

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

PART I What is the material and what do I need to know in an emergency?

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): **FORMALDEHYDE 35%**
CHEMICAL NAME/CLASS: Formaldehyde/Methanol Mixture
PRODUCT CODE NUMBER: 2918
PRODUCT USE: Printed Wiring Board Chemistry
SUPPLIER/MANUFACTURER'S NAME: **ELECTROCHEMICALS, Inc.**
ADDRESS: 5630 Pioneer Creek Drive
Maple Plain MN 55359
EMERGENCY PHONE: 1-800-424-9300 (**CHEMTREC**)
BUSINESS PHONE: 763-479-2008
DATE OF REVISION: December 12, 2006

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	% w/w	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA			OTHER
			TLV mg/m ³	STEL mg/m ³	PEL mg/m ³	STEL mg/m ³	IDLH mg/m ³	
Formaldehyde	50-00-0	30-35	NE	0.37 C, A2 (Suspected Human Carcinogen)	0.94	2.5	25	NIOSH REL: TWA = 0.02 STEL = 0.125 (C) DFG MAK: TWA = 0.625 (C) Carcinogen: EPA-B1, IARC-2A, MAK-B, NIOSH-X, NTP-2B, OSHA-X
Methanol (1)	67-56-1	5-10	262 (skin)	328 (skin)	260	325 (skin) (vacated 1989 PEL)	7980	NIOSH REL: TWA = 260 (skin) STEL = 325 DFG MAK TWA = 260 (C)
Water and other low hazard constituents. The other low hazard constituents are each present in less than 1 percent concentration.		Balance	NE	NE	NE	NE	NE	NE

NE = Not Established. C = Ceiling Limit. (1) Methanol is known to absorb through the skin. See Section 16 for Definitions of Terms Used.

NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This clear, colorless solution has a pungent, irritating odor. Formaldehyde (a component of this product) causes cancer and also causes allergic reactions. This product is combustible and must be preheated for ignition to become a potential hazard. This product is not reactive. In the event of fire or spill, adequate precautions must be taken. Emergency responders must wear the personal protective equipment suitable for the situation to which they are responding. **This product must be considered carcinogenic.**

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of occupational over-exposure are inhalation and contact with the skin and eyes. This product is both acutely and chronically toxic by all routes of entry into the body. The symptoms of over-exposure to this product are as follows.

INHALATION: If mists, sprays, or vapors of this product are inhaled, they may cause pulmonary irritation, coughing, difficulty breathing, dizziness, headache, nausea, and burning eyes. Additional data regarding Formaldehyde (a component of this product) follow:

Concentration Health Effect

- 2-3 ppm: Tingling in the nose and back of throat
- 10-20 ppm: Difficulty breathing, severe burning sensation in nose, throat, and windpipe
- 50-100 ppm: Serious injury
- >100 ppm: Fluid in the lungs, inflammation of the lungs, and death (the symptoms of fluid in the lungs can be delayed until hours after exposure.)

CONTACT WITH SKIN or EYES: Depending on the duration and concentration of over-exposure, eye contact will cause burning, tearing, tingling, and injury. Skin contact may cause reddening, discomfort, and irritation. Formaldehyde (a component of this product) can cause allergic reactions. Severe symptoms are tingling and reddening of the skin, development of eczema showing red rash, sealing, or cracking.

SKIN ABSORPTION: Methanol (a component of this product) is known to absorb through the skin. Formaldehyde (a component of this product) may be transported with the methanol. Reddening, irritation, or dermatitis may occur at the point of contact.




INGESTION: Ingestion is not anticipated to be a likely route of occupational exposure. If this product is swallowed, it can cause irritation and pain in the mouth, throat, esophagus, and other tissues of the digestive system. Symptoms can include dizziness, depression, headache, decreased body temperature, diarrhea, nausea, vomiting, and coma. Jaundice, acidosis, and blood in the urine may develop. Methanol (a component of this product) can cause visual impairment. 10 mL of Methanol (a component of this product) has caused death in humans. Ingestion of large volumes of this product may be fatal.

INJECTION: Accidental injection of this product, via laceration or puncture by a contaminated object, may cause pain and irritation in addition to the wound. The wound may be slow to heal. Symptoms similar to inhalation or ingestion over-exposure may occur.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. In the event of over-exposure, the following symptoms may be observed:

ACUTE: Itching, burning, and reddening of the exposed parts of the body may occur. If inhaled, irritation of the respiratory system may occur with coughing, difficulty breathing, and tearing of the eyes. Severe inhalation and ingestion over-exposure may be fatal.

CHRONIC: Formaldehyde (a component of this product) is known to cause cancer in test animals. It is considered to be a possible cancer causing agent in humans. Repeated or prolonged over-exposure to Formaldehyde can cause allergic reactions. Severe symptoms are tingling and reddening of the skin, development of eczema showing red rash, sealing, or cracking. Chronic inhalation of Formaldehyde may cause respiratory irritation, chronic obstruction, and impaired lung function. Chronic over-exposure to Methanol (a component of this product) can cause visual impairment and kidney and liver damage.

HAZARDOUS MATERIAL INFORMATION SYSTEM			
HEALTH		(BLUE)	3
FLAMMABILITY		(RED)	2
REACTIVITY		(YELLOW)	0
PROTECTIVE EQUIPMENT			D
EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		
For routine industrial applications			

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

SKIN EXPOSURE: If this product contaminates the skin, immediately begin decontamination with running water. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek immediate medical attention.

EYE EXPOSURE: If this product's liquid or vapors enter the eyes, open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes.

INHALATION: If vapors, mists, or sprays of this product are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, do not induce vomiting. Victim should drink milk, egg whites, or large quantities of water. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow.

Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take a copy of label and MSDS to physician or health professional with victim.

5. FIRE-FIGHTING MEASURES

FLASH POINT, °C (method): 60–68°C

AUTOIGNITION TEMPERATURE, °C: Not flammable.

FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): 7.0%
Upper (UEL): 73.0%

FIRE EXTINGUISHING MATERIALS:

<u>Water Spray:</u> YES	<u>Carbon Dioxide:</u> YES
<u>Foam:</u> YES	<u>Dry Chemical:</u> YES
<u>Halon:</u> YES	<u>Other:</u> Any "B" Class.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Short exposure could cause serious temporary or residual injury. This product must be preheated before ignition becomes a potential hazard. When involved in a fire, this material may decompose and produce irritating vapors and highly toxic gases including carbon monoxide, carbon dioxide, and formaldehyde.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

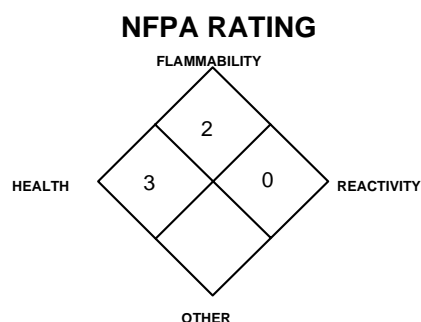
SPECIAL FIRE-FIGHTING PROCEDURES: Move containers from fire area if it can be done without risk to personnel. Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Chemical resistant clothing may be necessary. If this product is involved in a fire, fire run-off water should be contained to prevent possible environmental damage.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area, protect people, and respond with trained personnel.

In the event of a non-incident release, minimum Personal Protective Equipment should be **Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard-hat, and Self-Contained Breathing Apparatus**. Absorb spilled liquid with polypads or other suitable absorbent materials. Decontaminate the area thoroughly. Place all spill residue in an appropriate container and seal. Dispose of in accordance with Federal, State, and local hazardous waste disposal regulations (see Section, 13 Disposal Considerations).

NOTE: Colorimetric tubes are available for Formaldehyde (a component of this product),



PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash hands after handling this product. Do not eat or drink while handling this product. Remove contaminated clothing immediately. Employers using this product must comply with 29 CFR 1910.1048 (the Formaldehyde Standard) or an equivalent State Standard. Monitoring of the work area, using a passive monitor or other appropriate instrumentation, is recommended.

NOTE: Refer to the OSHA Formaldehyde Standard (29 CFR 1910.1048) for specific requirements associated with the use of this product. The Action Level for Formaldehyde is 0.625 mg/m³. In workplaces where employees are exposed above the Action Level, the OSHA requirements for monitoring, establishment of regulated areas, methods of compliance, respiratory protection, emergency response protocol, medical surveillance, training, and record keeping must be followed.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Avoid breathing vapors or mists generated by this product. Use in a well-ventilated location. Open containers slowly on a stable surface. Containers of this product must be properly labeled. Empty containers may contain corrosive liquid or vapors; therefore, empty containers must be handled with care. If the work area exposure level for Formaldehyde exceeds the OSHA PEL of 0.94 mg/m³ or the STEL of 2.5 mg/m³, the area must be posted with a sign which reads:

DANGER!
FORMALDEHYDE
IRRITANT AND POTENTIAL CANCER HAZARD
AUTHORIZED PERSONNEL ONLY

Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store away from incompatible materials (see Section 10, Stability and Reactivity). Material should be stored in secondary containers or in a diked area, as appropriate. Keep container tightly closed when not in use. Storage areas should be made of fire resistant materials. If appropriate, post warning signs in storage and use areas. Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely. Always use this product in areas where adequate ventilation is provided. Monitoring of the work area should be performed during maintenance operations. Decontaminate equipment using soapy water before maintenance begins. Collect all rinsates and dispose of according to applicable Federal, State, or local procedures.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided in Section 2 (Composition and Information on Ingredients), if applicable. Ensure eyewash/safety shower stations are available near areas where this product is used.

RESPIRATORY PROTECTION: Respiratory protection is not generally needed when using this product. Maintain airborne contaminant concentrations below exposure limits listed in Section 2 (Composition and Information on Ingredients). Use supplied air respiration protection if oxygen levels are below 19.5% or are unknown. Employers must comply with 29 CFR 1910.1048 (Formaldehyde standard).

NOTE: Follow the specific respiratory selection guidelines of the OSHA Formaldehyde Standard in regulated areas as defined by 29 CFR 1910.1048.

EYE PROTECTION: Splash goggles or safety glasses. Wear a face-shield when working with more than 1 gallon of this product.

HAND PROTECTION: Wear butyl or nitrile rubber gloves for routine industrial use. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this MSDS.

BODY PROTECTION: Use body protection appropriate for task. An apron or other impermeable body protection is suggested.

9. PHYSICAL and CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (air = 1): 1.03

SPECIFIC GRAVITY (water = 1): 1.085

SOLUBILITY IN WATER: Completely soluble.

VAPOR PRESSURE, mm Hg @ 20°C: Approximately 27.

ODOR THRESHOLD: Not available.

LOG WATER/OIL DISTRIBUTION COEFFICIENT: Not available.

EVAPORATION RATE (n-BuAc = 1): Similar to water.

FREEZING/MELTING POINT: Approximately -118°C.

BOILING POINT: Approximately 100°C.

pH: 2.8–4.0

APPEARANCE AND COLOR: This clear, colorless solution has a pungent, irritating odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): The odor is a distinct characteristic of this product.

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: Carbon dioxide, carbon monoxide.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong oxidizers, strong bases, strong acids, phenols, urea.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Heat, contact with incompatible materials.

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The specific toxicology data available for components greater than 1% in concentration are as follows.

FORMALDEHYDE:

Skin Irritancy (human) 0.15 mg/ 3 days/ intermittent; mild

Eye Irritancy (human) 4 ppm/ 5 minutes

Eye Irritancy (human) 1 ppm/ 6 minutes; mild

Skin Irritancy (rabbit) 500 mg/ 24 hours; severe

Skin Irritancy (rabbit) 540 mg (open); mild

Skin Irritancy (rabbit) 50 mg/ 24 hours; moderate

Eye Irritancy (rabbit) 0.05 mg/ 24 hours; severe

Eye Irritancy (rabbit) 10 mg; severe

Microsomal Mutagenicity Assay System

(Salmonellae typhimurium) 5 µL/ plate

DNA Inhibition System (Escherichia coli) 5 mmol/L

DNA Damage System (fibroblast, human) 100 µmol/L

TCLo (inhalation, rat) = 14.3 ppm/ 6 hours/ 2 years/ intermittent; carcinogenic effects

TCLo (inhalation, rat) = 0.05 mg/m³/ 4 hours; reproductive effect

TCLo (inhalation, rat) = 1 mg/m³/ 24 hours; teratogenic effect

TDLo (subcutaneous, rat) = 1170 mg/kg/ 65 weeks/ intermittent; equivocal tumorigenic agent

TC (inhalation, rat) = 15 ppm/ 6 hours/ 78 weeks/ intermittent; carcinogenic effects

LDLo (oral, woman) = 108 mg/kg

FORMALDEHYDE (continued):

TCLo (inhalation, human) = 17 mg/m³/ 30 minutes; eye and pulmonary effects

TCLo (inhalation, man) = 0.3 mg/m³; nose and central nervous system effects

LDLo (man) = 477 mg/kg

LD₅₀ (oral, rat) = 800 mg/kg

LC₅₀ (inhalation, rat) = 590 mg/m³

LC₅₀ (inhalation, rat) = 1000 mg/m³/ 30 minutes

LD₅₀ (subcutaneous, rat) = 420 mg/kg

LD₅₀ (intravenous, rat) = 87 mg/kg

LD₅₀ (oral, mouse) = 42 mg/kg

LC₅₀ (inhalation, mouse) = 400 mg/m³/ 2 hours

LDLo (intraperitoneal, mouse) = 16 mg/kg

LD₅₀ (subcutaneous, mouse) = 300 mg/kg

LDLo (subcutaneous, dog) = 350 mg/kg

LCLo (inhalation, cat) = 400 mg/m³/ 2 hours

LD₅₀ (skin, rabbit) = 270 mg/kg

LDLo (subcutaneous, rabbit) = 240 mg/kg

LD₅₀ (oral, guinea pig) = 260 mg/kg

METHANOL:

Skin Irritancy (rabbit) 500 mg/ 24 hours; moderate

Eye Irritancy (rabbit) 40 mg; moderate

DNA Inhibition System (lymphocyte, human) 300 mmol/L

Microsomal Mutagenicity Assay (lymphocyte, mouse) 7900 mg/L

METHANOL (continued):

TDLo (oral, rat) = 7500 mg/kg; reproductive effects

TCLo (inhalation, rat) = 10000 ppm/ 7 hours, teratogenic effects

LDLo (oral, man) = 6422 mg/kg; central nervous system, pulmonary, gastrointestinal effects

TDLo (oral, man) = 3429 mg/kg; eye effects

LDLo (oral, human) = 428 mg; central nervous system, pulmonary effects

LDLo (oral, human) = 143 mg/kg; eye, pulmonary, gastrointestinal effects

TDLo (oral, woman) = 4000 mg/kg; eye, pulmonary, gastrointestinal effects

TCLo (inhalation, human) = 86000 mg/m³; eye, pulmonary effects

TCLo (inhalation, human) = 300 ppm; eye, central nervous system, pulmonary effects

LD₅₀ (oral, rat) = 5628 mg/kg

LC₅₀ (inhalation, rat) = 64000 ppm/4 hours

LD₅₀ (intraperitoneal, rat) = 7529 mg/kg

LD₅₀ (intravenous, rat) = 2131 mg/kg

LD₅₀ (oral, mouse) = 7300 mg/kg

LD₅₀ (intraperitoneal, mouse) = 10765 mg/kg

LD₅₀ (subcutaneous, mouse) = 9800 mg/kg

LD₅₀ (intravenous, mouse) = 4710 mg/kg

LD₅₀ (dermal, rabbit) = 20000 mg/kg

LDLo (oral, monkey) = 7000 mg/kg

LCLo (inhalation, monkey) = 1000 ppm

LDLo (skin, monkey) = 393 mg/kg

11. TOXICOLOGICAL INFORMATION (Continued)

SUSPECTED CANCER AGENT: Formaldehyde (a component of this product) is listed as follows:

- EPA-B1, Probable Human Carcinogen (limited evidence of carcinogenicity from epidemiological studies)
- IARC-Group 2A, Probably Carcinogenic to Humans (limited human evidence, sufficient evidence in experimental animals)
- MAK-B, Justifiably suspected of having carcinogenic potential
- NIOSH-X, Carcinogen defined with no further categorization
- NTP-Group 2B, Reasonably anticipated to be a carcinogen (sufficient evidence of carcinogenicity from studies in experimental animals)
- OSHA-X, Carcinogen defined with no further categorization

The other components of this product are not on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, and CAL/OSHA and therefore are not considered to be, nor suspected to be, cancer causing agents by these agencies.

IRRITANCY OF PRODUCT: This product is an irritant and contains methanol (a component of this product), which is known to be absorbed through the skin. Formaldehyde (a component of this product) may be transported with the methanol.

SENSITIZATION TO THE PRODUCT: This product contains formaldehyde, which is known to cause allergic reactions, such as tingling and reddening of the skin, as well as rapid development of eczema, showing red rash, scaling, or cracking.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: This product is not reported to produce mutagenic effects in humans. Human mutation data are available for Formaldehyde and Methanol (components of this product); these data were obtained during clinical studies on specific human tissues exposed to high doses of these compound.

Embryotoxicity: This product is not reported to produce embryotoxic effects in humans.

Teratogenicity: This product is not reported to cause teratogenic effects in humans. Clinical studies on test animals exposed to relatively high doses of Formaldehyde and Methanol (components of this product) indicate teratogenic effects.

Reproductive Toxicity: This product is not reported to cause reproductive toxicity effects in humans. Clinical studies on test animals exposed to relatively high doses of Formaldehyde and Methanol (components of this product) indicate adverse reproductive effects.

*A **mutagen** is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An **embryotoxin** is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A **teratogen** is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A **reproductive toxin** is any substance which interferes in any way with the reproductive process.*

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing dermatitis, skin conditions, and respiratory, liver, and kidney disorders may be aggravated by over-exposure to this product.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate over-exposure. Administer oxygen if necessary. Refer to the OSHA Formaldehyde Standard (29 CFR 1910.1048, Paragraph L and Appendix A) for specific information on Medical Surveillance requirements (i.e. for the general physical exam, medical history, specific tests, and re-examination protocol).

BIOLOGICAL EXPOSURE INDICES: There are Biological Exposure Indices (BEIs) associated with Methanol (a component of this product).

BIOLOGICAL EXPOSURE INDICES (BEIs) for components of this product are as follows:		
CHEMICAL DETERMINANT	SAMPLING TIME	BEI
METHANOL • Methanol in urine	• End of shift	• 15 mg/L

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: Formaldehyde occurs naturally as a product of forest fires, animal wastes, microbial products of biological systems, and plant volatiles. Formaldehyde can slowly oxidize in air to form formic acid. Methanol occurs naturally as a plant volatile and during microbial degradation of biological wastes. When released on land or water, it is apt to volatilize and biodegrade. Additional environmental data are available as follows:

FORMALDEHYDE: $\log K_{ow} = 0.35$ (calculated). Water Solubility = 55g/ 100 mL. When released on land or water, formaldehyde is apt to biodegrade. Experiments on a variety of fish and shrimp show no bioconcentration of formaldehyde

METHANOL: $\log K_{ow} = -0.77$. Water Solubility = Miscible. BOD (g/g) = 0.76–1.12 standard dilution/sewage seed. The estimated half-life in water is 5.3 hours to 2.6 days. Methanol is highly mobile in soil The Bioconcentration Factor for Methanol is 2.0.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: The components of this product may be extremely harmful to plant and animal life, if this product is released into the environment. See Section 11 (Toxicological Information) for further information regarding the effects of this product's component on test animals.

EFFECT OF CHEMICAL ON AQUATIC LIFE: Formaldehyde and methanol are known to be toxic to aquatic life. Additional aquatic toxicity data are available as follows:

FORMALDEHYDE:

LC₅₀ (striped bass larvae) = 10 mg/L/46–98 hours

Median Lethal Dose (*Salmo gairdnerii*, rainbow trout) = 50 mg/L/ 48 hours

LC₅₀ (flounder) = 100–300 mg/L/ 48 hours/ salt water

LC₅₀ (*Salmo gairdnerii*, rainbow trout, green egg) = 565 mg/L/ 96 hours

LC₅₀ (*Salmo gairdnerii*, rainbow trout, eyed egg) = 198 mg/L/ 96 hours

LC₅₀ (*Salmo gairdnerii*, rainbow trout, sac larvae) = 89.5 mg/L/ 96 hours

LC₅₀ (*Salmo gairdnerii*, rainbow trout, fingerlings) = 61.9 mg/L/ 96 hours

FORMALDEHYDE (continued):

LC₅₀ (*Salmo gairdnerii*, rainbow trout,) = 440 mg/L/ 96 hours

LC₅₀ (*Salmo gairdnerii*, rainbow trout,) = 214 mg/L/ 24 hours

LC₅₀ (*Salmo gairdnerii*, rainbow trout,) = 118 µL/L/ 96 hours

LC₅₀ (*Salmo salar*, Atlantic salmon) = 173 µL/L/ 96 hours

LC₅₀ (*Salvelinus namaycush*, lake trout) = 100 µL/L/ 96 hours

LC₅₀ (*Ameiurus melas* or *Ictalurus melas*, black bullhead) = 62.1 µL/L/ 96 hours

LC₅₀ (*Ictalurus punctatus*, channel catfish) = 65.8 µL/L/ 96 hours

FORMALDEHYDE (continued):

LC₅₀ (*Lepomis cyanellus*, green sunfish) = 173 µL/L/ 96 hours

LC₅₀ (*Lepomis macrochirus*, bluegill) = 100 µL/L/ 96 hours

LC₅₀ (*Micropterus dolomieu*, smallmouth bass) = 136 µL/L/ 96 hours

LC₅₀ (*Micropterus salmoides*, largemouth bass) = 143 µL/L/ 96 hours

LC₅₀ (*Pimephales promelas*, fathead minnow) = 21.4 mg/L/ 96 hours

METHANOL:

LC₅₀ (*Pimephales promelas*, fathead minnow) = 29.4 mg/L/ 96 hours

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

EPA WASTE NUMBER: D001 (Characteristic/Ignitability), applicable for wastes consisting of this product.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME:	Formaldehyde solution
HAZARD CLASS NUMBER and DESCRIPTION:	8 (Corrosive Liquid)
UN IDENTIFICATION NUMBER:	UN 2209
PACKING GROUP:	III
DOT LABEL(S) REQUIRED:	Corrosive

EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004): 132

MARINE POLLUTANT: The components of this product are not designated by the Department of Transportation to be Marine Pollutant (per 49 CFR 172.101).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: This product is subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows:

COMPONENT	SARA 302	SARA 304	SARA 313
Formaldehyde	Yes	Yes	Yes
Methanol	No	Yes	Yes

SARA Threshold Planning Quantity: Formaldehyde = 500 lbs.

TSCA INVENTORY STATUS: The chemicals in this product are listed on the TSCA Inventory.

CERCLA REPORTABLE QUANTITY (RQ): Formaldehyde = 100 lbs; Methanol = 5,000 lbs.

OTHER FEDERAL REGULATIONS: 29 CFR 1910.1048 (Formaldehyde Standard).

STATE REGULATORY INFORMATION: Components of this product are covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: Formaldehyde, Methanol.

California - Permissible Exposure Limits for Chemical Contaminants: Formaldehyde, Methanol.

Florida - Substance List: Formaldehyde, Methanol.

Illinois - Toxic Substance List: Formaldehyde, Methanol.

Kansas - Section 302/313 List: Formaldehyde, Methanol.

Massachusetts - Substance List: Formaldehyde, Methanol.

Minnesota - List of Hazardous Substances: Formaldehyde, Methanol.

Missouri - Employer Information/Toxic Substance List: Formaldehyde, Methanol.

New Jersey - Right to Know Hazardous Substance List: Formaldehyde, Methanol.

North Dakota - List of Hazardous Chemicals, Reportable Quantities: Formaldehyde, Methanol.

Pennsylvania - Hazardous Substance List: Formaldehyde, Methanol.

Rhode Island - Hazardous Substance List: Formaldehyde, Methanol.

Texas - Hazardous Substance List: Formaldehyde, Methanol.

West Virginia - Hazardous Substance List: Formaldehyde, Methanol.

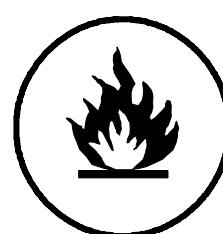
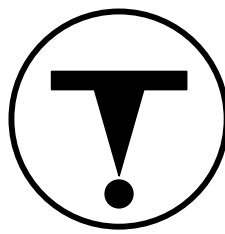
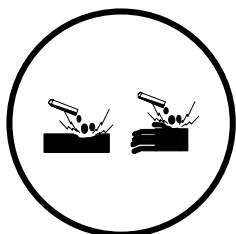
Wisconsin - Toxic and Hazardous Substances: Formaldehyde, Methanol.

CALIFORNIA PROPOSITION 65: Formaldehyde, as a gas, is on the California Proposition 65 list of Chemicals Known to the State to Cause Cancer. If heated, this product could release formaldehyde gas.

LABELING (Precautionary Statements): **DANGER!** MAY BE HARMFUL OR FATAL IF SWALLOWED. MAY CAUSE SKIN OR EYE IRRITATION. HARMFUL IF INHALED. INGESTION MAY CAUSE BLINDNESS. CONTAINS A CHEMICAL SUSPECTED TO BE A CARCINOGEN. Do not taste or swallow. Do not get on skin or in eyes. Avoid breathing vapors or mist. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves, goggles, and suitable body protection. **FIRST-AID:** In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. If inhaled, remove to fresh air. If ingested, do not induce vomiting. Get medical attention. **IN CASE OF FIRE:** Use water fog, dry chemical, CO₂, or "alcohol" foam. **IN CASE OF SPILL:** Absorb spill with polypads or other suitable absorbent materials. Place residue in suitable container and seal. Consult Material Safety Data Sheet for additional information.

TARGET ORGANS: Respiratory system, skin, eyes, central nervous system, liver, kidneys.

WHMIS SYMBOLS:



16. OTHER INFORMATION

PREPARED BY:

Electrochemicals, Inc .
5630 Pioneer Creek Drive, Maple Plain, MN 55359
(763) 479 -2008
December 12, 2006

DATE OF PRINTING:

All statements, technical information and recommendations herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed. **THE FOLLOWING IS MADE IN LIEU OF ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PURPOSE.** Seller's and manufacturer's only obligation shall be to replace such quantity of the product proved to be defective. Before using, user shall determine the suitability of the product for its intended use, and user assumes all risks and liability whatsoever in connection therewith.

NEITHER SELLER NOR MANUFACTURER SHALL BE LIABLE EITHER IN TORT OR IN CONTRACT FOR ANY LOSS OR DAMAGE, DIRECT, INCIDENTAL OR CONSEQUENTIAL, ARISING OUT OF THE USE OR THE INABILITY TO USE THE PRODUCT.

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS #: This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

EXPOSURE LIMITS IN AIR:

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.

TLV - Threshold Limit Value - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour **Time Weighted Average (TWA)**, the 15-minute **Short Term Exposure Limit**, and the instantaneous **Ceiling Level**. Skin absorption effects must also be considered.

OSHA - U.S. Occupational Safety and Health Administration.

PEL - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order.

IDLH - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called Recommended Exposure Levels (**RELs**). When no exposure guidelines are established, an entry of **NE** is made for reference.

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the **National Fire Protection Association (NFPA)**. **LEL** - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. **UEL** - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m³** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TD₀₁**, **LDLo**, and **LDo**, or **TC**, **TC₀₁**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause death. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Other acronyms used are: **Superfund Amendments and Reauthorization Act (SARA)**; the **Toxic Substance Control Act (TSCA)**; Marine Pollutant status according to the **DOT**; California's Safe Drinking Water Act (**Proposition 65**); the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund)**; and various state regulations. This section also includes information on the precautionary warnings which appear on the material's package label.