

HEXAMINE (HEXAMETHYLENETETRAMINE)

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SECTION 1: IDENTIFICATION

1.1 GHS Product identifier:

HEXAMINE
Hexamethylenetetramine; Methenamine; Urotropine; HMTA
CAS: 100-97-0

Other means of identification:

Not relevant

1.2 Recommended use of the chemical and restrictions on use:

Relevant uses: solid fuel tablet manufacture, curing agent/accelerator for phenolic and rubber compounds, chemical intermediate (e.g., for RDX and resin manufacture), corrosion inhibitor component, laboratory reagent. For industrial/commercial user only.
Uses advised against: All uses not specified in this section or in section 7.3.

1.3 Supplier's details:

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1.4 Emergency phone number:

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SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture:

GHS:
Classification of this product has been carried out in accordance with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Flam. Sol. 1	Flammable solid, Category 1, H228
Skin Sens. 1	Skin sensitisation, Category 1, H317

2.2 GHS label elements, including precautionary statements:

GHS: Danger
Hazard statements:
H228 – Flammable solid.
H317 – May cause an allergic skin reaction.

Precautionary statements:

P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P240: Ground/bond container and receiving equipment.
P241: Use explosion-proof electrical/ventilating/lighting equipment.
P264: Wash hands thoroughly after handling.
P272: Contaminated work clothing should not be allowed out of the workplace.
P280: Wear protective gloves/protective clothing.
P302+P352: IF ON SKIN: Wash with plenty of water.
P333+P313: If skin irritation or rash occurs: Get medical advice/attention.
P362+P364: Take off contaminated clothing and wash it before reuse.
P370+P378: In case of fire: Use dry chemical powder, sand, carbon dioxide, or foam to extinguish.
P501: Dispose of the contents/containers in accordance with local regulations.

2.3 Other hazards which do not result in classification:

Decomposes on strong heating or acid hydrolysis to release formaldehyde and ammonia (see sections 5 and 10).

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Substances:

Chemical description: Hexamethylenetetramine (Hexamine)
In accordance with Annex 4.3.3 of the GHS, the product contains:

Identification	Chemical Name / Classification	Concentration
CAS: 100-97-0	Hexamethylenetetramine (Hexamine) — Flam. Sol. 1: H228; Skin Sens. 1: H317 – Danger	≥99% (technical grade)

To obtain more information on the hazards of the substances, consult sections 11, 12 and 16.

3.2 Mixtures:

Non-applicable

SECTION 4: FIRST AID MEASURES

4.1 Description of necessary first-aid measures:

Request medical assistance immediately, showing the SDS of this product.

By inhalation:

Remove the person affected from the area of exposure and provide fresh air. Seek medical attention if discomfort continues.

By skin contact:

Wash affected skin thoroughly with plenty of water and soap. Seek medical attention if an allergic reaction/rash develops (H317).

By eye contact:

Rinse eyes thoroughly with lukewarm water for at least 15 minutes, holding eyelids open. Seek medical attention if irritation persists.

By ingestion/aspiration:

Rinse mouth with water. Do not induce vomiting. Seek medical attention if a large quantity is swallowed or discomfort occurs.

4.2 Most important symptoms/effects, acute and delayed:

Acute and delayed effects are indicated in sections 2 and 11.

4.3 Indication of immediate medical attention and special treatment needed, if necessary:

Not relevant

SECTION 5: FIRE-FIGHTING MEASURES

5.1 Suitable extinguishing media:

Suitable: Dry chemical powder, sand, carbon dioxide, foam. Water spray may be used to cool containers/control fire spread, applied cautiously.

Unsuitable: None known

5.2 Specific hazards arising from the chemical:

Flammable solid (H228); burns readily once ignited. Fine dust may form explosible dust/air mixtures. Combustion and thermal decomposition release irritant/toxic formaldehyde and ammonia/nitrogen oxide fumes.

5.3 Special protective actions for fire-fighters:

Wear self-contained breathing apparatus and full protective clothing due to toxic combustion products (formaldehyde, NOx). Cool fire-exposed containers with water spray from a safe distance.

Additional provisions:

Use water spray to cool fire-exposed containers. Prevent fire-fighting water from entering drains or watercourses. Approach the fire from upwind where possible.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures:

For non-emergency personnel:

Isolate leaks provided there is no additional risk for the people performing this task. Personal protection equipment must be used against potential contact with the spilt product (see section 8). Evacuate the area and keep out those who do not have protection.

For emergency responders:

Wear protective equipment. Keep unprotected persons away. See section 8.

6.2 Environmental precautions:

Prevent product from entering drains, watercourses or soil as good practice.

6.3 Methods and materials for containment and cleaning up:

Sweep or vacuum up dry material avoiding dust generation and keeping away from ignition sources; collect in suitable, labelled containers for disposal or recovery.

6.4 Reference to other sections:

See sections 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling:

A. General precautions for safe use:

Keep away from heat, sparks, open flame and other ignition sources. Avoid generating and inhaling dust. Avoid contact with skin (sensitiser).

B. Technical recommendations for the prevention of fires and explosions:

Bond/ground equipment during transfer of bulk powder. Use explosion-proof electrical equipment where dust clouds may form. Keep separate from oxidising agents and acids.

C. Technical recommendations on general occupational hygiene:

Do not eat, drink or smoke while handling. Wash hands and exposed skin thoroughly after use.

D. Technical recommendations to prevent environmental risks:

Prevent release to drains and watercourses.

7.2 Conditions for safe storage, including any incompatibilities:

A. Specific storage requirements:

Minimum Temp.	5°C
Maximum Temp.	30°C
Maximum time	24 Months

B. General conditions for storage:

Store in a cool, dry, well-ventilated place away from heat/ignition sources, strong oxidising agents and acids (which accelerate decomposition to formaldehyde and ammonia). For additional information see subsection 10.5.

7.3 Specific end use(s):

Except for the instructions already specified, it is not necessary to provide any special recommendation regarding the uses of this product.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters:

No specific occupational exposure limit has been established for this substance under Indian or internationally harmonized OEL lists currently referenced. Apply general dust/mist limits (e.g., 10 mg/m³ total inhalable / 3-5 mg/m³ respirable, as applicable) as good industrial hygiene practice.

8.2 Appropriate engineering controls:

It is recommended to use localized extraction in the work area as a collective protection measure to avoid exceeding occupational exposure limits, in addition to individual protective equipment (PPE) as needed. Consult the manufacturer's information leaflet for storage, use, cleaning and maintenance of PPE.

B. Respiratory protection:

Not normally required with adequate ventilation. Use a particulate filter respirator (FFP2/P2) where dust levels are elevated.

C. Specific protection for the hands:

Chemical-resistant gloves (nitrile or PVC) recommended given the skin-sensitisation hazard (H317).

D. Eye and face protection:

Safety goggles or glasses with side shields.

E. Bodily protection:

Standard chemical-resistant work clothing; anti-static clothing recommended where combustible dust may be present.

F. Additional emergency measures:

Emergency shower (ANSI Z358-1, ISO 3864-1:2011, ISO 3864-4:2011) and eyewash stations (DIN 12 899, ISO 3864-1:2011, ISO 3864-4:2011) should be available.

Environmental exposure controls:

Avoid environmental spillage of both the product and its container. See subsection 7.1.D.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties:

Appearance	
Physical state at 20°C	Solid (crystalline powder)

Appearance	White crystalline powder
Color	White
Odor	Odourless (faint amine-like odour possible)
Odour threshold	Not established
Volatility	
Boiling point at atmospheric pressure	Sublimes/decomposes at ~263°C (no true boiling point)
Vapour pressure at 20°C	Negligible
Evaporation rate at 20°C	Not relevant (solid)
Product Description	
Density / Relative density at 20°C	1.33 g/cm³ (literature)
Dynamic / Kinematic viscosity	Not applicable (solid)
Concentration	See section 3
pH	~8–9 (weakly alkaline aqueous solution; literature)
Vapour density at 20°C	Not relevant (solid)
Partition coefficient n-octanol/water 20°C	log Pow ~ –0.6 (literature)
Solubility in water at 20°C	Freely soluble, >800 g/L (literature)
Decomposition temperature	~263°C (sublimes with decomposition)
Melting point/freezing point	Sublimes rather than melting at atmospheric pressure
Flammability	
Flash Point	Non-applicable (solid); ignites readily as a combustible solid
Flammability (solid, gas)	Flammable solid, Category 1 (H228); burns rapidly once ignited
Autoignition temperature	~410°C (literature)
Lower / Upper flammability limit	Not relevant (solid, not gas/vapor); dust may form explosible mixtures with air
Particle Characteristics	
Median equivalent diameter	Available on request (grade dependent)

** Not relevant due to the nature of the product, not providing information on the properties of its hazards.*

9.2 Other information:

Explosive properties	Not classified as explosive; combustible dust may present a dust-explosion hazard under specific conditions
Oxidising properties	Non-oxidising
Corrosive to metals	Not corrosive
Heat of combustion	~30 kJ/g (literature)
Surface tension at 20°C	Not relevant (solid)
Refraction index	Not relevant (solid)

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity:
Stable under normal conditions of storage and use. Hydrolyses in the presence of acids (including on prolonged contact with moisture/dilute acid) to release formaldehyde and ammonia.

10.2 Chemical stability:
Chemically stable under recommended dry storage conditions away from heat and acids.

10.3 Possibility of hazardous reactions:
Reacts with strong oxidising agents (fire/explosion risk) and with acids (releases formaldehyde and ammonia). Combustible dust may form explosible mixtures with air under specific conditions.

10.4 Conditions to avoid:

Shock/Friction	Contact with Air	Increase in Temperature	Sunlight	Humidity
Dust may be ignitable by friction/impact under specific conditions	Combustible dust hazard	Ignites readily; flammable solid	Stable	Slowly hydrolyses with prolonged moisture contact

10.5 Incompatible materials:

Strong Oxidising Agents	Acids	Ignition Sources
Avoid contact (fire/explosion risk)	Releases formaldehyde/ammonia; avoid contact	Keep away

10.6 Hazardous decomposition products:
Formaldehyde and ammonia (on acid hydrolysis or strong heating); nitrogen oxides and carbon oxides on combustion.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects:
In case of exposure that is repetitive, prolonged, or at concentrations higher than the recommended occupational exposure limits, adverse health effects may result depending on the means of exposure:

A. Ingestion (acute effect):
Low acute oral toxicity; large doses may cause gastrointestinal discomfort; hydrolysis in the acidic stomach environment can release some formaldehyde.

B. Inhalation (acute effect):
Dust may cause irritation of the nose, throat and respiratory tract; combustion/decomposition fumes (formaldehyde, ammonia) are irritating and toxic.

C. Contact with skin and eyes (acute effect):
May cause an allergic skin reaction (H317, sensitiser); may cause mild eye irritation.

D. CMR effects (carcinogenicity, mutagenicity, reproductive toxicity):
Classification criteria for carcinogenicity, mutagenicity and reproductive toxicity are not met for hexamine itself based on available data; note that formaldehyde, a decomposition product, is classified by IARC as a Group 1 human carcinogen – this applies to the decomposition product, not to hexamine as supplied.

E. Sensitizing effects:
Classified as a skin sensitiser, Category 1 (H317), based on available data.

F. Specific target organ toxicity (STOT) – single exposure:
Classification criteria are not met for the substance itself based on available data; combustion/decomposition fumes are respiratory irritants (see above).

G. Specific target organ toxicity (STOT) – repeated exposure:

Classification criteria are not met based on available data.

H. Aspiration hazard:

Not relevant (solid).

Product-specific toxicological information:

Identification	Acute Toxicity	Genus
Hexamine CAS: 100-97-0	LD50 oral: ~9,200 mg/kg (literature; low acute oral toxicity)	Rat

SECTION 12: ECOLOGICAL INFORMATION

Not classified as hazardous to the aquatic environment under core GHS criteria based on available data.

12.1 Toxicity:

Identification	Acute Toxicity	Genus
Hexamine CAS: 100-97-0	Available on request (specific LC50/EC50 endpoints not established for this grade)	Fish / Crustacean

12.2 Persistence and degradability:

Reported as readily to inherently biodegradable in the literature; hydrolyses in the environment to formaldehyde and ammonia, both of which are further biodegraded/nitrified.

12.3 Bioaccumulative potential:

Low bioaccumulation potential expected (low log Pow, highly water soluble).

12.4 Mobility in soil:

Koc	Henry	Dry Soil	Moist Soil
Low	Low	Mobile (highly water soluble)	Mobile

12.5 Results of PBT and vPvB assessment:

Not expected to meet PBT/vPvB criteria based on available data.

12.6 Other adverse effects:

Decomposition products (formaldehyde, ammonia) are more acutely toxic to aquatic life than hexamine itself; avoid bulk release.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Disposal methods:

Dispose of via a licensed waste contractor in accordance with local regulations, or recover for reuse where practicable. Keep away from ignition sources during disposal handling given its flammable-solid classification.
Refer to national and local regulations on waste management (Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016, as amended).

SECTION 14: TRANSPORT INFORMATION

Transport of dangerous goods by land (ADR 2023 / RID 2023):

14.1 UN number	UN1328
14.2 UN proper shipping name	HEXAMETHYLENETETRAMINE
14.3 Transport hazard class(es)	4.1
14.4 Packing group	III
14.5 Environmental hazard	No
14.6 Special precautions for user	Physico-chemical properties: see section 9
14.7 Transport in bulk (Annex II MARPOL 73/78, IBC Code)	Not relevant

Transport of dangerous goods by sea (IMDG 41-22):

14.1 UN number	UN1328
14.2 UN proper shipping name	HEXAMETHYLENETETRAMINE
14.3 Transport hazard class(es)	4.1
14.4 Packing group	III
14.5 Marine pollutant	No
14.6 Special precautions for user	EmS Codes: F-A, S-I
14.7 Transport in bulk (Annex II MARPOL 73/78, IBC Code)	Not relevant

Transport of dangerous goods by air (IATA/ICAO 2024):

14.1 UN number	UN1328
14.2 UN proper shipping name	HEXAMETHYLENETETRAMINE
14.3 Transport hazard class(es)	4.1
14.4 Packing group	III
14.5 Environmental hazard	No
14.6 Special precautions for user	Physico-chemical properties: see section 9
14.7 Transport in bulk (Annex II MARPOL 73/78, IBC Code)	Not relevant

SECTION 15: REGULATORY INFORMATION

15.1 Safety, health and environmental regulations specific for the product in question:

It is recommended to use the information included in this safety data sheet as data used in a risk evaluation of local circumstances, in order to establish the necessary risk prevention measures for the manipulation, use, storage and disposal of this product. Petroleum and Explosives Safety Organisation (PESO) requirements may apply to bulk storage of this flammable solid; consult local fire/explosives authority guidance.

Other legislation:

Manufacture, Storage and Import of Hazardous Chemicals Rules 1989
The Factories Act, 1948 (Act No. 63 of 1948), as amended by the Factories (Amendment) Act, 1987 (Act 20 of 1987)
The Chemical Accidents (Emergency Planning, Preparedness, and Response) Rules, 1996
Public Liability Insurance Act, 1991

SECTION 16: OTHER INFORMATION

Legislation related to safety data sheets:

This safety data sheet has been designed in accordance with Annex 4 – Guidance on the preparation of Safety Data Sheets of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Texts of the legislative phrases mentioned in sections 2 and 3:

- H228: Flammable solid.
- H317: May cause an allergic skin reaction.

The phrases indicated do not refer to the product itself; they are present merely for informative purposes and refer to the individual components which appear in section 3.

Advice related to training:

Minimal training is recommended to prevent industrial risks for staff using this product, in order to facilitate their comprehension and interpretation of this safety data sheet, as well as the label on the product.

Principal bibliographical sources:

United Nations GHS (Rev. 8); ECHA Classification & Labelling Inventory; publicly available peer-reviewed and regulatory toxicological/ecotoxicological literature for this CAS number.

Abbreviations and acronyms:

ADR: European agreement concerning the international carriage of dangerous goods by road | IMDG: International maritime dangerous goods code | IATA: International Air Transport Association | ICAO: International Civil Aviation Organisation | COD: Chemical Oxygen Demand | BOD5: 5-day biochemical oxygen demand | BCF: Bioconcentration factor | LD50: Lethal Dose 50 | LC50: Lethal Concentration 50 | EC50: Effective Concentration 50 | Log-POW: Octanol-water partition coefficient | Koc: Partition coefficient of organic carbon | IARC: International Agency for Research on Cancer

The information contained in this safety data sheet is based on sources, technical knowledge and current legislation, without being able to guarantee its accuracy. This information cannot be considered a guarantee of the properties of the product; it is simply a description of the security requirements. The occupational methodology and conditions for users of this product are not within Suraj Chemicals' awareness or control, and it is ultimately the responsibility of the user to take the necessary measures to obtain the legal requirements concerning the manipulation, storage, use and disposal of chemical products. The information on this safety data sheet only refers to this product, which should not be used for needs other than those specified.

END OF SAFETY DATA SHEET