

## MATERIAL SAFETY DATA SHEET

### IDENTIFICATION

**NAME**  
Formaldehyde Solutions

**GRADE**  
USP 37-7; USP 37-11;  
LM 37 to 56%

**SYNONYMS**  
Formalin; Methanal

**CAS NAME**  
Formaldehyde

**I.D. NOS./CODES**  
NIOSH Registry No. LP8925000

**MANUFACTURER/DISTRIBUTOR**  
E. I. du Pont de Nemours & Co. (Inc.)

**ADDRESS**  
Wilmington, DE 19898

**CHEMICAL FAMILY**  
Aldehyde

**FORMULA**  
CH<sub>2</sub>O

**CAS REGISTRY NO.**  
50-00-0

**TSCA INVENTORY STATUS**  
Reported/Included

**PRODUCT INFORMATION PHONE**  
(800) 441-9442

**MEDICAL EMERGENCY PHONE**  
(800) 441-3637

**TRANSPORTATION EMERGENCY PHONE**  
CHEMTREC (800) 424-9300

### PHYSICAL DATA

**BOILING POINT, 760 mmHg**  
96.7 to 100°C (206 to 212°F)

**SPECIFIC GRAVITY**  
1.08 to 1.13

**VAPOR DENSITY**  
-1 (Air=1)

**pH INFORMATION**  
2.8 to 4.0

**FORM**  
Liquid

**COLOR**  
Colorless

**MELTING POINT**  
Polymerizes and separates below  
0 to 67°C (32 to 153°F)

**VAPOR PRESSURE**  
17 to 20 mmHg at 25°C (77°F)  
39 to 42 mmHg at 37.8°C (100°F)

**SOLUBILITY IN WATER**  
100%

**EVAPORATION RATE (BUTYL ACETATE=1)**  
Similar to water; >1

**APPEARANCE**  
Clear (turns milky on cooling)

**ODOR**  
Pungent

## HAZARDOUS COMPONENTS

<u>MATERIAL(S)</u>	<u>CAS NO.</u>	<u>APPROXIMATE %</u>
Formaldehyde	50-00-0	37-56
Methanol	67-56-1	1-11

## NONHAZARDOUS COMPONENTS

Water	7732-18-5	43-62
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## HAZARDOUS REACTIVITY

### INSTABILITY

No known hazardous instability.

### INCOMPATIBILITY

Reacts with many compounds. Reaction with phenol, strong acids, or alkalis may be violent. Reaction with hydrochloric acid may form bis-chloromethyl ether, an OSHA regulated carcinogen.

### DECOMPOSITION

Occurs slowly at elevated temperatures, releasing formaldehyde gas.

### POLYMERIZATION

Nonhazardous polymerization may occur at low temperatures, forming paraformaldehyde, a white solid.

## FIRE AND EXPLOSION DATA

### FLASH POINT

60 to 83°C (140 to 181°F) METHOD TCC

Grade	°C	°F
USP 37-7	69	156
USP 37-11	60	140
LM 37	83	181
LM 40	82	180
LM 44	80	176
LM 45	80	176
LM 50	79	174
LM 52	77	171
LM 56	73	163

FLAMMABLE LIMITS IN AIR, % BY VOL.  
LOWER 7  
UPPER 73

AUTOIGNITION TEMPERATURE  
424°C (795°F)

AUTODECOMPOSITION TEMPERATURE  
Not available.

FIRE AND EXPLOSION HAZARDS  
OSHA Class IIIA Combustible Liquid

### EXTINGUISHING MEDIA

"Alcohol" foam, dry chemical, carbon dioxide (CO<sub>2</sub>), water spray.

## **SPECIAL FIRE FIGHTING INSTRUCTIONS**

Cool container with water spray or fog to help absorb escaping fumes. Evacuate affected area. Stay upwind and avoid contact with smoke and fumes. If contact cannot be avoided, wear personal protective equipment (see page 5) including chemical splash goggles and air mask with breathing air supply. Runoff from fire control may cause pollution.

## **HEALTH HAZARD INFORMATION**

### **PRINCIPAL HEALTH HAZARDS (Including Significant Routes, Effects, Symptoms of Over-Exposure, and Medical Conditions Aggravated by Exposure)**

Causes eye burns. Harmful if inhaled or absorbed through skin—causes general tissue damage. Causes skin, nose, throat, and lung irritation. May cause allergic skin reaction. May be fatal or cause blindness if swallowed. Cannot be made nonpoisonous.

#### **Formaldehyde:**

Inhalation 4-hour LC50: 250 ppm in rats  
Skin absorption LD50: 270 mg/kg in rabbits  
Oral LD50: 500 mg/kg in rats

Formaldehyde is a mild to moderate skin irritant, is an eye irritant and can produce permanent eye damage, and skin sensitization in animals. Toxic effects described in animals from exposure by inhalation to the vapor or mist include severe irritation to the upper respiratory tract and mucosal surfaces, eye irritation, and nonspecific effects such as weight loss and irritation. Toxic effects observed in animals from exposure by ingestion include severe irritation to mucosal surfaces and decreased body weight. Tests in some animals demonstrate carcinogenic activity. Formaldehyde shows mutagenic activity in bacterial and mammalian cell culture test systems, but is generally negative in whole animal systems. Tests for teratogenic activity by several routes have been negative. The available data is inadequate to assess reproductive effects, although limited studies do not suggest effects.

Human health effects of overexposure by skin contact with formaldehyde solutions include irritation with discomfort or rash, or allergic skin rash. Eye contact with formaldehyde solutions may cause eye irritation with discomfort, tearing, and blurring of vision; or eye corrosion with corneal or conjunctival ulceration. Effects of overexposure to formaldehyde vapors may include discomfort, such as nausea, headache, or weakness; irritation of the upper respiratory passages; temporary lung irritation effects with cough, discomfort, difficulty breathing, or shortness of breath. On rare occasions, respiratory sensitization (asthma) has been reported in individuals. Gross overexposure by ingestion and, rarely, inhalation has been fatal. Epidemiologic studies do not demonstrate an increased risk of human cancer from exposure to this compound. A Soviet study of questionable merit on women exposed to urea formaldehyde resin in textile processing noted effects on pregnant workers and their offspring. However, these effects could be explained by other factors and have not been substantiated by other studies. Individuals with preexisting diseases of the lungs, eyes, or skin may have increased susceptibility to the toxicity of excessive exposures.

## PRINCIPAL HEALTH HAZARDS (cont'd)

### Methanol:

Inhalation 1 hour LC50:	145,000 ppm in rats
Skin absorption LD50:	15,840 mg/kg in rabbits
Oral LD50:	9100 mg/kg in rats

Methanol is a skin and eye irritant in animals. Toxic effects described in animals from exposure by inhalation include ocular effects, blindness, liver effects, kidney effects, heart effects, nasal discharges, and cardiovascular effects. Toxic effects observed in animals from exposures by ingestion include anaesthetic effects, liver effects, acidosis, and ocular effects. Tests in bacterial or mammalian cell cultures demonstrate no mutagenic activity. Methanol produced developmental effects in the offspring of rats exposed by inhalation to levels of 10,000 or 20,000 ppm during pregnancy. Behavioral effects were observed in the offspring of rats exposed to 2500 mg/kg/day in their drinking water (equivalent to human ingestion of 150 mL, a dose expected to be fatal). Because maternal effects in humans would also occur at these high oral and inhalation concentrations, it is concluded that methanol is not a significant hazard for the conceptus.

Human health effects of overexposure by skin or eye contact with methanol liquid may cause skin irritation with discomfort or rash; or eye irritation with discomfort, tearing, or blurring of vision. Inhalation, ingestion, or skin absorption of methanol may cause visual disturbances including blindness; temporary nervous system effects such as muscular tremors or dizziness, headache, confusion, incoordination, and loss of consciousness; nonspecific discomfort, such as nausea, headache, or weakness; acidosis; irritation of the upper respiratory passages; abnormal liver and kidney function; cardiovascular effects; or fatality from gross overexposure. Skin permeation can occur in amounts capable of producing the effects of systemic toxicity. Individuals with preexisting diseases of the retina, kidneys, liver or cardiovascular system may have increased susceptibility to the toxicity of excessive exposures.

### CARCINOGENICITY

FORMALDEHYDE is listed by the International Agency for Research on Cancer as probably carcinogenic to humans, on the basis of animal evidence, but human data is inadequate, (IARC group 2B). Listed by the National Toxicology Program as reasonably anticipated to be carcinogenic. Listed by ACGIH as an A2 Industrial Substance Suspect of Carcinogenic Potential for Man. OSHA, in its Formaldehyde Standard (29 CFR 1910.48), considers formaldehyde a potential carcinogen. METHANOL is not listed as a carcinogen by IARC, NTP, OSHA, or ACGIH.

### EXPOSURE LIMITS [PEL (OSHA), TLV (ACGIH), AEL (DU PONT), ETC.]

Formaldehyde: OSHA 8-hour Time Weighted Average (TWA) = 1 ppm; OSHA 15 minute Short Term Exposure Limit (STEL) = 2 ppm (see 29 CFR 1910.1048). ACGIH 8-hour TLV<sup>(R)</sup>-TWA = 1 ppm, 1.5 mg/m<sup>3</sup>; ACGIH Short Term Exposure Limit (STEL) = 2 ppm, 3 mg/m<sup>3</sup>; Du Pont AEL 8 and 12-hour TWA = 1 ppm (15 minute TWA = 2 ppm).

Methanol: OSHA 8-hour Time Weighted Average (TWA) and ACGIH TLV<sup>(R)</sup>-TWA = 200 ppm, 260 mg/m<sup>3</sup>; ACGIH STEL = 250 ppm, 310 mg/m<sup>3</sup>. The Du Pont AEL 8- and 12-hour TWA = 200 ppm. Both the ACGIH and Du Pont limits carry an "Avoid Skin Contact" notation.

## SAFETY PRECAUTIONS

Do not get in eyes.  
Avoid contact with skin and clothing.  
Avoid breathing mist or vapor.  
Wash thoroughly after handling.

## FIRST AID

In case of eye contact: Immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

In case of skin contact: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse.

If inhaled: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

If swallowed: Induce vomiting immediately by giving two glasses of water and sticking finger down throat. Following this, give activated charcoal slurry. If significant quantities of methanol have been swallowed, then give a methanol antidote by mouth (a solution of 100 mL of 100-proof ethyl alcohol [grain alcohol] in 2000 mL of water). Call a physician. Never give anything by mouth to an unconscious person.

NOTE: To prepare activated charcoal slurry, suspend 50 gm of activated charcoal in 400 mL of water in a bottle and shake well.

## PROTECTION INFORMATION

### GENERALLY APPLICABLE CONTROL MEASURES

Ventilation adequate to keep formaldehyde concentrations below indicated exposure limits should be provided.

### PERSONAL PROTECTIVE EQUIPMENT

Have available and wear as appropriate: chemical splash goggles; full-length face shield/splash goggle combination; neoprene, nitrile, butyl, or polyvinyl gloves; coveralls with long sleeves. Selection and maintenance of personal protective equipment shall be in accordance with 29 CFR 1910.1048 (h). If exposure limits may be exceeded, the appropriate respirator as specified in Table I, 29 CFR 1910.1048 (g) should be used.

Wear self-contained breathing apparatus and full body protection for entry into areas where concentrations exceed 100 ppm, and for emergency reentry into areas of unknown concentrations.

## DISPOSAL INFORMATION

### **AQUATIC TOXICITY**

The mixture is moderately toxic (96-hr. LC50 = 38-48 mg/L).

### **SPILL, LEAK OR RELEASE**

Wear self-contained breathing apparatus and full body protection. Soak up small spills with earth, sand, or other noncombustible absorbent material and remove in covered metal containers. Dike large spills and neutralize with dilute (5%) solutions of ammonia, sodium sulfite, or sodium bisulfite and remove. Flush area with plenty of water. Comply with Federal, State, and local regulations on reporting releases.

### **WASTE DISPOSAL**

Comply with Federal, State, and local regulations. If approved, flush to chemical sewer, incinerate, remove to a hazardous material landfill, or flush to waste water treatment system. Very dilute solutions can be handled by biochemical action in formaldehyde-adapted waste treatment systems; water spray or fog will help absorb escaping fumes.

## SHIPPING INFORMATION

### DOT-172.101 (F.P. = Flash Point)

	<u>F.P.&gt;141°F;</u> <u>≤110 gal.</u>	<u>F.P.&gt;141°F;</u> <u>&gt;110 gal.</u>	<u>F.P.≤141°F;</u> <u>≤110 gal.</u>	<u>F.P.≤141°F;</u> <u>&gt;110 gal.</u>
Shipping Name	Formaldehyde Solution	Formaldehyde Solution	Formaldehyde Solution	Formaldehyde Solution
Hazard Class	ORM-A	Combustible Liquid	ORM-A	Combustible Liquid
UN No.	2209	2209	1198	1198
DOT Placard	None	Combustible	None	Combustible

### DOT/IMO (172.102)

	<u>F.P.&gt;141°F (≤110 gal.)</u>	<u>F.P. ≤141°F</u>
Shipping Name	Formaldehyde Solution	Formaldehyde Solution
Hazard Class	ORM-A, 9	Flammable Liquid, 3.3
UN No.	2209	1198

### **REPORTABLE QUANTITY**

1000 lb/454 kg

### **SHIPPING CONTAINERS**

Tank cars, tank trucks, drums, bottles

**SHIPPING INFORMATION (cont'd)**

**STORAGE CONDITIONS**

Keep container closed. Keep away from heat and flame. Store in heated tank or warm room, above minimum storage temperature for grade handled.

**ADDITIONAL INFORMATION AND REFERENCES**

NPCA - HMIS RATINGS

Health (Acute)            3  
Flammability              2  
Reactivity                1  
Personal Protection      -

Personal Protection rating to be supplied by user depending on use conditions.

NFPA RATINGS

Health                    2  
Flammability            2  
Reactivity               0  
Unusual Hazards       -

SARA/Title III Hazard Categories and Lists

Categories:

Chronic Health       - Yes  
Acute Health         - Yes  
Fire Hazard          - Yes  
Pressure Hazard     - No  
Reactivity Hazard   - No

Lists:

Extremely Hazardous Substance - Yes  
CERCLA Hazardous Substance - Yes  
Toxic Chemicals                    - Yes

For further information, see Du Pont "Formaldehyde Solutions Data Sheet" and "Formaldehyde Properties, Uses, Storage, and Handling Bulletin."

DATE OF LATEST REVISION/REVIEW: 3/88

PERSON RESPONSIBLE FOR MSDS:

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