### MATERIAL SAFETY DATA SHEET

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FOR 24-HOUR EMERGENCY INFORMATION CALL: CHEMTREC 800-424-9300 (Within U.S.A.)
703-527-3887 (International -- Collect)

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## PRODUCT IDENTIFICATION

<table>
<thead>
<tr>
<th>PRODUCT NAME:</th>
<th>CHLOROFORM-d</th>
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<tbody>
<tr>
<td>CAT. NO:</td>
<td>DC1080, DC1080M, DC10810T, DC1083, DC1083M</td>
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<tr>
<td>CHEMICAL NAME:</td>
<td>CHLOROFORM-d</td>
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<tr>
<td>SYNONYM(S):</td>
<td>DEUTEROCHLOROFORM, TRICHLOROMETHANE-d</td>
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<tr>
<td>FORMULA:</td>
<td>CDCl₃</td>
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<tr>
<td>CAS. NO:</td>
<td>865-49-6</td>
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## HAZARDOUS INGREDIENTS OF MIXTURES

PRINCIPAL HAZARDOUS COMPONENT(S): CHLOROFORM-d, PURE MATERIAL >99%

THIS PRODUCT IS HAZARDOUS AS DEFINED IN 29 CFR 1910.1200 (OSHA HAZARD COMMUNICATION STANDARD). OSHA HAZARD: CARCINOGEN (NTP ANTICIPATED CARCINOGEN; IARC GROUP 2B POSSIBLE HUMAN CARCINOGEN), SKIN IRRITANT, EYE IRRITANT.

EXPOSURE LIMITS:

| OSHA PEL:   | TABLE Z-1 TWA = CEILING OF 50ppm (240 mg/m³) |
|            | TABLE Z-1-A (REVOKED 6/30/93) TWA = 2ppm (9.78 mg/m³) |
| ACGIH TLV: | TWA = 10ppm (49 mg/m³) |

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## PHYSICAL DATA

Boiling Point: 141°F (61°C)
MELTING POINT: -83°F (-64°C)
SPECIFIC GRAVITY: (H₂O = 1): 1.50
VAPOR PRESSURE: (mm Hg):
  @ 50.7°F (10.4°C) = 100
  @ 70°F (21°C) = 165
  @100°F (38°C) = 350

PERCENT VOLATILE BY VOLUME: 100
VAPOR DENSITY (Air = 1): 4.13
EVAPORATION RATE (n - Butyl Acetate = 1): 17.7
MOLECULAR WEIGHT (gm/mole): 120.39

SOLUBILITY IN WATER: 1ml DISSOLVES IN 200ml WATER AT 77°F (25°C)
APPEARANCE AND ODOR: CLEAR, COLORLESS LIQUID WITH HEAVY, ETHEREAL ODOR

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## FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT: NONE (NON-FLAMMABLE)        METHOD USED: N/A

FLAMMABLE LIMITS:  LEL = N/A ___%       UEL = N/A ___%

AUTO IGNITION TEMPERATURE: N/A

EXTINGUISHING MEDIA: NON-FLAMMABLE, NON-EXPLOSIVE, DOES NOT SUPPORT COMBUSTION. HOWEVER, DRY CHEMICAL, CARBON DIOXIDE, FOAM, WATER SPRAY, OR FOG CAN BE USED TO EXTINGUISH OTHER BURNING MATERIALS IN PRESENCE OF CHLOROFORM.

SPECIAL FIRE FIGHTING PROCEDURES: FIRE FIGHTERS SHOULD WEAR FULL PROTECTIVE CLOTHING INCLUDING GLOVES, RUBBER BOOTS AND POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS WITH FULL FACE COVERAGE MASK, BECAUSE MATERIAL CAN EVOLVE TOXIC AND CORROSIVE FUMES OF PHOSGENE, DEUTERIUM (HYDROGEN) CHLORIDE, AND OTHER CHLORIDE-CONTAINING FUMES WHEN THERMALLY DECOMPOSED BY OPEN FLAMES, HOT SURFACES OR OTHER MEANS.

UNUSUAL FIRE AND EXPLOSION HAZARDS: OVERHEATED CONTAINERS MAY RUPTURE OR BURST. REMOVE CONTAINERS FROM FIRE SCENE IF POSSIBLE TO DO SO SAFELY. OTHERWISE CONTAINERS CAN BE COOLED WITH WATER SPRAY.

NFPA HAZARD RATING (Scale 0-4, 0 = lowest hazard):

<table>
<thead>
<tr>
<th>HEALTH</th>
<th>FLAMMABILITY</th>
<th>REACTIVITY</th>
</tr>
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<tbody>
<tr>
<td>2</td>
<td>0</td>
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---------------HEALTH HAZARD DATA---------------

EXPOSURE LIMITS:

OSHA PEL: TABLE Z-1 TWA = CEILING OF 50ppm (240 mg/m³)
          TABLE Z-1-A (REVOKED 6/30/93) TWA = 2ppm (9.78 mg/m³)

ACGIH TLV: TWA = 10ppm (49 mg/m³)

PRIMARY ROUTE(S) OF EXPOSURE: INHALATION

CARCINOGENICITY:

NTP: ANTICIPATED CARCINOGEN

IARC: POSSIBLE HUMAN CARCINOGEN (GROUP 2B)

OSHA: NO SPECIFIC STANDARD, BUT EXPOSURE LIMITS SET BASED ON AVOIDANCE OF CANCER

OTHER (NIOSH, ACGIH): ACGIH QUOTES OTHER SOURCES AS POSITIVE. NATIONAL CANCER INSTITUTE: CARCINOGENIC IN MICE AND RATS.

HMIS RATINGS (Scale 0-4, 0 = lowest hazard):

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<td>1</td>
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</table>

SIGNS AND SYMPTOMS OF EXPOSURE: THE INITIAL INDICATION THAT EXPOSURE IS OCCURRING IS OFTEN THE ODOR OF CHLOROFORM. IF EXPOSURE CONTINUES, HEADACHE, DIZZINESS, FAINTING SENSATIONS, NAUSEA, SALIVATION, VOMITING OR UNCONSCIOUSNESS MAY RESULT.

TARGET ORGAN(S): LIVER, KIDNEYS, HEART, NERVOUS SYSTEM, SKIN, AND EYES

EFFECTS OF OVEREXPOSURE:
INHALATION: ACUTE OR SINGLE OVEREXPOSURE: INHALATION OF CHLOROFORM CAUSES DILATION OF THE PUPILS, WITH DIMINISHED REACTION TO LIGHT, AS WELL AS REDUCED INTRAOCULAR PRESSURE. INHALATION OF HIGH CONCENTRATIONS MAY ALSO CAUSE HEADACHE, DIZZINESS, NAUSEA, SALIVATION, VOMITING, FAINTING SENSATIONS AND NARCOSIS. IT HAS BEEN WIDELY USED AS AN ANESTHETIC, WHICH INITIALLY CAUSES A FEELING OF WARMTH IN THE FACE AND BODY, FOLLOWED BY IRRITATION OF MUCOUS MEMBRANES AND SKIN, AND THEN NEVROUS ABERRATION. PROLONGED INHALATION CAUSES PARALYSIS ALONG WITH CARDIAC RESPIRATORY FAILURE AND THEN DEATH. DUE TO THE TOXIC EFFECTS, IT IS RARELY USED AS AN ANESTHETIC ANYMORE. THE TOXIC EFFECTS INCLUDE LIVER, HEART AND KIDNEY DAMAGE.

CHRONIC OR REPEATED OVEREXPOSURE: CHRONIC INHALATION OF CHLOROFORM, DEPENDING ON CONCENTRATION, CAUSES ABOVE ACUTE EFFECTS. IN ADDITION, REPEATED USE AS AN ANESTHETIC HAS CAUSED PROFOUND TOXEMIA AND LIVER, HEART AND KIDNEY DAMAGE. EXPERIMENTAL, PROLONGED LIGHT ANESTHESIA PRODUCES HEPATITIS IN DOGS. THE MAXIMUM CONCENTRATION OVER SEVERAL HOURS OR FOR PROLONGED EXPOSURE THAT PRODUCES FEW OR NO OVERT SYMPTOMS IS 2000 - 2500ppm. NOTE, HOWEVER, THAT THIS ISignoring THE CARCINOGENIC POTENTIAL AND THE TOXICITY TO THE LIVER, HEART AND KIDNEYS.

EYES: ACUTE OR SINGLE OVEREXPOSURE: DIRECT CONTACT WITH EYES WILL CAUSE IRRITATION WHICH IS USUALLY TEMPORARY. WHEN INHALED, CAUSES DILATION OF PUPILS WITH REDUCED REACTION TO LIGHT AS WELL AS REDUCED INTRAOCULAR PRESSURE.

CHRONIC OR REPEATED OVEREXPOSURE: CAUSES IRRITATION OF THE CONJUNCTIVA.

SKIN: ACUTE OR SINGLE OVEREXPOSURE: BURNING SENSATION, POSSIBLE TEMPORARY REDDENING.

CHRONIC OR REPEATED OVEREXPOSURE: CAN CAUSE BURNING SENSATION, REDDENING, RASH OR OTHER IRRITATION PRIMARILY BY DEFATTING OF SKIN TISSUE BY SIMPLE SOLVENT ACTION. ADDITIONAL EXPOSURE, ESPECIALLY IN MORE SENSITIVE PERSONS, MAY CAUSE DERMATITIS, CHLORACNE OR SECONDARY SKIN INFECTIONS.

INGESTION: ACUTE OR SINGLE OVEREXPOSURE: THE ORAL TOXICITY OF CHLOROFORM IS RELATIVELY LOW. INGESTION CAN CAUSE STOMACH AND INTESTINAL LINING IRRITATION. VOMITING MAY ALSO OCCUR, ALLOWING MATERIAL TO BE ASPIRATED INTO AIRWAY AND LUNGS, CAUSING MUCOUS MEMBRANE IRRITATION AND/OR LUNG IRRITATION AND CONSEQUENT INHALATION EXPOSURE. OTHER EFFECTS MAY ALSO INCLUDE PARALYSIS, CARDIAC RESPIRATORY FAILURE AND DEATH.

CHRONIC OR REPEATED OVEREXPOSURE: NO ADDITIONAL INFORMATION AVAILABLE.

MEDICAL CONDITIONS THAT MAY BE AGGRAVATED BY EXPOSURE: LIVER, HEART, KIDNEY DEFICIENCIES OR DISEASES; MAY INITIATE OR AGGRAVATE DERMATITIS OR OTHER ALLERGIC REACTIONS INCLUDING ASTHMA.

TOXICITY DATA: ORAL LD₅₀ (RAT) = 800 mg/kg
         ORAL LD₅₀ (RAT, 14TH DAY) = 2.18ml/kg (3,235 mg/kg)
         INHALATION LC₅₀ (RAT) = 8000ppm FOR 4 HOURS
         INHALATION LC₅₀ (MOUSE) = 28ppm

68,000 - 82,000ppm KILLS MOST ANIMALS IN A FEW MINUTES; 14,000ppm IS LIFE THREATENING FOR 30 - 60 MINUTE EXPOSURE; 5,000 - 6,000ppm TOLERABLE BY ANIMALS FOR 1 HOUR WITHOUT SERIOUS DISTURBANCES; 2,000 - 2,500ppm IS MAXIMUM CONCENTRATION TOLERATED FOR SEVERAL HOURS OF PROLONGED EXPOSURE WITH SLIGHT SYMPTOMS PRODUCED IN ANIMALS.

EMERGENCY AND FIRST AID PROCEDURES:
INHALATION: MOVE VICTIM TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. OBTAIN PROFESSIONAL MEDICAL ATTENTION IMMEDIATELY.

EYES: IMMEDIATELY IRRIGATE WITH WATER (PREFERABLY WARM) FOR AT LEAST 15 MINUTES. OBTAIN PROFESSIONAL MEDICAL ATTENTION IMMEDIATELY.

SKIN: IMMEDIATELY FLUSH AFFECTED AREA WITH LARGE AMOUNTS OF WATER (PREFERABLY WARM) AND SOAP, IF AVAILABLE. REMOVE ANY CONTAMINATED CLOTHING OR SHOES AFTER BEGINNING WATER FLUSH AND CONTINUE FLUSHING FOR AT LEAST 15 MINUTES. IT IS ADVISABLE TO CONSULT A PHYSICIAN, ESPECIALLY IF ANY SYMPTOMS DEVELOP FROM EXPOSURE.

INGESTION: OBTAIN PROFESSIONAL MEDICAL ATTENTION IMMEDIATELY.

---------------REACTIVITY DATA---------------

STABILITY: STABLE

CONDITIONS TO AVOID: NOT APPLICABLE

INCOMPATIBILITY: STRONG ALKALIS (SUCH AS SODIUM HYDROXIDE OR SODIUM METHOXIDE) ESPECIALLY IN PRESENCE OF WATER; REACTIVE METALS SUCH AS LITHIUM, SODIUM, POTASSIUM, ALUMINUM, MAGNESIUM, CALCIUM, ZINC, ESPECIALLY IN PRESENCE OF MOISTURE; ACID HALIDES.

HAZARDOUS DECOMPOSITION PRODUCTS: THERMAL DECOMPOSITION OR BURNING CAN PRODUCE PHOSGENE, DEUTERIUM (HYDROGEN) CHLORIDE, OTHER TOXIC AND CORROSIVE CHLORIDE-CONTAINING FUMES.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR.

HMIS RATINGS (Scale 0-4, 0 = lowest hazard):

- HEALTH 1
- FLAMMABILITY 0
- REACTIVITY 1

---------------SPILL OR LEAK PROCEDURES---------------

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: WEAR FULL PROTECTIVE CLOTHING INCLUDING CHEMICAL SAFETY GOGGLES, APRON, GLOVES AND RESPIRATORY PROTECTION.

STOP LEAK AT SOURCE, AND VENTILATE AREA WELL. SMALL SPILLS WILL QUICKLY EVAPORATE. LARGER SPILLS CAN BE CONTAINED AND ABSORBED INTO AN INERT CHEMICAL ABSORBENT SUCH AS SAND, VERMICULITE OR A CHEMICAL SPILL PILLOW. SHOVEL SPILL LADEN ABSORBENT, AND STORE IN A SEALABLE WASTE CONTAINER TO PREVENT EVAPORATION, UNTIL DISPOSAL. DO NOT WASH SPILL INTO SEWER OR CONTAMINATE SOIL, GROUND WATER, OR SURFACE WATER.

WASTE DISPOSAL METHOD: INCINERATION IN AN EPA APPROVED INCINERATOR EQUIPPED WITH AFTERBURNER AND STACK GAS SCRUBBER; OR CONSULT AN EXPERT ON WASTE DISPOSAL AND ENSURE COMPLIANCE WITH LOCAL DISPOSAL REGULATIONS.

FOLLOW ALL LOCAL, STATE AND FEDERAL REGULATIONS.

--------------SPECIAL PROTECTION INFORMATION--------------
RESPIRATORY PROTECTION: POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS WITH FULL COVERAGE FACEMASK; CANISTER TYPE MASK (WITH CANISTER SUITABLE FOR ORGANIC VAPOR) AND FULL COVERAGE FACEMASK TO BE USED ONLY FOR ESCAPE FROM SPILL AREA, OR FOR VERY SMALL SPILLS.

VENTILATION: LABORATORY FUME HOOD OR LOCAL EXHAUST

PROTECTIVE GLOVES: VITON, POLYCHLOROPRENE RUBBER, NEOPRENE, NITRILE-RUBBER, RUBBER, POLYVINYLALCOHOL, AND MOST OTHER SOLVENT RESISTANT GLOVES SUITABLE.

EYE PROTECTION: CHEMICAL SAFETY GOGGLES.

OTHER PROTECTIVE EQUIPMENT: EYE WASH BOTTLE OR STATION; EMERGENCY DELUGE SHOWER, IF HANDLING LARGE QUANTITIES OF MATERIAL; CHEMICAL APRON.

---------------SPECIAL PRECAUTIONS---------------

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: KEEP CONTAINER TIGHTLY SEALED WHEN NOT IN USE. USE ONLY IN WELL-VENTILATED AREA (SUCH AS A LABORATORY FUME HOOD).

DO NOT CONTACT SKIN, EYES OR CLOTHING WITH MATERIAL OR BREATHE ANY VAPORS CREATED BY HANDLING OR TRANSFERRING MATERIAL. WASH HANDS THOROUGHLY AFTER HANDLING MATERIAL AND BEFORE EATING OR SMOKING.

STORE MATERIAL AWAY FROM FOOD AND BEVERAGES IN A COOL, DRY LOCATION AWAY FROM EXCESS HEAT, DIRECT SUNLIGHT, OR DAMP OR WET LOCATIONS. EXPOSURE TO LIGHT AND MOISTURE OR MOIST AIR CAN, OVER TIME, CAUSE PHOSGENE FORMATION, WHICH IS ACCELERATED BY HEAT AND LIGHT.

SHELF LIFE: INDEFINITE IF STORED IN TIGHTLY SEALED CONTAINER AWAY FROM HEAT, DIRECT SUNLIGHT, ATMOSPHERIC MOISTURE, AND OXYGEN. DO NOT STORE IN DAMP OR WET LOCATIONS. REFRIGERATION IS ADVANTAGEOUS, BUT NOT A NECESSITY.

ALL OF THE PHYSIOLOGICAL AND TOXICOLOGICAL HAZARDS OF THIS MATERIAL MAY NOT BE FULLY KNOWN. HANDLE WITH DUE RESPECT, MINIMIZING AS MUCH AS POSSIBLE ANY BODILY CONTACT WITH THE MATERIAL.

---------------NOTICE---------------

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT, BUT IT SHOULD NOT BE ASSUMED THAT IT IS ALL INCLUSIVE, AND IT SHALL BE USED ONLY AS A GUIDE.

THE ABOVE PRODUCT IS INTENDED ONLY FOR LABORATORY USE BY TRAINED LABORATORY PERSONNEL, AND IS NOT INTENDED FOR FOOD, DRUG, OR HOUSEHOLD USE. NORELL, INC. SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT.