**** MATERIAL SAFETY DATA SHEET ****

Pyruvic aldehyde, 40 wt% solution in water

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Pyruvic aldehyde, 40 wt% solution in water
Catalog Numbers: 17579-0000, 17579-1000, 17579-5000
Synonyms: Pyruvaldehyde
Company Identification (Europe): Acros Organics BVBA
Janssen Pharmaceuticalalaan 3a
2440 Geel, Belgium
Company Identification (USA): Acros Organics
One Reagent Lane
Fairlawn, NJ 07410
For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies in Europe, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>%</th>
<th>EINECS#</th>
<th>Haz Symbols</th>
<th>Risk Phrases</th>
</tr>
</thead>
<tbody>
<tr>
<td>78-98-8</td>
<td>Pyruvic aldehyde, 40 wt% solution in water</td>
<td></td>
<td>201-164-8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hazard Symbols: XN
Risk Phrases: 10 20/21/22 36/37/38

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Flammable. Harmful by inhalation, in contact with skin and if swallowed. Irritating to eyes, respiratory system and skin.

Potential Health Effects

Eye:
Causes eye irritation.
Skin:
Causes skin irritation. Harmful if absorbed through the skin.
Ingestion:
Harmful if swallowed. May cause irritation of the digestive tract.
Inhalation:
Harmful if inhaled. Causes respiratory tract irritation.
Chronic:
Not available.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin:
Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion:
Get medical aid. Wash mouth out with water.
Inhalation:
Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Will burn if involved in a fire. Flammable liquid and vapor.
Extinguishing Media:
Use water spray, dry chemical, carbon dioxide, or chemical foam.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool.

**** SECTION 7 - HANDLING AND STORAGE ****

Handling:
Use spark-proof tools and explosion proof equipment. Avoid breathing dust, vapor, mist, or gas. Avoid contact with skin and eyes.
Storage:
Keep away from sources of ignition. Store in a cool, dry place. Keep tightly closed
container closed when not in use. Store in a tightly closed container. Flammables-area.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Facilities storing or utilizing this material should be equipped
with an eyewash facility and a safety shower. Use adequate general or
local explosion-proof ventilation to keep airborne levels to
acceptable levels.

Personal Protective Equipment

Eyes:
Wear chemical goggles.

Skin:
Wear appropriate protective gloves to prevent skin
exposure.

Clothing:
Wear appropriate protective clothing to prevent skin
exposure.

Respirators:
Follow the OSHA respirator regulations found in 29
CFR 1910.134 or European Standard EN 149. Always use
a NIOSH or European Standard EN 149 approved
respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:
Clear liquid

Color:
yellow - yellow-brown

Odor:
Not available.

pH:
Not available.

Vapor Pressure:
Not available.

Viscosity:
Not available.

Boiling Point:
> 72 deg C

Freezing/Melting Point:
< 25 deg C

Autoignition Temperature:
> 285 deg C (> 545.00 deg F)

Flash Point:
> 37 deg C (> 98.60 deg F)

Explosion Limits, lower:
Not available.

Explosion Limits, upper:
Not available.

Decomposition Temperature:

Solubility in water:
Specific Gravity/Density: 1.200

Molecular Formula: C3H4O2

Molecular Weight: 72.06

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.

Conditions to Avoid:
Incompatible materials, ignition sources, excess heat, metals (slowly
corrodes), direct sunlight.

Incompatibilities with Other Materials:
Strong oxidizing agents, bases, amines, inorganic acids.

Hazardous Decomposition Products:
Carbon monoxide, irritating and toxic fumes and gases, carbon
dioxide.

Hazardous Polymerization: May occur.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:  
CAS# 78-98-8: UZ0700000
LD50/LC50:  
CAS# 78-98-8: Draize test, rabbit, eye: 500 mg Moderate; Oral, rat:
LD50 = 531 mg/kg.

Carcinogenicity:
Pyruryc aldehyde, 40 wt% solution in water -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
See actual entry in RTECS for complete information.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.

**** SECTION 14 - TRANSPORT INFORMATION ****

IATA
Shipping Name: ALDEHYDES, N.O.S.*
Hazard Class: 3
UN Number: 1989
Packing Group: III

IMO
Shipping Name: ALDEHYDES, N.O.S.
Hazard Class: 3
UN Number: 1989
Packing Group: III

RID/ADR
Shipping Name: ALDEHYDES, N.O.S.
Hazard Class: 3
UN Number: 1989
Packing group: III
European/International Regulations
European Labeling in Accordance with EC Directives

Hazard Symbols: XN

Risk Phrases:
R 10 Flammable.
R 20/21/22 Harmful by inhalation, in contact with skin and if swallowed.
R 36/37/38 Irritating to eyes, respiratory system and skin.

Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.

WGK (Water Danger/Protection)
CAS# 78-98-8: 1

United Kingdom Occupational Exposure Limits

United Kingdom Maximum Exposure Limits

Canada
CAS# 78-98-8 is listed on Canada’s DSL List.
CAS# 78-98-8 is not listed on Canada’s Ingredient Disclosure List.

Exposure Limits

US FEDERAL

TSCA
CAS# 78-98-8 is listed on the TSCA inventory.

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 7/16/1996 Revision #1 Date: 4/07/2004

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

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