

## Praxair Material Safety Data Sheet

### 1. Chemical Product and Company Identification

<b>Product Name:</b> Formaldehyde, solutions, flammable (MSDS No. P-6224-B)	<b>Trade Names:</b> 37% Formaldehyde Aqueous Solution
<b>Chemical Name:</b> Mixture of formaldehyde, methanol, and water	<b>Synonyms:</b> Formalin, formic aldehyde, methanal, methyl aldehyde, methylene oxide, oxymethylene.
<b>Chemical Family:</b> Aldehyde	<b>Product Grades:</b> None assigned.
<b>Telephone:</b> <b>Emergencies:</b> 1-800-645-4633* <b>CHEMTREC:</b> 1-800-424-9300* <b>Routine:</b> 1-800-PRAXAIR	<b>Company Name:</b> Praxair, Inc. 39 Old Ridgebury Road Danbury, CT 06810-5113

*\*Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier, Praxair sales representative, or call 1-800-PRAXAIR (1-800-772-9247).*

### 2. Hazards Identification

#### EMERGENCY OVERVIEW

**Cancer suspect agent.**

**DANGER! Flammable, corrosive liquid.**

**May form explosive mixtures with air.**

**Harmful or fatal if swallowed.**

**Harmful if inhaled or absorbed through the skin.**

**Eye and skin irritant.**

**Self-contained breathing apparatus and protective clothing may be required by rescue workers.**

**Under ambient conditions, this is a clear, colorless liquid with a pungent odor.**

**OSHA REGULATORY STATUS:** The components of this mixture are considered hazardous by the OSHA Hazard Communications Standard (29 CFR 1910.1200).

#### POTENTIAL HEALTH EFFECTS:

##### Effects of a Single (Acute) Overexposure

**Inhalation.** Respiratory tract irritant. Causes headache, nausea, vomiting, dizziness, drowsiness, and sensory impairment (e.g., of senses of smell and sight).

**Skin Contact.** Skin irritant; may cause burns. Prolonged and widespread contact may result in the absorption of harmful amounts of formaldehyde.

**Swallowing.** Causes severe irritation and inflammation of the mouth, throat, and stomach, accompanied by nausea, vomiting, and severe abdominal pain. May cause blindness and death.

**Eye Contact.** Severe eye irritant. Vapors may cause severe irritation and tearing. Liquid may cause permanent eye injury from chemical burns.

**Effects of Repeated (Chronic) Overexposure.** May cause skin sensitization. May cause liver and kidney damage.

**Other Effects of Overexposure.** None known.

**Medical Conditions Aggravated by Overexposure.** Formaldehyde may aggravate an existing eye, skin, or respiratory condition. The potential to cause liver and kidney injury may exacerbate existing liver and/or kidney diseases.

**CARCINOGENICITY:** ACGIH (2009) lists formaldehyde as a suspected human carcinogen (A2) because it causes cancer in experimental animals under conditions considered relevant to human exposure. Formaldehyde is listed by NTP and OSHA as a potential cancer hazard. OSHA has established OSHA Standard 1910.1048, *Formaldehyde*, governing its handling and use. IARC deems formaldehyde to be carcinogenic to humans.

#### POTENTIAL ENVIRONMENTAL EFFECTS:

**Environmental Fate—Formaldehyde. Released into soil.** Should leach into groundwater.

**Released into water.** Should readily biodegrade without significant accumulation. Significant evaporation not expected. **Released into air.** Should be readily degraded by reaction with photochemically produced hydroxyl radicals and photolysis. Should readily be removed from the atmosphere by dry and wet deposition. Should have a half-life of less than 1 day.

**Environmental Fate—Methanol. Released into soil.** Should readily biodegrade and is expected to leach into groundwater. **Released into water.** Should readily biodegrade without significant accumulation and quickly evaporate. Should have a half-life from 1 and 10 days.

**Released into air.** Should be readily degraded by reaction with photochemically produced hydroxyl radicals and readily removed from the atmosphere by wet deposition. Should have a half-life between 10 and 30 days. For further information, see section 12, Ecological Information.

### 3. Composition/Information on Ingredients

See section 16 for important information about mixtures.

COMPONENT	CAS NUMBER	CONCENTRATION
Formaldehyde	50-00-0	37%
Water	7732-18-5	>62%*
Methanol	67-56-1	0.1-0.3%

\*The symbol > means "greater than."

### 4. First Aid Measures

**INHALATION:** Immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, qualified personnel may give oxygen. Call a physician.

**SKIN CONTACT:** Remove contaminated clothing and shoes. Flush skin with copious amounts of water.

**SWALLOWING:** Do not induce vomiting. If conscious, give water or milk. Get immediate medical attention.

**EYE CONTACT:** Flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly.

Immediately see a physician, preferably an ophthalmologist.

**NOTES TO PHYSICIAN:** *There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.*

## 5. Fire Fighting Measures

**FLAMMABLE PROPERTIES:** May form explosive mixtures with air and oxidizing agents.

**SUITABLE EXTINGUISHING MEDIA:** CO<sub>2</sub>, dry chemical foam. Water may be ineffective. Use water spray or fog to reduce flammable vapors.

**PRODUCTS OF COMBUSTION:** Formaldehyde, carbon monoxide, carbon dioxide

**PROTECTION OF FIREFIGHTERS: DANGER! Flammable, corrosive liquid.** Evacuate all personnel from danger area. Remove sources of ignition if without risk. Do not extinguish any flames emitted from containers; stop flow if without risk, or allow flames to burn out.

Reapproach with extreme caution using self-contained breathing apparatus and protective clothing. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

**Specific Physical and Chemical Hazards.** If venting or leaking formaldehyde catches fire, do not extinguish flames. Flammable vapors are heavier than air and may spread extensively from leak, creating an explosive re-ignition hazard at considerable distances from the source. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with an approved explosion meter.

**Protective Equipment and Precautions for Firefighters.** Firefighters should wear self-contained breathing apparatus and full fire-fighting turnout gear.

## 6. Accidental Release Measures

### STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

**DANGER! Flammable, corrosive liquid.**

**Personal Precautions.** May form explosive mixtures with air. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus and protective clothing where needed. Remove all sources of ignition if without risk. Reduce vapors with fog or fine water spray, taking care to prevent runoff. Shut off flow if without risk. Ventilate area. Flammable vapors may spread from spill. Before entering area, especially confined areas, check atmosphere with an appropriate device. Absorb spill with an inert material and place into containers for later disposal.

**Environmental Precautions.** Prevent waste from contaminating the surrounding environment. Keep personnel away. Discard any product, residue, disposable container, or liner in an environmentally acceptable manner, in full compliance with federal, state, and local regulations. If necessary, call your local supplier for assistance.

## 7. Handling and Storage

**PRECAUTIONS TO BE TAKEN IN HANDLING:** Vapors are toxic and can cause symptoms of suffocation due to oxygen deficiency. Store and use with adequate ventilation. Keep containers

and container valves tightly closed when not in use, even when empty. Do not eat, drink, or smoke in areas where formaldehyde is used or stored. Wash hands and face thoroughly to clean them of any residual product before eating, drinking, smoking, using the toilet, or applying cosmetics. Protect containers from damage. Use only spark-proof tools and explosion-proof equipment. Keep away from heat, sparks, and open flame. Leak check system with soapy water; never use a flame. Slowly and carefully open formaldehyde valves. For other precautions in using this solution, see section 16.

**PRECAUTIONS TO BE TAKEN IN STORAGE:** Store and use with adequate ventilation. Never store formaldehyde in open containers or containers made of incompatible materials. (See section 10.) Store formaldehyde containers in approved storage cabinets for flammable liquids. Otherwise, separate from oxygen, chlorine, and other oxidizers by at least 20 ft (6.1 m), or use a barricade of noncombustible material. This barricade should be at least 5 ft (1.53 m) high and have a fire resistance rating of at least ½ hour. Firmly secure containers upright to keep them from falling or being knocked over. Keep valves tightly closed. Post "No Smoking or Open Flames" signs in storage and use areas. There must be no sources of ignition. All electrical equipment in storage areas must be explosion-proof. Storage areas must meet national electric codes for Class 1 hazardous areas. Store only where temperature will not exceed 125°F (52°C). Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods.

**8. Exposure Controls/Personal Protection**

COMPONENT	OSHA PEL	ACGIH TLV-TWA (2009)
Formaldehyde	0.75 ppm; 2 ppm, 15-min (STEL)	0.3 ppm (c)*
Water	N.E.**	N.E.**
Methanol	200 ppm	200 ppm; 250 ppm, 15-min STEL, skin

\*(c) – Ceiling values are not Time-Weighted-Average (TWA).

\*\*N.E.–Not Established.

TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

IDLH = 20 ppm (formaldehyde); 6000 ppm (methanol)

**ENGINEERING CONTROLS:**

**Local Exhaust.** Use an explosion-proof local exhaust ventilation system with sufficient air flow velocity to maintain the concentration of formaldehyde vapors below all applicable exposure limits in the worker's breathing zone.

**Mechanical (General).** May be the only practical control method if devices emitting formaldehyde are widely dispersed.

**Special.** None

**Other.** None

**PERSONAL PROTECTIVE EQUIPMENT:**

**Skin Protection.** Wear work gloves for container handling; plastic or rubber gloves where exposure to liquid may occur. Protective clothing and footwear where needed. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133. Regardless of protective equipment, never touch live electrical parts.

**Eye/Face Protection.** Wear safety glasses and a full face shield. Select in accordance with OSHA 29 CFR 1910.133.

**Respiratory Protection.** A respiratory protection program that meet OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable) requirements must be followed whenever workplace conditions warrant respirator use. Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure (e.g., an organic vapor cartridge). For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus. Refer to OSHA 29 CFR 1910.1048 for respiratory protection requirements.

## 9. Physical and Chemical Properties

<b>APPEARANCE:</b>	Clear, colorless liquid
<b>ODOR:</b>	Pungent
<b>ODOR THRESHOLD:</b>	0.8 – 1.0 ppm
<b>PHYSICAL STATE:</b>	Liquid at normal temperature and pressure
<b>pH:</b>	2.8 – 4.0
<b>MELTING POINT</b> at 1 atm:	Not available.
<b>BOILING POINT</b> at 1 atm:	214°F (101°C)
<b>FLASH POINT</b> (test method):	185°F (85°C) (closed cup)
<b>EVAPORATION RATE</b> (Butyl Acetate = 1):	Not available.
<b>FLAMMABILITY:</b>	Flammable
<b>FLAMMABLE LIMITS IN AIR</b> , % by volume:	<b>LOWER:</b> 7% <b>UPPER:</b> 73%
<b>VAPOR PRESSURE</b> at 68°F (20°C):	0.078 lb/ft <sup>3</sup> (1.25 kg/m <sup>3</sup> ) (calculated)
<b>VAPOR DENSITY</b> at 68°F (20°C):	Not available.
<b>SPECIFIC GRAVITY</b> (H <sub>2</sub> O = 1) at 68°F (20°C) and 1 atm:	1.075
<b>SPECIFIC GRAVITY</b> (Air = 1) at 68°F (20°C):	1.04
<b>SOLUBILITY IN WATER</b> 68°F (20°C):	Miscible
<b>PARTITION COEFFICIENT: n-octanol/water:</b>	Not available.
<b>AUTOIGNITION TEMPERATURE:</b>	806°F (430°C)
<b>DECOMPOSITION TEMPERATURE:</b>	Not available.
<b>PERCENT VOLATILES BY VOLUME:</b>	Not available.
<b>MOLECULAR WEIGHT:</b>	30.03 (formaldehyde), 32.04 (methanol)
<b>MOLECULAR FORMULA:</b>	Mixture of HCHO, CH <sub>3</sub> OH, & H <sub>2</sub> O

## 10. Stability and Reactivity

**CHEMICAL STABILITY:**  Unstable     Stable

**CONDITIONS TO AVOID:** Polymerization catalysts

**INCOMPATIBLE MATERIALS:** Strong oxidizers, strong alkalies, and acids (such as hydrochloric acid, nitric acid, chromic acid, and perchloric acid), alkali metals, amines and ammonia, phenol, and reducing agents.

**HAZARDOUS DECOMPOSITION PRODUCTS:** Fumes of formaldehyde gas

**POSSIBILITY OF HAZARDOUS REACTIONS:**  May Occur  Will Not Occur

May react with alkalis and oxidizing materials such as peroxides, nitric acid, and chromic acid. Formic acid decomposes slowly during storage and more rapidly under fire conditions, forming carbon monoxide.

### 11. Toxicological Information

**ACUTE DOSE EFFECTS:** For formaldehyde: LD<sub>50</sub>=800 mg/kg, oral, rat; LD<sub>50</sub>=42 mg/kg, oral, mouse; LC<sub>Lo</sub>=250 mg/kg, inhalation, rat. LC<sub>Lo</sub>=900 mg/kg, inhalation, mouse; LC<sub>50</sub>=590 mg/kg, inhalation, rat. For methanol: LD<sub>50</sub>=5,628 mg/kg, oral, rat; LD<sub>50</sub>=7,300 mg/kg, oral, mouse; LD<sub>50</sub>=12,880 mg/kg, oral rat; LD<sub>50</sub>=14,200 mg/kg, oral rabbit.

**STUDY RESULTS:** Prolonged or repeated exposure to formaldehyde may result in respiratory impairment. Rats exposed to formaldehyde at 2 ppm developed benign nasal tumors and changes of the cell structure in the nose as well as inflamed mucous membranes of the nose. Structural changes in the epithelial cells in the human nose have also been observed. Some persons have developed asthma or bronchitis following exposure to formaldehyde, most often as the result of an accidental spill involving a single exposure to a high concentration of formaldehyde.

### 12. Ecological Information

**ECOTOXICITY:** The following toxicity information is for formaldehyde: 96 Hr LC<sub>50</sub> fathead minnow, 24.1 mg/L (flow-through); 96 Hr LC<sub>50</sub> bluegill, 0.10 mg/L (flow-through); 96 Hr EC<sub>50</sub> water flea, 20 mg/L. The methanol portion is expected to be slightly toxic to aquatic life. The LC<sub>50</sub>/96 Hr values for fish are between 10 and 100 mg/L.

**OTHER ADVERSE EFFECTS:** This solution does not contain any Class I or Class II ozone-depleting chemicals.

### 13. Disposal Considerations

**WASTE DISPOSAL METHOD:** Do not attempt to dispose of residual or unused quantities. Return container to supplier. See section 6.

### 14. Transport Information

**DOT/IMO SHIPPING NAME:** Formaldehyde, solutions, flammable

HAZARD CLASS:	PACKING GROUP/Zone:	IDENTIFICATION NUMBER:	PRODUCT RQ:
3	III	UN1198	100 lb (45.4 kg)

**SHIPPING LABEL(s):** FLAMMABLE LIQUID, CORROSIVE

**PLACARD (when required):** FLAMMABLE LIQUID, CORROSIVE

**SPECIAL SHIPPING INFORMATION:** Containers should be transported in a secure position, in a well-ventilated vehicle. Containers transported in an enclosed, nonventilated compartment of a vehicle can present serious safety hazards.

**MARINE POLLUTANTS:** Formaldehyde is not listed as a marine pollutant by the DOT.

## 15. Regulatory Information

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, state, and local regulations.

### U.S. FEDERAL REGULATIONS:

EPA (ENVIRONMENTAL PROTECTION AGENCY)

CERCLA: COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 (40 CFR Parts 117 and 302):

**Reportable Quantity (RQ):** 100 lb (45.4 kg)

SARA: SUPERFUND AMENDMENT AND REAUTHORIZATION ACT:

**SECTIONS 302/304:** Require emergency planning based on Threshold Planning Quantity (TPQ) and release reporting based on Reportable Quantities (RQ) of Extremely Hazardous Substances (EHS) (40 CFR Part 355):

**TPQ:** 500 lb (227 kg)

**EHS RQ (40 CFR 355):** 100 lb (45.4 kg)

**SECTIONS 311/312:** Require submission of MSDSs and reporting of chemical inventories with identification of EPA hazard categories. The hazard categories for this product are as follows:

**IMMEDIATE:** Yes

**DELAYED:** Yes

**PRESSURE:** No

**REACTIVITY:** Yes

**FIRE:** Yes

**SECTION 313:** Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

Formaldehyde and methanol are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40CFR Part 372.

**40 CFR 68: RISK MANAGEMENT PROGRAM FOR CHEMICAL ACCIDENTAL RELEASE PREVENTION:** Requires development and implementation of risk management programs at facilities that manufacture, use, store, or otherwise handle regulated substances in quantities that exceed specified thresholds.

Formaldehyde is listed as a regulated substance in quantities of 15,000 lb (6810 kg) or greater.

**TSCA: TOXIC SUBSTANCES CONTROL ACT:** The components of this solution are listed on the TSCA inventory.

**OSHA: OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION:**

29 CFR 1910.119: PROCESS SAFETY MANAGEMENT OF HIGHLY HAZARDOUS CHEMICALS: Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals.

Formaldehyde is listed in Appendix A as a highly hazardous chemical in quantities of 1,000 lb (454 kg) or greater.

### STATE REGULATIONS:

**CALIFORNIA:** Formaldehyde is listed by California under the SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (Proposition 65).

**WARNING:** Formaldehyde is a chemical known to the State of California to cause cancer; (*California Health and Safety Code §25249.5 et seq.*)

**PENNSYLVANIA:** This product is subject to the PENNSYLVANIA WORKER AND COMMUNITY RIGHT-TO-KNOW ACT (35 P.S. Sections 7301-7320).

## 16. Other Information

Read and understand all labels and instructions supplied with all containers of this product.

**OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE: *Flammable, corrosive liquid.*** May form explosive mixtures with air. Use piping and equipment adequately designed to withstand pressures to be encountered. All piped formaldehyde systems and associated equipment must be grounded. Use a backflow prevention device in any piping. Use only in a closed system. Never work on an operating system. First, shut down operations. Then, in an environmentally safe manner in compliance with all federal, state, and local laws, depressurize the system and drain it of as much formaldehyde as possible before opening the system or attempting to repair any leaks.

**Mixtures.** When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Remember, chemicals have properties that can cause serious injury or death.

### HAZARD RATING SYSTEMS:

#### NFPA RATINGS:

HEALTH = 2  
FLAMMABILITY = 2  
INSTABILITY = 0  
SPECIAL = None

#### HMIS RATINGS:

HEALTH = 2\*  
FLAMMABILITY = 2  
PHYSICAL HAZARD = 0

*\*An asterisk used in conjunction with HMIS health hazard ratings designates a carcinogenic or reproductive hazard.*

Praxair asks users of this product to study this MSDS and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this MSDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

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The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of use of the product are not within the control of Praxair, Inc., it is the user's obligation to determine the conditions of safe use of the product.

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