

## 1. PRODUCT IDENTIFICATION

<u>TRADE NAME (AS LABELED):</u>	<b>Dimethylformamide (DMF)</b>
<u>CHEMICAL NAME/CLASS/SYNONYMS:</u>	amide / N,N-Dimethylformamide
<u>PRODUCT NUMBER:</u>	DMF
<u>U.N. NUMBER:</u>	UN 2265
<u>U.N. DANGEROUS GOODS CLASS/SUBSIDIARY RISK:</u>	Hazard Class 3 Packing group III
<u>MANUFACTURER'S NAME:</u>	<b>NuGeneration Technologies, LLC</b>
<u>ADDRESS:</u>	100 Professional Center Drive, Rohnert Park, CA 94928 USA
<u>EMERGENCY PHONE:</u>	(800) 424-9300 ( <b>CHEMTREC</b> )
<u>BUSINESS PHONE:</u>	(707) 820-4080 (Product Information)
<u>DATE OF PREPARATION:</u>	October 4, 2009
<u>DATE OF LAST REVISION:</u>	New

## 2. COMPOSITION and INFORMATION ON INGREDIENTS

Hazardous Ingredients:	CAS #	EC #	ICSC #	WT %	Hazard Symbol; Risk Phrases
Dimethylformamide (DMF)	68-12-2	200-679-5		100%	HAZARD CLASSIFICATION: T RISK PHRASES: R20-21, R36, R60

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR, EU Directives and the Japanese Industrial Standard *JIS Z 7250: 2000*.

See Section 3 for full text of Risk Phrases and Safety Phrases

## 3. HAZARD IDENTIFICATION

**EU LABELING AND CLASSIFICATION:** This product meets the definition of the following hazard class as defined by the European Economic Community Guidelines.

**EU CLASSIFICATION:** Toxic (T)

**EU RISK PHRASES:** R 20/21 – Also harmful by inhalation and in contact with skin, R36 – Irritating to eyes, R60 – may cause harm to unborn child.

**EU SAFETY PHRASES:** S24 – Avoid contact with skin, S36 – Wear suitable protective clothing, S37 – Wear suitable gloves.



**EMERGENCY OVERVIEW: WARNING! COMBUSTIBLE LIQUID. TOXIC IF ABSORBED THROUGH SKIN.**

**CONTAINS MATERIAL WHICH MAY CAUSE KIDNEY DAMAGE BASED ON ANIMAL DATA. CONTAINS MATERIAL WHICH CAN CAUSE LIVER DAMAGE. CONTAINS MATERIAL WHICH MAY CAUSE CARDIAC OR CARDIOVASCULAR DAMAGE BASED ON ANIMAL DATA. CONTAINS MATERIAL THAT MAY ADVERSELY AFFECT THE DEVELOPING FETUS BASED ON ANIMAL DATA.**

**Use with local exhaust ventilation. Wear a NIOSH-certified (or equivalent) organic vapor/particulate respirator.**

**Wear NIOSH-certified chemical goggles. Wear protective clothing.**

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**SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE:** Routes of entry for solids and liquids include eye and skin contact, ingestion and inhalation. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquefied gases

**INHALATION:** Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath.

**CONTACT WITH SKIN or EYES:** Prolonged or repeated skin contact may cause irritation. Contact with eyes may cause inflammation and redness.

**INGESTION:** Harmful if swallowed.



**HEALTH EFFECTS OR RISKS FROM EXPOSURE:**

**ACUTE:** Contact with skin or eyes may cause burning and irritation. Inhalation will cause respiratory irritation.

**CHRONIC:** Repeated or prolonged exposure to this product can produce target organs damage. Chronic exposure can cause liver damage. Material is a possible carcinogen.

**TARGET ORGANS: Acute:** Skin, eyes, cardiac and respiratory system.

**Chronic:** Skin, eyes and target organs.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM			
<b>HEALTH HAZARD</b>		(BLUE)	2
<b>FLAMMABILITY HAZARD</b>		(RED)	2
<b>PHYSICAL HAZARD</b>		(YELLOW)	0
PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		SEE SECTION 8
For Routine Industrial Use and Handling Applications			

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate  
3 = Serious 4 = Severe \* = Chronic hazard

## 4. FIRST-AID MEASURES

Contaminated individuals of chemical exposure must be taken for medical attention if any adverse effect occurs. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to health professional with contaminated individual.

**SKIN EXPOSURE:** Wash affected areas thoroughly with soap and water. Immediate medical attention required.

**EYE EXPOSURE:** In case of contact with the eyes, rinse immediately for at least 15 minutes with plenty of water. Immediate medical attention required.

**INHALATION:** remove contaminated individual to fresh air. If breathing is difficult, give oxygen. Seek medical attention.

**INGESTION:** Rinse mouth and then drink plenty of water. Never induce vomiting or give anything by mouth if the victim is unconscious or having convulsions. Immediate medical attention required.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** Skin and respiratory disorders, as well as conditions involving the "Target Organs" (see Section 3, Hazard Identification) may be aggravated by prolonged overexposures to this product.

**RECOMMENDATIONS TO PHYSICIANS:** Treat symptoms and eliminate overexposure.

## 5. FIRE-FIGHTING MEASURES

**FLASH POINT:** 58 C (136 F)

**AUTOIGNITION TEMPERATURE:** 410 C (770 F)

**FLAMMABLE LIMITS (in air by volume, %):** 2.2 LEL, 16.0 UEL

**FIRE EXTINGUISHING MATERIALS:** Use fire extinguishing materials appropriate for surrounding fire.

Water Spray: Yes

Foam: Yes

Halon: Yes

Carbon Dioxide: Yes

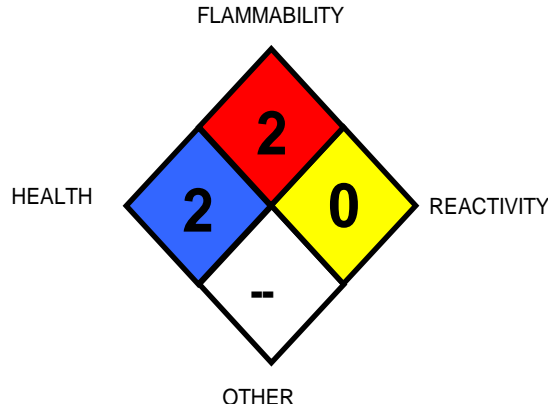
Dry Chemical: Yes

Other: Any "C" Class

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** No data.

**SPECIAL FIRE-FIGHTING PROCEDURES:** Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Isolate materials not yet involved in the fire and protect personnel. Move containers from fire area if this can be done without risk; otherwise, cool with carefully applied water spray. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

## NFPA RATING



## 6. ACCIDENTAL RELEASE MEASURES

**SPILL AND LEAK RESPONSE:** Uncontrolled releases should be responded to by appropriately trained personnel using pre-planned procedures. Proper protective equipment should be used.

Remove all sources of ignition. Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate protective equipment as specified in section 8.

**Spills** Pick up and place in suitable container for reclamation or disposal, using a method that does not generate dust. U.S. Regulations (CERCLA) requires porting spills and releases o soil, water and air in excess of reportable quantities. Prevent entry into sewers, basements or confined areas, dike if needed. Dispose of in accordance with U.S. Federal, State, and local hazardous waste disposal regulations; those of Canada and its Provinces, those of Australia, Japan and EU Member States (see Section 13, Disposal Considerations).

## 7. HANDLING and STORAGE

**WORK PRACTICES AND HYGIENE PRACTICES:** As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing dusts generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

**STORAGE AND HANDLING PRACTICES:** All employees who handle this material should be trained to handle it safely. Avoid contact with eyes, skin, and clothing. Empty drums should be completely drained (triple rinsed), properly bunged, and promptly returned to a drum reconditioner, or disposed of properly. Open containers slowly on a stable surface. Containers of this product must be properly labeled. Storage areas of this product should be clearly identified, well-illuminated, clear of obstruction and accessible only to trained and authorized personnel. Store containers in a cool, dry location away from direct sunlight at temperatures between 39°F - 120°F. Keep product from freezing. Keep container tightly closed when not in use. Observe all warnings and precautions listed for this product.



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## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

**VENTILATION AND ENGINEERING CONTROLS:** Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below. Use a chemical fume hood or local exhaust ventilation, and process enclosure if necessary, to control airborne dust. Ensure eyewash/safety shower stations are available near areas where this product is used.

### EXPOSURE LIMITS/GUIDELINES:

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR									
		ACGIH-TLVs		OSHA-PELs		NIOSH-RELS		NIOSH	AIHA WEELS		OTHER
		TWA ppm	STEL ppm	TWA ppm	STEL ppm	TWA ppm	STEL ppm	IDLH ppm	TWA ppm	STEL ppm	ppm
DMF	68-12-2	10	NE	10	30	N.E	NE	NE	N.E.	N.E	

NE = Not Established.

NIC = Notice of Intended Change

See Section 16 for Definitions of Terms Used.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent standard of Canada, or standards of EU member states (including EN 149 for respiratory PPE, and EN 166 for face/eye protection), and those of Japan. Please reference applicable regulations and standards for relevant details.

**RESPIRATORY PROTECTION:** Maintain airborne contaminant concentrations below guidelines listed above, if applicable. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-93, the European Standard EN149, or EU member states. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under U.S. Federal OSHA's Respiratory Protection Standard (1910.134-1998) or the regulations of various U.S. States, Canada, EU Member States, or those of Japan. Air-purifying respirators with dust/mist/fume filters are recommended if operations may produce mists or sprays from this product.

**EYE PROTECTION:** Safety goggles. If necessary, refer to U.S. OSHA 29 CFR 1910.133, Canadian Standards, and the European Standard EN166, Australian Standards, or relevant Japanese Standards. Maintain eye wash fountain and quick drench facilities in the work area.

**HAND PROTECTION:** Use chemically-resistant gloves when handling this product. If necessary, refer to U.S. OSHA 29 CFR 1910.138, the European Standard DIN EN 374, the appropriate Standards of Canada, Australian Standards, or relevant Japanese Standards.

**BODY PROTECTION:** Use body protection appropriate for task (e.g. lab coat, overalls). If necessary, refer to appropriate Standards of Canada, or appropriate Standards of the EU, Australian Standards, or relevant Japanese Standards. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136.

## 9. PHYSICAL and CHEMICAL PROPERTIES

**BULK DENSITY:** 7.9 lbs/gallon

**SPECIFIC GRAVITY @ 20°C:** 0.94 (water=1)

**SOLUBILITY IN WATER:** Soluble in 11 parts water

**VAPOR PRESSURE, hPa @ 20°C (68°F):** 3.77

**ODOR:** amine like

**APPEARANCE and COLOR:** Liquid

**EVAPORATION RATE (n-BuAc=1):** No Data

**MELTING POINT:** -61°C (-78F)

**BOILING POINT:** 152° C (306F)

**pH:** 7 (200g/L)

## 10. STABILITY and REACTIVITY

**STABILITY:** Stable under normal conditions.

**DECOMPOSITION PRODUCTS:** May emit oxides of carbon and nitrogen when heated to decomposition.

**MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:** nitrates, strong oxidizing agents.

**HAZARDOUS POLYMERIZATION:** Not know to occur.

**CONDITIONS TO AVOID:** Reacts with strong oxidizing agents. Reacts with halogenated compounds.

## 11. TOXICOLOGICAL INFORMATION

**TOXICITY DATA:** Together with nitrosating agents (f. i. nitrites, nitrogen oxides) nitrosamines may be formed under certain conditions. Nitrosamines showed a carcinogenic effect in animal experiment. Dimethylformamide is easily absorbed through the skin and can increase the toxicity of other chemicals.

### Oral:

Type of value: LD50  
Species: rat (male/female)  
Value: 3,040 mg/kg (BASF-Test)

### Inhalation:

Type of value: LC50  
Species: rat (male/female)  
Value: > 5.9 mg/l (BASF-Test)  
Exposition time: 4 h  
Species: rat  
Value: (IRT)  
Exposition time: 7 h  
No Mortality within the stated exposition time as shown in animal studies, however, deaths occurred after longer exposure.

### Dermal:

Type of value: LD50  
Species: rat (male/female)  
Value: > 3,160 mg/kg  
The European Union (EU) has classified this substance as 'harmful'.

### Irritation / corrosion

#### Skin:

Species: rabbit  
Result: non-irritant  
Method: BASF-Test

#### Eye:

Species: rabbit  
Result: Irritant.  
Method: BASF-Test



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### **Sensitization:**

Mouse Local Lymph Node Assay (LLNA)

Species: mouse

Result: Non-sensitizing.

Guinea pig maximization test

Species: guinea pig

Result: Non-sensitizing.

## 12. ECOLOGICAL INFORMATION

### **Fish**

Acute:

other Flow through.

Lepomis macrochirus/LC50 (96 h): 7,100 mg/l

Literature data.

### **Aquatic invertebrates**

Acute:

Directive 79/831/EEC static

Daphnia magna/EC50 (48 h): > 100 mg/l

Nominal values (confirmed by concentration control analytics)

### **Aquatic plants**

Toxicity to aquatic plants:

DIN 38412 Part 9 green algae/EC50 (72 h): > 1,000 mg/l

Nominal concentration.

### **Degradability / Persistence**

#### **Biological / Abiological Degradation**

Test method: OECD 301E/92/69/EEC, C.4-B (aerobic), municipal sewage treatment plant effl.

Method of analysis: DOC reduction

Degree of elimination: 100 % (21 d)

Evaluation: Readily biodegradable (according to OECD criteria).

Readily biodegradable (according to OECD criteria).

### **Bioaccumulation**

OECD Guideline 305 C

carp (56 d) Bioconcentration factor 0.3 - 1.2

Accumulation in organisms is not to be expected.

### **Other adverse effects:**

Do not release untreated into natural waters.

## 13. DISPOSAL CONSIDERATIONS

### **Waste disposal of substance:**

Must be dumped or incinerated in accordance with local regulations. Incinerate or dispose of in a RCRA-licensed facility. Do not discharge into waterways or sewer systems without proper authorization.

### **Container disposal:**

Empty containers with less than 1 inch of residue may be land filled at a licensed facility. Recommend crushing, puncturing or other means to prevent unauthorized use of used containers. If containers are not empty, they



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must be disposed of in a RCRA-licensed facility.

RCRA: D001

## 14. TRANSPORTATION INFORMATION

US DOT, IATA, IMO, ADR:

PROPER SHIPPING NAME: N,N-DIMETHYLFORMAMIDE  
HAZARD CLASS NUMBER: 3  
UN IDENTIFICATION NUMBER: UN2265 PACKING GROUP: III  
DOT LABEL(S) REQUIRED: Dangerous Goods



NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER, 2004: --

MARINE POLLUTANT: This product is not designated as a marine pollutant by the Department of Transportation (49 CFR 172.101, Appendix B).

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA): This product is considered as dangerous goods.

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO): This product is considered as dangerous goods.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This product is considered by the United Nations Economic Commission for Europe to be dangerous goods.

## 15. REGULATORY INFORMATION

### ADDITIONAL UNITED STATES REGULATIONS:

**U.S. SARA REPORTING REQUIREMENTS:** The components of this product are subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act, and are listed as follows:

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
DMF	NO	NO	YES

### ADDITIONAL UNITED STATES REGULATIONS (continued):

**U.S. SARA THRESHOLD PLANNING QUANTITY:** There are no specific Threshold Planning Quantities for the components of this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lbs (4,540 kg) therefore applies, per 40 CFR 370.20.

**U.S. CERCLA REPORTABLE QUANTITY (RQ):** 100

**U.S. TSCA INVENTORY STATUS:** The components of this product are listed on the TSCA Inventory.

**OTHER U.S. FEDERAL REGULATIONS:** Not applicable.

**CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65):** This product is NOT on the Proposition 65 Lists.

### ADDITIONAL CANADIAN REGULATIONS:

**CANADIAN DSL/NDSL INVENTORY STATUS:** The components of this product are on the DSL or NDSL Inventories

**CANADIAN WHMIS CLASSIFICATION and SYMBOLS:** B3, D2A, D2B



## EUROPEAN ECONOMIC COMMUNITY INFORMATION:

**EU CLASSIFICATION:** Toxic (T)

**EU RISK PHRASES:** R 20/21 – Also harmful by inhalation and in contact with skin, R36 – Irritating to eyes, R60 – may cause harm to unborn child.

**EU SAFETY PHRASES:** S24 – Avoid contact with skin, S36 – Wear suitable protective clothing, S37 – Wear suitable gloves.



**EUROPEAN ECONOMIC COMMUNITY INFORMATION FOR CONSTITUENTS:** The following information is available for the components of this product. **DMF:** EU EINECS/ELINCS NUMBER: 200-679-5

## **AUSTRALIAN INFORMATION FOR PRODUCT:**

**AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS:** The components of this product are listed on the AICS.

**HAZARDOUS SUBSTANCES INFORMATION SYSTEM:** DMF is listed by the Hazardous Substances Information System as a Hazardous Substance.

**STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS:** Not applicable.

**LABELING AND CLASSIFICATION:** The product is regulated, based a review of the regulation [NOHSC: 10005 (1994-Current)]:

## **JAPANESE INFORMATION FOR PRODUCT:**

**JAPANESE MINISTER OF INTERNATIONAL TRADE AND INDUSTRY (MITI) STATUS:** The components of this product are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese MITI.

**JAPANESE ENCS INVENTORY:** The components of this product are on the ENCS Inventory as indicated in the section on International Chemical Inventories, below.

**POISONOUS AND DELETERIOUS SUBSTANCES CONTROL LAW:** No component of this product is a listed Specified Poisonous Substance under the Poisonous and Deleterious Substances Control Law.

## **INTERNATIONAL CHEMICAL INVENTORIES:**

Listing of the components on individual country Chemical Inventories is as follows:

DMF is listed on the following inventories:

Asia-Pac: Listed

Australian Inventory of Chemical Substances (AICS): Listed

Korean Existing Chemicals List (ECL): Listed

Japanese Existing National Inventory of Chemical Substances (ENCS): Listed

Philippines Inventory of Chemicals and Chemical Substances (PICCS): Listed

Swiss Giftlist List of Toxic Substances: Listed

U.S. TSCA: Listed

## 16. OTHER INFORMATION

**PREPARED BY:** Donato Polignone

MSDS Authoring Services

**DATE:** August 19, 2009

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**End of MSDS**