MSDS Number: **D6408** * * * * * *Effective Date:* ***09/16/09*** * * * * * *Supercedes:* ***08/02/07***

MSDS **Material Safety Data Sheet**

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: **Mallinckrodt Baker, Inc.**
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

N, N-DIMETHYLFORMAMIDE

1. Product Identification

Synonyms: DMF; Dimethylformamide; Formyldimethylamine; Formamide, N,N-Dimethyl-
CAS No.: 68-12-2
Molecular Weight: 73.09
Chemical Formula: HCON(CH3)2
Product Codes:
J.T. Baker: 9213, 9220, 9221, 9222, 9223, 9344, J766
Mallinckrodt: 4906, 4921, 4929, 5356, V265

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Dimethylformamide	68-12-2	98 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. TOXIC TO THE LIVER. AFFECTS THE KIDNEYS, CARDIOVASCULAR SYSTEM AND CENTRAL NERVOUS SYSTEM. CAUSES ALCOHOL INTOLERANCE AND SKIN PROBLEMS. FLAMMABLE LIQUID AND VAPOR.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 2 - Moderate
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Causes irritation to respiratory tract. Symptoms may include coughing, shortness of breath. Causes liver, kidney, cardiovascular system and central nervous system disorders. May cause abdominal pain, loss of appetite, nausea, weakness, dizziness, headache, constipation, vomiting, diarrhea, increased blood pressure anxiety, and palpitations. A flushing of the face and skin may occur, especially with coincident ingestion of alcoholic beverages.
Ingestion:
Causes irritation to the gastrointestinal tract. Symptoms parallel inhalation. Fatal dose estimated at 10 gm.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching and pain. Can cause skin problems. Absorption through the skin can readily occur, resulting in symptoms paralleling inhalation.
Eye Contact:
Causes irritation, redness, and pain. May cause severe irritation and blurred vision.
Chronic Exposure:
Repeated skin contact may cause dermatitis. Repeated or prolonged exposure to

vapors may cause damage to the liver and kidney.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, gastric troubles or impaired kidney, liver, or cardiovascular function may be more susceptible to the effects of this substance. Affects alcohol intolerance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention.

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5. Fire Fighting Measures

Fire:
Flash point: 58C (136F) CC
Autoignition temperature: 445C (833F)
Flammable limits in air % by volume:
lel: 2.2; uel: 15.2
Flammable Liquid and Vapor!
Explosion:
Above the flash point, explosive vapor-air mixtures may be formed. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated. Contact with strong oxidizers may cause fire. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, alcohol foam or carbon dioxide.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water spray may be used to extinguish surrounding fire and cool exposed containers. Water spray will also reduce fume and irritant gases.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
N,N,-Dimethylformamide:
-OSHA Permissible Exposure Limit (PEL):
10 ppm (TWA) skin
-ACGIH Threshold Limit Value (TLV):
10 ppm (TWA) skin, Group A4: not classifiable as a human carcinogen.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee

exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Other Control Measures:
Provide clean work clothes daily to workers who regularly use this material. Direct workers to shower before changing into street clothes.

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9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Fishy, pungent.

Solubility:
Completely miscible with water.

Specific Gravity:
0.949 @ 20C (68F).

pH:
6.7

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
153C (307F)

Melting Point:
-61C (-78F)

Vapor Density (Air=1):
2.5

Vapor Pressure (mm Hg):
2.7 @ 20C (68F)

Evaporation Rate (BuAc=1):
0.17

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
May form ammonia, carbon oxides, amines, and nitrogen oxides when heated to decomposition. Above 350C (662F), DMF begins to degrade with formation of dimethylamine and carbon monoxide.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Bromine, carbon tetrachloride, chromic anhydride, 2,5-dimethylpyrrole, phosphorus oxychloride, hexachlorobenzene, magnesium nitrate, methylene diisocyanate, phosphorus trioxide, triethyl aluminum, organic nitrates, acidic and alkaline materials, and other halogenated compounds. Contact with iron or strong oxidizers may cause fires and explosions; may react violently with alkyl aluminums. Methylene diisocyanate can polymerize violently on contact with DMF.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

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11. Toxicological Information

Oral rat LD50: 2,800 mg/kg. skin rabbit LD50: 4720 mg/kg. Investigated as a tumorigen, mutagen, reproductive effector.

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  --------\Cancer Lists\-----------------------------------------------------
-
                                          ---NTP Carcinogen---
  Ingredient                              Known    Anticipated    IARC
Category
  ------------------------------------   -----    -----------    ------------
-
  Dimethylformamide (68-12-2)             No          No              3
```

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12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into water, this material is expected to readily biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals.

Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l.

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13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

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14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, N,N-DIMETHYLFORMAMIDE
Hazard Class: 3
UN/NA: UN2265
Packing Group: III
Information reported for product/size: 430LB

International (Water, I.M.O.)

Proper Shipping Name: N,N-DIMETHYLFORMAMIDE
Hazard Class: 3
UN/NA: UN2265
Packing Group: III
Information reported for product/size: 430LB

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15. Regulatory Information

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  --------\Chemical Inventory Status - Part 1\--------------------------------
--
  Ingredient                                          TSCA  EC   Japan
Australia
  ------------------------------------------------  ----  ---  -----  --------
-
  Dimethylformamide (68-12-2)                        Yes  Yes   Yes      Yes

  --------\Chemical Inventory Status - Part 2\--------------------------------
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                                                          --Canada--
  Ingredient                                        Korea  DSL   NDSL  Phil.
  ----------------------------------------------  -----  ---   ----  -----
  Dimethylformamide (68-12-2)                      Yes   Yes   No     Yes

  --------\Federal, State & International Regulations - Part 1\--------------
--
                                              -SARA 302-    ------SARA 313----
--
  Ingredient                                  RQ    TPQ     List  Chemical
Catg.
  ----------------------------------------  ---   -----   ----  ------------
--
  Dimethylformamide (68-12-2)                 No    No      Yes        No

  --------\Federal, State & International Regulations - Part 2\--------------
--
                                                            -RCRA-    -TSCA-
  Ingredient                                  CERCLA     261.33     8(d)
  ----------------------------------------  ------     ------    ------
  Dimethylformamide (68-12-2)                 100        No         No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
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Australian Hazchem Code: 2P
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **2** Flammability: **2** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. TOXIC TO THE LIVER. AFFECTS THE KIDNEYS, CARDIOVASCULAR SYSTEM AND CENTRAL NERVOUS SYSTEM. CAUSES ALCOHOL INTOLERANCE AND SKIN PROBLEMS. FLAMMABLE LIQUID AND VAPOR.
Label Precautions:
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.

Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.

Label First Aid:

If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

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