ATTN: SAFETY DIRECTOR
UNIV OF WISC-WHITEWATER
PURCHASING OFFICE
800 W MAIN ST
WHITEWATER WI 53190-1705

SIGMA CHEMICAL COMPANY
POST OFFICE BOX 14508
SAINT LOUIS, MISSOURI 63178, USA

EMERGENCY PHONE 1-314-771-5765
DATE 05/27/97
CUST#: 2-097-94816
PO#: VISA 05/23/97

MATERIAL SAFETY DATA SHEET PAGE 1

SECTION 1. -- -- -- -- -- - CHEMICAL IDENTIFICATION-- -- -- -- -- -- --

CATALOG #: HT501-320
NAME: FORMALIN SOLUTION, NEUTRAL BUFFERED

SECTION 2. -- -- -- -- COMPOSITION/INFORMATION ON INGREDIENTS -- -- -- --

CAS #: 50-00-0
EC NO: 200-001-8

ADDITIONAL INFORMATION

COMPONENT CAS NUMBER PERCENT
FORMALDEHYDE 50-00-0 3.7-4.0%
METHANOL 67-56-1 1.0-1.5%
SODIUM PHOSPHATE MONOBASIC 10049-21-5 0.4%
SODIUM PHOSPHATE DIBASIC 7558-79-4 0.65%
WATER 7732-18-5 BALANCE

SYNONYMS
ALDEHYDE FORMIQUE (FRENCH) * ALDEHYD MRAVENCI (CZECH) * ALDEIDE
FORMICA (ITALIAN) * BFV * PANNOFORM * FORMALDEHYDE (ACGIH;OSHA) *
FORMALDEHYDE SOLUTIONS, FLAMMABLE (UN1198) (DOT) * FORMALDEHYDE,
SOLUTIONS (UN2209) (DOT) * FORMALDEHYD (CZECH, POLISH) * FORMALDEHYDE,
GAS * FORMALIN * FORMALIN 40 * FORMALINA (ITALIAN) * FORMALINE
(GERMAN) * FORMALIN-LOESUNGEN (GERMAN) * FORMALITH * FORMIC ALDEHYDE *
FORMOL * FYDE * lysiform * METHANAL * METHYL ALDEHYDE *
* METHYLENE OXIDE * MORBICID * NCI-C02799 * OPLOSSINGEN (DUTCH) *
OXOMETHANE * OXYMETHYLENE * PARAFORM * RCRW waste number U122 *
SUPERLYSOFORM * UN1198 (DOT) * UN2209 (DOT) *

SECTION 3. -- -- -- -- -- -- -- HAZARDS IDENTIFICATION -- -- -- -- --

LABEL PRECAUTIONARY STATEMENTS

TOXIC
MAY CAUSE CANCER.
MAY CAUSE HERITABLE GENETIC DAMAGE.
TOXIC BY INHALATION, IN CONTACT WITH SKIN AND IF SWALLOWED.
MAY CAUSE SENSITIZATION BY INHALATION AND SKIN CONTACT.
CONTAINS FORMALDEHYDE
POTENTIAL CANCER HAZARD.
READILY ABSORBED THROUGH SKIN.
LACHRYMATORY.
COMBUSTIBLE.
TARGET ORGAN(S):
EYES
KIDNEYS
IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).
IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.

CONTINUED ON NEXT PAGE

5006
SIGMA CHEMICAL COMPANY  
POST OFFICE BOX 14508  
SAINT LOUIS, MISSOURI 63178, USA

CUST#: 2-097-94816  
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MATERIAL SAFETY DATA SHEET  
PAGE 2

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CATALOG #: HT501-320  
NAME: FORMALIN SOLUTION, NEUTRAL BUFFERED

WEAR SUITABLE PROTECTIVE CLOTHING, GLOVES AND EYE/FACE PROTECTION.  
DO NOT BREATHE VAPOR.

SECTION 4. ----- FIRST-AID MEASURES-----

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.  
ASSURE ADEQUATE FLUSHING OF THE EYES BY SEPARATING THE EYELIDS WITH FINGERS.  
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.  
IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS. CALL A PHYSICIAN IMMEDIATELY.  
WASH CONTAMINATED CLOTHING BEFORE REUSE.  
DISCARD CONTAMINATED SHOES.

SECTION 5. ----- FIRE FIGHTING MEASURES-----

EXTINGUISHING MEDIA  
WATER MAY BE EFFECTIVE FOR COOLING, BUT MAY NOT EFFECT EXTINGUISHMENT.  
CARBON DIOXIDE, DRY CHEMICAL POWDER OR APPROPRIATE FOAM.

SPECIAL FIREFIGHTING PROCEDURES  
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES. USE WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS.

COMBUSTIBLE LIQUID.

UNUSUAL FIRE AND EXPLOSIONS HAZARDS  
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

SECTION 6. ----- ACCIDENTAL RELEASE MEASURES-----

EVACUATE AREA.  
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.

ABSORB ON SAND OR VERMICULITE AND PLACE IN CLOSED CONTAINERS FOR DISPOSAL.  
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

SECTION 7. ----- HANDLING AND STORAGE-----

REFER TO SECTION 8.

SECTION 8. ----- EXPOSURE CONTROLS/PERSONAL PROTECTION-----

WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.

USE ONLY IN A CHEMICAL FUME HOOD.  
SAFETY SHOWER AND EYE BATH.

CONTINUED ON NEXT PAGE  
5007
Catalog #: HT501-320
Name: Formalin solution, neutral buffered

Do not breathe vapor. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure. Wash thoroughly after handling. Keep tightly closed. Keep away from heat and open flame. Store in a cool dry place. Keep away from heat and open flame. Store in a cool dry place.

Section 9. Physical and Chemical Properties

Appearance and Odor: Liquid.

Physical Properties:
- Boiling Point: Approx 212°F
- Flashpoint: 85°C by closed cup

 Explosion Limits in Air:
- Upper: 73%
- Lower: 7.0%

 Vapor Pressure: 25 mm Hg
 Solubility: Water soluble
 Specific Gravity: 1.000
 Vapor Density: 1.02 (Air = 1)

Section 10. Stability and Reactivity

Incompatibilities:
- Incompatible with: Aniline, Phenol, Isocyanates, Anhydrides.
- Strong Acids
- Strong Bases
- Reacts violently with: Strong oxidizing agents

Hazardous Combustion or Decomposition Products:
- Toxic Fumes of: Carbon monoxide, carbon dioxide

Section 11. Toxicological Information

Acute Effects:
- Toxic by inhalation, ingestion or skin absorption. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes and skin. Inhalation may result in spasm, inflammation and edema of the larynx and bronchi. Chemical pneumonitis and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting.

Continued on next page.
MATERIAL SAFETY DATA SHEET

CATALOG #: HT501-320
NAME: FORMALIN SOLUTION, NEUTRAL BUFFERED

MAY CAUSE ALLERGIC RESPIRATORY AND SKIN REACTIONS.
EXPOSURE CAN CAUSE:
COUGHING, CHEST PAINS, DIFFICULTY IN BREATHING.
PULMONARY EDEMA, EFFECTS MAY BE DELAYED.
GASTROINTESTINAL DISTURBANCES
MAY CAUSE CONVULSIONS.
READILY ABSORBED THROUGH SKIN.

CHRONIC EFFECTS
CARCINOGEN.
MAY ALTER GENETIC MATERIAL.
TARGET ORGAN(S):
EYES
KIDNEYS
LIVER
HEART

TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL, AND
TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.

RTECS #: LP8925000
FORMALDEHYDE

IRRITATION DATA
SKN-HMN 150 UG/3D-1 MLD 85DKA8 - 127.77
EYE-HMN 4 PPM/5M IAPWAR 4.79.61
EYE-HMN 1 PPM/6M NSE MLD AIHAAP 54.463.83
SKN-RBT 2 MG/24H SEV 85JCAE - 4.56.86
SKN-RBT 540 MG OPEN MLD UCDS** 4.71.67
SKN-RBT 90 MG/24H MOD TXAPA9 21.369.62
EYE-RBT 750 MG/24H SEV 85JCAE - 264.86
EYE-RBT 750 MG SEV AJOPAA 25.1363.46
EYE-RBT 10 MG SEV TXAPA9 55.501.80

TOXICITY DATA
ORL-WMN LDLO:108 MG/KG 29ZWE 5.328.66
UNR-MAN LDLO:477 MG/KG 85DCAI 7.73.70
ORL-RAT LD50:100 MG/KG FCTOD7 6.447.88
IHL-RAT LC50:203 MG/M3 GTFZAB 18.24.55.74
SCU-RAT LD50:420 MG/KG APTOA6 6.299.50
TVN-RAT LD50:67 MG/KG AEPPAE 21.166.54
ORL-MUS LD50:42 MG/KG NTIS** AD-A126-539
IHL-MUS LD50:46.4 GM/M3/4H CUTOEX 1.47.93
SNU-MUS LD50:300 MG/KG APTOA6 6.299.50
SKN-RBT LD50:270 UL/KG UCDS** 4.71.67
ORL-GPG LD50:260 MG/KG JIHTAB 23.259.41

TARGET ORGAN DATA
SENSE ORGANS AND SPECIAL SENSES (OTHER OLFACTION EFFECTS)
SENSE ORGANS AND SPECIAL SENSES (OLFACTION TUMORS)
BEHAVIORAL (SOCNOLENCE)
BEHAVIORAL (CONVULSIONS OR EFFECT ON SEIZURE THRESHOLD)
BEHAVIORAL (EXCITEMENT)

CONTINUED ON NEXT PAGE
CATALOG #: HT501-320
NAME: FORMALIN SOLUTION, NEUTRAL BUFFERED

BEHAVIORAL (AGGRESSION)
LUNGS, THORAX OR RESPIRATION (BRONCHIOLAR CONstriction, INCLUDING ASTHMA)
LUNGS, THORAX OR RESPIRATION (ACUTE PULMONARY EDEMA)
LUNGS, THORAX OR RESPIRATION (RESPIRATORY OBSTRUCTION)
GASTROINTESTINAL (GASTRITIS)
GASTROINTESTINAL (ULCERATION OR BLEEDING FROM STOMACH)
GASTROINTESTINAL (NAUSEA OR VOMITING)
BLOOD (OTHER CHANGES)
SKIN AND APPENDAGES (TUMORS)
PATERNAL EFFECTS (SPERMATOGENESIS)
PATERNAL EFFECTS (TESTES, EPIDIDYMIS, SPERM DUCT)
PATERNAL EFFECTS (PROSTATE, SEMINAL VESICLE, COWPER'S, ACCESSORY GLANDS)
PATERNAL EFFECTS (OTHER EFFECTS ON MALE)
EFFECTS ON FERTILITY (MALE FERTILITY INDEX)
EFFECTS ON FERTILITY (POST-IMPLANTATION MORTALITY)
EFFECTS ON FETUS OR EMBRYO (FETOTOXICITY)
EFFECTS ON EMBRYO OR FETUS (FETAL DEATH)
SPECIFIC DEVELOPMENTAL ABNORMALITIES (CRANIOFACIAL)
SPECIFIC DEVELOPMENTAL ABNORMALITIES (MUSCULOSKELETAL SYSTEM)
SPECIFIC DEVELOPMENTAL ABNORMALITIES (HEPATOBLIARY SYSTEM)
SPECIFIC DEVELOPMENTAL ABNORMALITIES (OTHER DEVELOPMENTAL ABNORMALITIES)
EFFECTS ON NEWBORN (GROWTH STATISTICS)
EFFECTS ON NEWBORN (BIOCHEMICAL AND METABOLIC)
EFFECTS ON NEWBORN (BEHAVIORAL)
EFFECTS ON NEWBORN (OTHER POSTNATAL MEASURES OR EFFECTS)
TUMORIGENIC (CARCINOGENIC BY RTECS CRITERIA)
TUMORIGENIC (EQUIVOCAL TUMORIGENIC AGENT BY RTECS CRITERIA)
TUMORIGENIC (TUMORS AT SITE OF APPLICATION)
BIOCHEMICAL EFFECTS (EFFECT ON INFLAMMATION OR MEDIATION OF INFLAMMATION)
ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES
(RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.

SECTION 12. - - - - - - ECOLOGICAL INFORMATION - - - - - - -
DATA NOT YET AVAILABLE.

SECTION 13. - - - - - - DISPOSAL CONSIDERATIONS - - - - - - -
THIS COMBUSTIBLE MATERIAL MAY BE BURNED IN A CHEMICAL INCINERATOR
EQUIPPED WITH AN AFTERBURNER AND SCRUBBER.
OBSEIVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14. - - - - - - - TRANSPORT INFORMATION - - - - - - -
CONTACT SIGMA CHEMICAL COMPANY FOR TRANSPORTATION INFORMATION.

SECTION 15. - - - - - - REGULATORY INFORMATION - - - - - - -
EUROPEAN INFORMATION
EC INDEX NO: 605-001-00-5
TOXIC
CONTINUED ON NEXT PAGE
CATALOG #: HT501-320
NAME: FORMALIN SOLUTION, NEUTRAL BUFFERED

R 40 POSSIBLE RISK OF IRREVERSIBLE EFFECTS.
R 43 MAY CAUSE SENSITIZATION BY SKIN CONTACT.
S 26 IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.
S 36/37 WEAR SUITABLE PROTECTIVE CLOTHING AND GLOVES.
S 45 IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).
S 51 USE ONLY IN WELL VENTILATED AREAS.

REVIEWS, STANDARDS, AND REGULATIONS

OEL-MAC
ACGIH TLV-SUSPECTED HUMAN CARCINOGEN DTLVS* TLV/BEI, 96
ACGIH TLV-CL 0.37 MG/M3 (0.3 PPM) DTLVS* TLV/BEI, 96
IARC CANCER REVIEW: ANIMAL SUFFICIENT EVIDENCE IMEMDT 62, 217, 95
IARC CANCER REVIEW: HUMAN LIMITED EVIDENCE IMEMDT 62, 217, 95
IARC CANCER REVIEW: GROUP 2A IMEMDT 62, 217, 95
IARC CANCER REVIEW: GROUP 2A IMEMDT 62, 217, 95
EPA FIPFA 1988 PESTICIDE SUBJECT TO REGISTRATION OR RE-REGISTRATION FERBAC 54, 7740, 89
MSHA STANDARD: AIR-CL 2 PPM (3 MG/M3)
DTLWS* 3, 19, 73
OSHA PEL: GEN INDU: SEE 1910.1048
CFRGR 29, 1910.1000, 94
OSHA PEL: CONSTRUCT: SEE CFR 29,1926.1148
CFRGR 29, 1926.55, 94
OSHA PEL: FED CONT: CL 5 PPM (6 MG/M3)
CFRGR 44.50-204, 50, 94
OEL: ARAB REPUBLIC OF EGYPT: TWA 2 PPM (3 MG/M3) JAN93
OEL: AUSTRALIA: TWA 1 PPM (1.5 MG/M3); STEL 2 PPM (3 MG/M3); CARCINOGEN JAN93
OEL: BELGIUM: TWA 1 PPM (1.2 MG/M3); STEL 2 PPM (2.5 MG/M3); CARCINOGEN JAN93
OEL: DENMARK: STEL 0.3 PPM (0.4 MG/M3); CARCINOGEN JAN93
OEL: FINLAND: STEL 1 PPM (1.3 MG/M3); SKIN JAN93
OEL: FRANCE: STEL 2 PPM (3 MG/M3) JAN93
OEL: GERMANY: TWA 0.5 PPM (0.6 MG/M3); CARCINOGEN JAN93
OEL: HUNGARY: STEL 0.6 MG/M3; CARCINOGEN JAN93
OEL: JAPAN: TWA 0.5 PPM (0.61 MG/M3); CARCINOGEN JAN93
OEL: THE NETHERLANDS: TWA 1 PPM (1.5 MG/M3); STEL 2 PPM (3 MG/M3) JAN93
OEL: THE PHILIPPINES: TWA 5 PPM (6 MG/M3) JAN93
OEL: POLAND: TWA 2 MG/M3 JAN93
OEL: RUSSIA: TWA 0.5 PPM; STEL 0.5 MG/M3; SKIN JAN93
OEL: SWEDEN: TWA 0.5 PPM (0.6 MG/M3); STEL 1 PPM (1.2 MG/M3) JAN93

CONTINUED ON NEXT PAGE
CATALOG #: HT501-320
NAME: FORMALIN SOLUTION, NEUTRAL BUFFERED

OEL-SWITZERLAND: TWA 0.5 PPM (0.6 MG/M3); STEL 1 PPM (1.2 MG/M3) JAN93
OEL-THAILAND: TWA 3 PPM; STEL 5 PPM JAN93
OEL-TURKEY: TWA 5 PPM (6 MG/M3) JAN93
OEL-UNITED KINGDOM: TWA 2 PPM (2.5 MG/M3); STEL 2 PPM (2.5 MG/M3) JAN93
OEL IN GULAGARIA, COLOMBIA, JORDAN, KOREA CHECK ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM CHECK ACGIH TLV
NIOSH REL TO FORMALDEHYDE-AIR: 18H CA TWA 0.016 PPM; CL 0.1 PPM/15M
NIOSH* DHHS #92-100, 92
NOHS 1974: H2D M1529; NIS 72; TNE 10311; NOS 67; TNE 66921
NOHS 1974: H2D M3342; NIS 273; TNE 33243; NOS 155; TNE 394660
NOHS 1983: H2D M6579; NIS 87; TNE 11309; NOS 69; TNE 207013; TFE 104994
NOES 1983: H2D M33640; NIS 309; TNE 65738; NOS 193; TNE 1329322; TFE 441902

EPA GENETOX PROGRAM 1988, POSITIVE: CARCINOGENICITY-MOUSE/RAT
EPA GENETOX PROGRAM 1988, POSITIVE: D MELANOGASTER-RECIPIRICAL
EPA GENETOX PROGRAM 1988, POSITIVE: N CRASSA-REVERSION; E COLI POLA
EPA GENETOX PROGRAM 1988, POSITIVE: D MELANOGASTER SEX-LINKED LETHAL
EPA GENETOX PROGRAM 1988, POSITIVE: S CEREVISIAE GENE CONVERSION; S CEREVISIAE-REVERSION
EPA GENETOX PROGRAM 1988, INCONCLUSIVE: IN VITRO UDS-HUMAN FIBROBLAST
EPA GENETOX PROGRAM 1988, INCONCLUSIVE: CHO GENE MUTATION
EPA TSCA SECTION 8(B) CHEMICAL INVENTORY
EPA TSCA SECTION 8(D) UNPUBLISHED HEALTH/SAFETY STUDIES
ON EPA IRIS DATABASE
EPA TSCA TEST SUBMISSION (TSCAPS) DATA BASE, JANUARY 1997
NIOSH CURRENT INTELLIGENCE BULLETIN 34 APRIL 1981
NIOSH ANALYTICAL METHOD, 1994: ALDEHYDES, SCREENING, 2539
NIOSH ANALYTICAL METHOD, 1994: FORMALDEHYDE BY ON DUST (TEXTILE OR WOOD) 5700
NIOSH ANALYTICAL METHOD, 1994: FORMALDEHYDE BY GC 2541; BY VIS, 3500
NTP 7TH ANNUAL REPORT ON CARCINOGENS 1992: ANTICIPATED TO BE CARCINOGEN
OSHA ANALYTICAL METHOD #ID-102

U.S. INFORMATION
MAY CONTAIN UP TO:
4.0% FORMALDEHYDE 50-00-0
1.5% METHANOL 67-56-1
THESE PRODUCTS ARE SUBJECT TO SARA SECTION 313 REPORTING REQUIREMENTS.

SECTION 16. OTHER INFORMATION

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO
BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. SIGMA SHALL NOT BE
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CUST#: 2-097-94816
PO#: VISA 05/23/97

MATERIAL SAFETY DATA SHEET

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CATALOG #: HT501-320
NAME: FORMALIN SOLUTION, NEUTRAL BUFFERED

P.O. BOX 355
MILWAUKEE, WISCONSIN 53201, USA

MATERIAL WAS SHIPPED TO THIS ADDRESS:
UNIV OF WISC-WHITEWATER
MEG WARACZINSKI
PSYCHOLOGY
CENTRAL REC STORES
N FREMONT ST
WHITEWATER WI 53190

5013