technical data should always be taken into account to ensure selection of the most appropriate glove for the task.</p> <p>Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example:</p> <ul style="list-style-type: none"> <li>· Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of.</li> <li>· Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential</li> </ul> <p>Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a</p> |

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|                         |  |
|-------------------------|--|
|                         | non-perfumed moisturiser is recommended.   |
| <b>Body protection</b>  | See Other protection below   |
| <b>Other protection</b> | <ul style="list-style-type: none"> <li>▸ Overalls.</li> <li>▸ PVC Apron.</li> <li>▸ PVC protective suit may be required if exposure severe.</li> <li>▸ Eyewash unit.</li> <li>▸ Ensure there is ready access to a safety shower.</li> <li>▸ Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.</li> <li>▸ For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets).</li> <li>▸ Non sparking safety or conductive footwear should be considered. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot and shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds. Electrical resistance must range between 0 to 500,000 ohms. Conductive shoes should be stored in lockers close to the room in which they are worn. Personnel who have been issued conductive footwear should not wear them from their place of work to their homes and return.</li> </ul> |

## SECTION 9 Physical and chemical properties

## Information on basic physical and chemical properties

|   |               |  |               |
|---|---------------|--|---------------|
| <b>Appearance</b>                                   | Not Available |  |               |
| <b>Physical state</b>                               | Liquid        | <b>Relative density (Water = 1)</b>            | Not Available |
| <b>Odour</b>  | Not Available | <b>Partition coefficient n-octanol / water</b> | Not Available |
| <b>Odour threshold</b>                              | Not Available | <b>Auto-ignition temperature (°C)</b>          | Not Available |
| <b>pH (as supplied)</b>                             | Not Available | <b>Decomposition temperature (°C)</b>          | Not Available |
| <b>Melting point / freezing point (°C)</b>          | Not Available | <b>Viscosity (cSt)</b>                         | Not Available |
| <b>Initial boiling point and boiling range (°C)</b> | 170-172       | <b>Molecular weight (g/mol)</b>                | Not Available |
| <b>Flash point (°C)</b>                             | Not Available | <b>Taste</b>                                   | Not Available |
| <b>Evaporation rate</b>                             | Not Available | <b>Explosive properties</b>                    | Not Available |
| <b>Flammability</b>                                 | Not Available | <b>Oxidising properties</b>                    | Not Available |
| <b>Upper Explosive Limit (%)</b>                    | Not Available | <b>Surface Tension (dyn/cm or mN/m)</b>        | Not Available |
| <b>Lower Explosive Limit (%)</b>                    | Not Available | <b>Volatile Component (%vol)</b>               | Not Available |
| <b>Vapour pressure (kPa)</b>                        | Not Available | <b>Gas group</b>                               | Not Available |
| <b>Solubility in water</b>                          | Not Available | <b>pH as a solution (1%)</b>                   | Not Available |
| <b>Vapour density (Air = 1)</b>                     | Not Available | <b>VOC g/L</b>                                 | Not Available |

## SECTION 10 Stability and reactivity

|   |  |
|---|--|
| <b>Reactivity</b>                         | See section 7  |
| <b>Chemical stability</b>                 | <ul style="list-style-type: none"> <li>▸ Unstable in the presence of incompatible materials.</li> <li>▸ Product is considered stable.</li> <li>▸ Hazardous polymerisation will not occur.</li> </ul> |
| <b>Possibility of hazardous reactions</b> | See section 7  |
| <b>Conditions to avoid</b>                | See section 7  |

## 4,4-Dimethoxybutan-2-one

|   |               |
|---|---------------|
| <b>Incompatible materials</b>           | See section 7 |
| <b>Hazardous decomposition products</b> | See section 5 |

## SECTION 11 Toxicological information

## Information on toxicological effects

|                     |   |
|---------------------|---|
| <b>Inhaled</b>      | The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.<br>Ketone vapours irritate the nose, throat and mucous membrane. High concentrations depress the central nervous system, causing headache, vertigo, poor concentration, sleep and failure of the heart and breathing. |
| <b>Ingestion</b>    | The material has <b>NOT</b> been classified by EC Directives or other classification systems as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence.  |
| <b>Skin Contact</b> | The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.   |
| <b>Eye</b>          | Although the liquid is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn).  |
| <b>Chronic</b>      | Long-term exposure to the product is not thought to produce chronic effects adverse to the health (as classified by EC Directives using animal models); nevertheless exposure by all routes should be minimised as a matter of course.  |

**Legend:** 1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances

|  |   |                                 |   |
|--|---|---------------------------------|---|
| <b>Acute Toxicity</b>                    | ✗ | <b>Carcinogenicity</b>          | ✗ |
| <b>Skin Irritation/Corrosion</b>         | ✗ | <b>Reproductivity</b>           | ✗ |
| <b>Serious Eye Damage/Irritation</b>     | ✗ | <b>STOT - Single Exposure</b>   | ✗ |
| <b>Respiratory or Skin sensitisation</b> | ✗ | <b>STOT - Repeated Exposure</b> | ✗ |
| <b>Mutagenicity</b>                      | ✗ | <b>Aspiration Hazard</b>        | ✗ |

**Legend:** ✗ – Data either not available or does not fill the criteria for classification  
✓ – Data available to make classification

## SECTION 12 Ecological information

## Toxicity

**Legend:** Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data

## Persistence and degradability

| Ingredient               | Persistence: Water/Soil | Persistence: Air |
|--------------------------|-------------------------|------------------|
| 4,4-Dimethoxybutan-2-one | HIGH                    | HIGH             |

## Bioaccumulative potential

| Ingredient               | Bioaccumulation        |
|--------------------------|------------------------|
| 4,4-Dimethoxybutan-2-one | LOW (LogKOW = -0.8448) |

## Mobility in soil

| Ingredient               | Mobility       |
|--------------------------|----------------|
| 4,4-Dimethoxybutan-2-one | HIGH (KOC = 1) |



## 4,4-Dimethoxybutan-2-one

## SECTION 13 Disposal considerations

## Waste treatment methods

|                                     |  |
|-------------------------------------|--|
| <b>Product / Packaging disposal</b> | <p>Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.</p> <p>A Hierarchy of Controls seems to be common - the user should investigate:</p> <ul style="list-style-type: none"> <li>▸ Reduction</li> <li>▸ Reuse</li> <li>▸ Recycling</li> <li>▸ Disposal (if all else fails)</li> </ul> <p>This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.</p> <ul style="list-style-type: none"> <li>▸ <b>DO NOT allow wash water from cleaning or process equipment to enter drains.</b></li> <li>▸ It may be necessary to collect all wash water for treatment before disposal.</li> <li>▸ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.</li> <li>▸ Where in doubt contact the responsible authority.</li> <li>▸ Recycle wherever possible.</li> <li>▸ Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.</li> <li>▸ Dispose of by: burial in a land-fill specifically licensed to accept chemical and / or pharmaceutical wastes or Incineration in a licensed apparatus (after admixture with suitable combustible material).</li> <li>▸ Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.</li> </ul> |
|-------------------------------------|--|

## SECTION 14 Transport information

## Labels Required

|                         |   |
|-------------------------|---|
|                         |  |
| <b>Marine Pollutant</b> | NO  |

## Land transport (ADR-RID)

|                                     |                                |                |
|-------------------------------------|--------------------------------|----------------|
| <b>UN number or ID number</b>       | 1224                           |                |
| <b>UN proper shipping name</b>      | KETONES, LIQUID, N.O.S.        |                |
| <b>Transport hazard class(es)</b>   | Class                          | 3              |
|                                     | Subsidiary risk                | Not Applicable |
| <b>Packing group</b>                | III                            |                |
| <b>Environmental hazard</b>         | Not Applicable                 |                |
| <b>Special precautions for user</b> | Hazard identification (Kemler) | 30             |
|                                     | Classification code            | F1             |
|                                     | Hazard Label                   | 3              |
|                                     | Special provisions             | 274            |
|                                     | Limited quantity               | 5 L            |
|                                     | Tunnel Restriction Code        | 3 (D/E)        |

## Air transport (ICAO-IATA / DGR)

|                                   |                           |                |
|-----------------------------------|---------------------------|----------------|
| <b>UN number</b>                  | 1224                      |                |
| <b>UN proper shipping name</b>    | Ketones, liquid, n.o.s. * |                |
| <b>Transport hazard class(es)</b> | ICAO/IATA Class           | 3              |
|                                   | ICAO / IATA Subrisk       | Not Applicable |
|                                   | ERG Code                  | 3L             |

**4,4-Dimethoxybutan-2-one**

|                                     |   |       |
|-------------------------------------|---|-------|
| <b>Packing group</b>                | III   |       |
| <b>Environmental hazard</b>         | Not Applicable  |       |
| <b>Special precautions for user</b> | Special provisions  | A3    |
|                                     | Cargo Only Packing Instructions                           | 366   |
|                                     | Cargo Only Maximum Qty / Pack                             | 220 L |
|                                     | Passenger and Cargo Packing Instructions                  | 355   |
|                                     | Passenger and Cargo Maximum Qty / Pack                    | 60 L  |
|                                     | Passenger and Cargo Limited Quantity Packing Instructions | Y344  |
|                                     | Passenger and Cargo Limited Maximum Qty / Pack            | 10 L  |

**Sea transport (IMDG-Code / GGVSee)**

|                                     |                         |                |
|-------------------------------------|-------------------------|----------------|
| <b>UN number</b>                    | 1224                    |                |
| <b>UN proper shipping name</b>      | KETONES, LIQUID, N.O.S. |                |
| <b>Transport hazard class(es)</b>   | IMDG Class              | 3              |
|                                     | IMDG Subrisk            | Not Applicable |
| <b>Packing group</b>                | III                     |                |
| <b>Environmental hazard</b>         | Not Applicable          |                |
| <b>Special precautions for user</b> | EMS Number              | F-E, S-D       |
|                                     | Special provisions      | 223 274        |
|                                     | Limited Quantities      | 5 L            |

**Inland waterways transport (ADN)**

|                                     |                         |                |
|-------------------------------------|-------------------------|----------------|
| <b>UN number</b>                    | 1224                    |                |
| <b>UN proper shipping name</b>      | KETONES, LIQUID, N.O.S. |                |
| <b>Transport hazard class(es)</b>   | 3                       | Not Applicable |
|                                     |                         |                |
| <b>Packing group</b>                | III                     |                |
| <b>Environmental hazard</b>         | Not Applicable          |                |
| <b>Special precautions for user</b> | Classification code     | F1             |
|                                     | Special provisions      | 274            |
|                                     | Limited quantity        | 5 L            |
|                                     | Equipment required      | PP, EX, A      |
|                                     | Fire cones number       | 0              |

**Transport in bulk according to Annex II of MARPOL and the IBC code**

Not Applicable

**Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code**

| Product name             | Group         |
|--------------------------|---------------|
| 4,4-Dimethoxybutan-2-one | Not Available |

**Transport in bulk in accordance with the IGC Code**

| Product name             | Ship Type     |
|--------------------------|---------------|
| 4,4-Dimethoxybutan-2-one | Not Available |

**SECTION 15 Regulatory information**

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

4,4-Dimethoxybutan-2-one is found on the following regulatory lists

## 4,4-Dimethoxybutan-2-one

Europe EC Inventory

European Union - European Inventory of Existing Commercial Chemical Substances (EINECS)

## National Inventory Status

| National Inventory                              | Status  |
|---|---|
| Australia - AIIC / Australia Non-Industrial Use | Yes   |
| Canada - DSL                                    | Yes   |
| Canada - NDSL                                   | No (4,4-Dimethoxybutan-2-one)   |
| China - IECSC                                   | No (4,4-Dimethoxybutan-2-one)   |
| Europe - EINEC / ELINCS / NLP                   | Yes   |
| Japan - ENCS                                    | Yes   |
| Korea - KECI                                    | Yes   |
| New Zealand - NZIoC                             | Yes   |
| Philippines - PICCS                             | Yes   |
| USA - TSCA                                      | Yes   |
| Taiwan - TCSI                                   | Yes   |
| Mexico - INSQ                                   | No (4,4-Dimethoxybutan-2-one)   |
| Vietnam - NCI                                   | Yes   |
| Russia - FBEPH                                  | No (4,4-Dimethoxybutan-2-one)   |
| <b>Legend:</b>                                  | <i>Yes = All CAS declared ingredients are on the inventory<br/>No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.</i> |

## SECTION 16 Other information

|                      |            |
|----------------------|------------|
| <b>Revision Date</b> | 03/07/2023 |
| <b>Initial Date</b>  | 04/07/2023 |

## SDS Version Summary

| Version | Date of Update | Sections Updated  |
|---------|----------------|---|
| 3.4     | 03/07/2023     | Korean MSDS Number, Identification of the substance / mixture and of the company / undertaking - Supplier Information |

## Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

For detailed advice on Personal Protective Equipment, refer to the following EU CEN Standards:

EN 166 Personal eye-protection

EN 340 Protective clothing

EN 374 Protective gloves against chemicals and micro-organisms

EN 13832 Footwear protecting against chemicals

EN 133 Respiratory protective devices

## Definitions and abbreviations

PC - TWA: Permissible Concentration-Time Weighted Average

PC - STEL: Permissible Concentration-Short Term Exposure Limit

IARC: International Agency for Research on Cancer

ACGIH: American Conference of Governmental Industrial Hygienists

STEL: Short Term Exposure Limit

TEEL: Temporary Emergency Exposure Limit,

IDLH: Immediately Dangerous to Life or Health Concentrations

ES: Exposure Standard

OSF: Odour Safety Factor

NOAEL :No Observed Adverse Effect Level

**4,4-Dimethoxybutan-2-one**

LOAEL: Lowest Observed Adverse Effect Level  
TLV: Threshold Limit Value  
LOD: Limit Of Detection  
OTV: Odour Threshold Value  
BCF: BioConcentration Factors  
BEI: Biological Exposure Index  
AIIIC: Australian Inventory of Industrial Chemicals  
DSL: Domestic Substances List  
NDSL: Non-Domestic Substances List  
IECSC: Inventory of Existing Chemical Substance in China  
EINECS: European INventory of Existing Commercial chemical Substances  
ELINCS: European List of Notified Chemical Substances  
NLP: No-Longer Polymers  
ENCS: Existing and New Chemical Substances Inventory  
KECI: Korea Existing Chemicals Inventory  
NZIoC: New Zealand Inventory of Chemicals  
PICCS: Philippine Inventory of Chemicals and Chemical Substances  
TSCA: Toxic Substances Control Act  
TCSI: Taiwan Chemical Substance Inventory  
INSQ: Inventario Nacional de Sustancias Químicas  
NCI: National Chemical Inventory  
FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

**Classification and procedure used to derive the classification for mixtures according to Regulation (EC) 1272/2008 [CLP]**

| <b>Classification according to regulation (EC) No 1272/2008 [CLP] and amendments</b> | <b>Classification Procedure</b> |
|--|---------------------------------|
| Flammable Liquids Category 3, H226   | Expert judgement                |