HEXION™

Material Safety Data Sheet

FOR INDUSTRIAL USE ONLY

Hexamine-Free Flow

Revision Date 16-APR-2012

1. Product and company identification

Product name	Hexamine-Free Flow
MSDS Number	000000109231
Product Type	Hexamethylenetetramine
Product use	Additive
Manufacturer, **Importer**, **Supplier**	Hexion Inc. 180 East Broad Street Columbus OH 43215 4information@momentive.com
Print date	22-JAN-2015
Telephone	**For Emergency Medical Assistance** Call Health & Safety Information Services, 1-866-303-6949 **For Emergency Transportation Information** CHEMTREC US Domestic (800) 424-9300 CHEMTREC International (703) 527-3887 CANUTEC CA Domestic (613) 996-6666 For additional health and safety or regulatory information, call 1 888 443 9466 .

2. Hazards identification

OSHA/HCS status	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Emergency overview	DANGER ! FLAMMABLE SOLID. COMBUSTIBLE DUST WHEN FINELY DIVIDED AND SUSPENDED IN AIR. FINE DUST CLOUDS MAY FORM EXPLOSIVE MIXTURES. PRODUCT CAN EXPLODE IF DUST CLOUD IS FORMED AND IGNITED. MINIMIZE AIRBORNE DUST. PREVENT DUST ACCUMULATION. ELIMINATE ALL FIRE/IGNITION SOURCES INCLUDING STATIC DISCHARES NEAR PRODUCT/PACKAGE. REFER TO HANDLING SECTION 7 OF THE MSDS FOR MORE INFORMATION. CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION. MAY CAUSE ALLERGIC RESPIRATORY AND SKIN REACTION.

Potential acute health effects

Inhalation	Irritating to respiratory system. May cause sensitization by inhalation. Exposure to decomposition products may cause a health hazard. Serious

effects may be delayed following exposure.

Ingestion Not expected to be harmful under normal conditions of use.

Skin Irritating to skin. May cause sensitization by skin contact.

Eyes Irritating to eyes.

Potential chronic health effects

Chronic effects Contains material that can cause target organ damage. Can cause fibrotic lung disease.

Inhalation of silica dust may cause delayed lung injury or lung fibrosis (including silicosis and/or pneumoconiosis) and/or other diseases which may lead to permanent disability and/or death. Silicosis is a form of disabling pulmonary fibrosis which can be progressive. Prolonged exposure to respirable silica may cause diminished lung capacity with shortness of breath during physical exertion and may cause fatigue, breathlessness, wheezing, cough, and sputum production. Preexisting respiratory disorders may be aggravated by exposure. Smoking may aggravate the effects of exposure and may increase the risk of developing respiratory disease from exposure. Consult with your employer and your doctor for further information or if you believe you may be developing any breathing or lung problems. There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by fibrosis of the lungs, skin and other internal organs) and kidney disease. Silicosis is also reported to increase the risk of tuberculosis. Some studies show an increased incidence in chronic bronchitis and emphysema in workers exposed to respirable crystalline silica.

Carcinogenicity No known significant effects or critical hazards.

Mutagenicity No known significant effects or critical hazards.

Teratogenicity No known significant effects or critical hazards.

Developmental effects No known significant effects or critical hazards.

Fertility effects No known significant effects or critical hazards.

Target organs Contains material which causes damage to the following organs: kidneys, lungs, immune system, eye, lens or cornea Review Section 2 and 11 for any additional assessments.

Over-exposure signs/symptoms

Inhalation Adverse symptoms may include the following: respiratory tract irritation, coughing, wheezing and breathing difficulties, asthma,

Ingestion No specific data.

Skin Adverse symptoms may include the following: irritation, redness,

Eyes Adverse symptoms may include the following: pain or irritation, watering, redness,

Medical conditions aggravated by over-exposure Pre-existing respiratory and skin disorders and disorders involving any other target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See section 11 for more detailed information on health effects and symptoms.

3. Composition/Information on ingredients

Ingredient name	CAS number	WT %
Hexamethylenetetramine	100-97-0	**70.0 - 100.0**
Silica	7631-86-9	**1.0 - 5.0**

*** Any applicable Canadian trade secret numbers will be listed in Section 15.*

4. First aid measures

Eye contact

Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention.

Skin contact

Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Inhalation

Move exposed person to fresh air. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. Keep person warm and at rest. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours. In the event of any complaints or symptoms, avoid further exposure.

Ingestion

Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Protection of first aid personnel

No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

Notes to physician

In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

See section 11 for more detailed information on health effects and symptoms.

5. Fire-fighting measures

Flammability of the product

Flammable solid. Fine dust clouds may form explosive mixtures with air. Runoff to sewer may create fire or explosion hazard. Combustible solid that burns. Eliminate all fire/ignition sources including static discharges

near product/package. Keep away from heat, hot surfaces, sparks, and flame.

Extinguishing media

Suitable Use dry chemical, CO2, water spray (fog) or foam.

Not suitable Do not use water jet.

Special exposure hazards Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Hazardous combustion products Decomposition products may include the following materials: carbon oxides, nitrogen oxides, metal oxide/oxides, ammonia formaldehyde, hydrogen cyanide

Special protective equipment for fire-fighters Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Special Remarks on Explosion Hazards Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidizing medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions). The ATEX Directive defines combustible powders as less than 500 microns in diameter. When processed with flammable liquids/vapors/mists, ignitable (hybrid) mixtures may be formed with combustible dusts. Ignitable mixtures will increase the rate of explosion pressure rise and the MIE will be lower than the pure dust in air mixture. The Lower Explosive Limit (LEL) of the vapor/dust mixture will be lower than the individual LELs for the vapors/mists or dusts. See NFPA 77 for additional guidance.

6. Accidental release measures

Minimize airborne dust and eliminate all fire/ignition sources. Do not use air hoses for cleaning. Minimize dry sweeping to avoid generation of dust clouds. Vacuum dust-accumulating surfaces and remove to a chemical disposal area. Vacuums with explosion-proof motors should be used.

Personal precautions No action shall be taken involving any personal risk or without suitable training. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).

Environmental precautions Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Large spill Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Vacuum material and place in a designated, labelled waste container. Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Small spill Move containers from spill area. Vacuum material and place in a

designated, labelled waste container. Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor.

7. Handling and storage

Handling

Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Persons with a history of skin sensitization problems or asthma, allergies or chronic or recurrent respiratory disease should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Empty containers retain product residue and can be hazardous. Do not reuse container.

COMBUSTIBLE DUST HANDLING PROCEDURES:
Combustible dusts at sufficient concentrations can form explosive mixtures with air. High dust concentrations should be avoided. Follow US NFPA Standard 654, "Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids," UK HSE Guidance HSG 103, approved Codes of Practice (ACOPS) established for Explosive Atmospheres under the ATEX Directive 1999/92/EC for worker protection and ATEX Directive 94/9/EC that regulates equipment and protection systems used in potentially explosive atmospheres or other national guidance on safe handling of combustible dusts. Train workers in the recognition and prevention of hazards associated with combustible dust in the plant.

Minimize airborne dust and eliminate all ignition sources. Keep away from heat, hot surfaces, sparks, and flame. Establish good housekeeping practices. Remove dust accumulations on a regular basis by vacuuming or gentle sweeping to avoid creating dust clouds. Use continuous suction at points of dust generation to capture and minimize the accumulation of dusts. Particular attention should be given to overhead and hidden horizontal surfaces to minimize the probability of a "secondary" explosion. According to NFPA Standard 654, dust layers 1/32 in.(0.8 mm) thick can be sufficient to warrant immediate cleaning of the area.

Control sources of static electricity. This product or the package itself can accumulate static charges, and static discharge can be a source of ignition. Solids handling systems must be designed in accordance with applicable NFPA standards (including 654 and 77) and other national guidance. Do not empty directly into flammable solvents or in the presence of flammable vapors. The operator, the packaging container and all equipment must be grounded with electrical bonding and grounding systems. Plastic bags and plastics cannot be grounded, and antistatic bags do not completely protect against development of static charges.

Storage

Store in accordance with local regulations. Store in a segregated and

approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep away from heat, hot surfaces, sparks and flame. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

8. Exposure controls/personal protection

Ingredient name	**Occupational exposure limits**
Silica	**ACGIH TLV Time Weighted Average (TWA)** 10 mg/m3 **OSHA PEL Time Weighted Average (TWA)** 80 mg/m3

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures Review ASTM E 1132-99, "Standard Practice for Health Requirements Relating to Occupational Exposure to Respirable Crystalline Silica," as well as other guidelines such as NIOSH publications.

Engineering measures Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Hygiene measures Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Respiratory Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Hands Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Eyes Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved

by a specialist before handling this product.

In work areas meeting the criteria in 29 CFR 1910.132, it is recommended that employees wear flame resistant, non-static-generating clothing including safety shoes that are static dissipating. For PPE selection see National Fire Protection Association (NFPA) 2113, Standard on Selection, Care, Use and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire.

Environmental exposure controls

Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9. Physical and chemical properties

Information on basic physical and chemical properties

Appearance		
Physical state	:	Not available
Color	:	Not available
Odor	:	Not available
Odor threshold	:	Not available
pH	:	Not available
Melting Point	:	Approx. 280 °C(536 °F)
Boiling point	:	280 °C (536 °F)
Flash point	:	Approx. 250 °C (482 °F)
Evaporation rate	:	Not available
Flammable limits		
Upper:	:	Not available
Lower:	:	Not available
Vapor pressure	:	Not available
Vapor density	:	Not available
Relative density	:	1.33
Solubility	:	Soluble
Partition coefficient: n-octanol/water	:	Not available
Auto-ignition temperature	:	770 °F (770 °F)
Decomposition temperature	:	Not available
Viscosity	:	Kinematic-Not available Dynamic- Not applicable.
Typical % solids	:	Not available

Other information

***Minimum Explosive Concentration (MEC)**	:	0.015 - 0.030 kg/m3
***Minimum Ignition Energy (MIE)**	:	Less than 3 - 5 mJ
***Minimum Ignition Temperature (MIT)**	:	460 - 530 °C
***Minimum Ignition Temperature - Layer**	:	320 - 330 °C
***Kst**	:	224 - 347 m.b_/s

** These values listed above are only representative values. A resin's characteristics may change depending upon the process and conditions of use at your facility or any changes made to the resin during use, including further grinding or mixing with other products. In order to obtain more specific data for your particular resin as it is used at your facility, we recommend that you conduct your own characterization testing.*

10. Stability and reactivity

Reactivity	Stable under normal conditions.
Stability	The product is stable. Under normal conditions of storage and use, hazardous polymerization will not occur.
Conditions to avoid	Avoid the creation of dust when handling and avoid all possible sources of ignition (spark or flame). Prevent dust accumulation. See Section 7 Handling.
Materials to avoid	Reactive or incompatible with the following materials: oxidizing materials, acids,
Hazardous decomposition products	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

11. Toxicological information

Acute toxicity

Ingredient name				
Hexamethylenetetramine				
	LD50	Oral	Mouse	569 mg/kg
Silica				
	LD50	Oral	Rat	3,160 mg/kg

Other Toxicological Information

Carcinogenicity

Classification

Ingredient name		
Hexamethylenetetramine		
	ACGIH	Not classified
	IARC	Not classified
	NTP	Not listed
	OSHA	Not classified
Silica		
	ACGIH	Not classified.
	IARC	IARC Group 3, not classifiable as to carcinogenicity to humans
	NTP	Not listed
	OSHA	Not classified

Mutagenicity

Conclusion/Summary	**Hexamethylenetetramine:** In an Ames assay (in vitro) using Salmonella typhimurium, this chemical produced a weak dose-response increase in mutations in strain TA100 with metabolic activation and, in strain TA98 with and without metabolic activation. However, it was reported as NOT mutagenic when tested in an Ames assay (in vitro) using Salmonella typhimurium strains TA1535, TA1537 and TA1538 with and without activation.

12. Ecological information

Environmental effects

No known significant effects or critical hazards.

Aquatic ecotoxicity

Ingredient name

Hexamethylenetetramine

Fresh water	Acute LC50 49,800 mg/l/96 h	Fathead minnow
Marine water	Acute LC50 49,000 mg/l/4 d	Sheepshead minnow
Marine water	Acute LC50 > 10,000 mg/l/4 d	Bleak

Other adverse effects

No known significant effects or critical hazards.

13. Disposal considerations

Waste disposal The generation of waste should be avoided or minimized wherever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

14. Transport information

The data provided in this section is for information only and may not be specific to your package size or mode of transport. You will need to apply the appropriate regulations to properly classify your shipment for transportation.

International transport regulations

Regulatory information	UN/NA number	Proper shipping name	Classes/*PG	Reportable Quantity (RQ)
CFR	1328	HEXAMETHYLENETETRAMINE	Class 4.1 III	
TDG	1328	HEXAMETHYLENETETRAMINE	Class 4.1 III	
IMO/IMDG	1328	HEXAMETHYLENETETRAMINE	Class 4.1 III	
IATA (Cargo)	1328	HEXAMETHYLENETETRAMINE	Class 4.1 III	

*PG : Packing group

15. Regulatory information

US regulations

HCS Classification Flammable solid, Irritating material, Sensitizing material, Target organ effects

U.S. Federal regulations **SARA 311/312 Classification** Immediate (acute) health hazard, Delayed (chronic) health hazard, Fire hazard

SARA 313 - Supplier Notification
This product contains the following toxic chemical(s) subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986, and Subpart C-Supplier Notification Requirement of 40 CFR Part 372.
None required.

SARA 302 Extremely Hazardous Substances None required.

State regulations

Massachusetts RTK Substances The following components are listed: Silica,

New Jersey RTK Hazardous Substances The following components are listed: Hexamethylenetetramine, Silica,

Pennsylvania RTK Hazardous Substances The following components are listed: Silica,

California Prop. 65: None required.

Canada

WHMIS (Canada)
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

Canadian lists **Canadian NPRI:** None required.

International regulations

Chemical inventories
Europe inventory All components are listed or exempted.
Philippines inventory (PICCS) All components are listed or exempted.
New Zealand Inventory (NZIoC) Not determined.
Korea inventory (KECI) All components are listed or exempted.
Japan inventory (ISHL) Not determined.
Japan inventory (ENCS) All components are listed or exempted.
China inventory (IECSC) All components are listed or exempted.
Australia inventory (AICS) All components are listed or exempted.
Canada inventory All components are listed or exempted.
United States inventory (TSCA 8b) All components are listed or exempted.

16. Other information

Hazardous Material Information System III (U.S.A.)
Health : 2
Flammability: 3
Physical hazards : 0
Chronic : *

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.
The customer is responsible for determining the PPE code for this material.

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