

## SAFETY DATA SHEET

### SECTION 1: Identification of the substance/mixture and of the company/undertaking

#### 1.1. Product identifier

Piperidine

**Synonyms:**

Hexahydropyridine; Pentamethylenimine; Hexazane; Cyclopentimine; Cypentil; Azocyclohexane

**Chemical Abstracts Registry No:** 110-89-4

**REACH Registration Number:** 01-2119962908-20-0003

#### 1.2. Relevant identified uses of the substance or mixture and uses advised against

chemical intermediate; laboratory reagent

#### 1.3. Details of the supplier of the safety data sheet

Vertellus Integrated Pyridines LLC  
201 North Illinois Street, Suite 1800,  
Indianapolis, IN 46204  
317-247-8141

**Only Representative for EU REACH Registration:**

Vertellus Specialties UK Ltd.  
Seal Sands Road, Seal Sands  
Middlesbrough, TS2 1UB England  
Phone: +44 1642 546 546

**e-mail Address:** sds@vertellus.com

#### 1.4. Emergency telephone number

**Vertellus:** 1-317-247-8141

**CHEMTREC (USA):** 1-800-424-9300 (collect calls accepted)

**CHEMTREC (International):** 1-703-527-3887 (collect calls accepted)

**NRCC (China):** +86 532 83889090

### SECTION 2: Hazards identification

#### 2.1. Classification of the substance or mixture

(According to Regulation (EC) No 1272/2008)

Skin Corrosion/Irritation Category 1B  
Flammable Liquids Category 2  
Acute Toxicity Inhalation Dust / Mist Category 3  
Acute Toxicity Dermal Category 3  
Acute Toxicity Oral Category 4  
Serious Eye Damage/Eye Irritation Category 1

(According to Directive 67/548/EEC)

**Symbol:** F, T, C  
**Risk Phrases:** R34: Causes burns.  
R23/24: Toxic by inhalation and in contact with skin.  
R11: Highly Flammable.  
R22: Harmful if swallowed.  
**Safety Phrases:** S16: Keep away from sources of ignition - No smoking.  
S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.  
S27: Take off immediately all contaminated clothing.  
S45: In case of accident or if you feel unwell, seek medical advice immediately.

#### 2.2. Label elements

Hazard Symbols  
(Pictogram):



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Signal Word:	Danger
Hazard Precautions:	H225 - Highly flammable liquid and vapour. H302 - Harmful if swallowed. H311+H331 - Toxic in contact with skin or if inhaled. H314 - Causes severe skin burns and eye damage.
Prevention Precautionary Statements:	P210 - Keep away from heat/sparks/open flames/hot surfaces. – No smoking. P240 - Ground/bond container and receiving equipment. P241 - Use explosion-proof electrical/ventilating/lighting/telecommunication/computer/equipment. P242 - Use only non-sparking tools. P243 - Take precautionary measures against static discharge. P270 - Do not eat, drink or smoke when using this product. P280 - Wear protective gloves/protective clothing/eye protection/face protection.
First Aid Precautionary Statements:	P301+P330+P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting. P302+P352 - IF ON SKIN: Wash with plenty of soap and water. P304+P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P310 - Immediately call a POISON CENTER or doctor/physician. P363 - Wash contaminated clothing before reuse.
Storage Precautionary Statements:	Not required.
Disposal Precautionary Statements:	Not required.
<b><u>2.3. Other hazards</u></b>	
Other Hazards:	Not applicable

### SECTION 3: Composition/information on ingredients

#### 3.1. Substances or 3.2. Mixtures

Ingredient	CAS Number	Concentration (weight %)	EC Number	CLP Inventory/ Annex VI	EU DSD Classification (67/548/EEC)	EU CLP Classification (1272/2008)
Piperidine	110-89-4	~ 100	203-813-0	613-027-00-3	C, T, F R34- R23/24- R11- R22	Acute Tox. 3; H311 Acute Tox. 3; H331 Acute Tox. 4; H302 Flam. Liq. 2; H225 Skin Corr. 1B; H314 Eye Dam. 1; H318

NOTE: See Section 8 for exposure limit data for these ingredients. See Section 15 for trade secret information (where applicable). See Section 16 for the full text of the R-phrases above.

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### SECTION 4: First aid measures

#### 4.1. Description of first aid measures

Skin Contact:	Remove contaminated clothing. Wash affected area with soap and water. Rinse thoroughly. If irritation persists or other symptoms are observed, seek medical advice
Eye Contact:	Rinse eyes immediately with large amounts of water for at least 15 minutes, occasionally lifting the eyelids. GET MEDICAL ATTENTION.
Inhalation:	Remove from exposure area to fresh air immediately. If breathing has stopped, give artificial respiration. Keep affected person warm and at rest. If exposed to excessive levels remove to fresh air and get medical attention if cough or other symptoms develop.
Ingestion:	Do NOT induce vomiting, this material is corrosive. If swallowed, contact physician or poison control center immediately. Give oxygen if respiration is shallow. Due to this material's corrosivity, it is essential to get medical attention as quickly as possible.

#### 4.2 Most important symptoms and effects, both acute and delayed

Acute:	Piperidine is corrosive to skin and eyes on contact. This material is readily absorbed through the skin and is considered toxic via dermal exposure. Vapors may be extremely irritating to the respiratory tract and eyes. High vapor concentrations may produce weakness, dizziness, headache, nausea, vomiting, labored breathing, increased heart rate and/or elevated blood pressure. Extended exposure (i.e., via contact with saturated clothing) may lead to skin burns and systemic poisoning, with symptoms similar to those above.
Delayed Effects:	None known.

#### 4.3. Indication of any immediate medical attention and special treatment needed

Note to Physician:	No specific indications. Treatment should be based on the judgment of the physician in response to the reactions of the patient.
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### SECTION 5: Firefighting measures

#### 5.1. Extinguishing media

Appropriate Extinguishing Media:	Foam, alcohol foam, carbon dioxide, dry chemical.
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#### 5.2. Special hazards arising from the substance or mixture

Hazardous Products of Combustion:	Toxic vapors may be released upon thermal decomposition (cyanides, nitrogen oxides, carbon monoxide).
Potential for Dust Explosion:	Not applicable.
Special Flammability Hazards:	Severe explosion hazard in the form of vapor (within flammability limits) when exposed to heat, flame or static discharge.

#### 5.3. Advice for firefighters

Basic Fire Fighting Guidance:	Wear self-contained breathing apparatus and full protective clothing (i.e., Bunker gear). Skin and eye contact should be avoided. Normal fire fighting procedures may be used.
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### SECTION 6: Accidental release measures

#### 6.1. Personal precautions, protective equipment and emergency procedures

- Evacuation Procedures:** Isolate the hazard area and deny entry to unnecessary and unprotected personnel.
- Special Instructions:** See Section 8 for personal protective equipment recommendations. Remove all contaminated clothing to prevent further absorption. Decontaminate affected personnel using the first aid procedures in Section 4. Leather shoes that have been saturated must be discarded.

#### 6.2. Environmental precautions

Prevent releases to soils, drains, sewers and waterways.

#### 6.3. Methods and material for containment and cleaning up

Remove all ignition sources. Ventilate the area of spill or leak. Wear protective equipment during clean-up. For small spills, use suitable absorbent material and collect for later disposal. For large spills, the area may require diking to contain the spill. Material can then be collected (e.g., suction) for later disposal. After collection of material, flush area with water. Dispose of the material in accordance with standard practice for disposal of potentially hazardous materials as required by applicable federal, state or local laws.

#### 6.4. Reference to other sections

Refer to section 8 for information on selecting personal protective equipment. Refer to section 13 for information on spilled product, absorbent and clean up material disposal instructions.

### SECTION 7: Handling and storage

#### 7.1. Precautions for safe handling

- Precautions for Unique Hazards:** Not applicable.
- Practices to Minimize Risk:** Wear appropriate protective equipment when performing maintenance on contaminated equipment. Wash hands thoroughly before eating or smoking after handling this material. Do not eat, drink or smoke in work areas. Prevent contact with incompatible materials. Avoid spills and keep away from drains. Handle in a manner to prevent generation of aerosols, vapors or dust clouds.
- Special Handling Equipment:** Not applicable.

#### 7.2. Conditions for safe storage, including any incompatibilities

- Storage Precautions & Recommendations:** Maintain dry, ventilated conditions for storage. Protect containers against physical damage. Outside or detached storage is preferable. Inside storage should be in standard flammable liquids storage room or cabinet. Keep away from strong acids and oxidizing agents. Should be periodically inspected.
- Dangerous Incompatibility Reactions:** Avoid contact with strong acids and oxidizing agents.
- Incompatibilities with Materials of Construction:** May cause some forms of plastics and rubbers to deteriorate.

#### 7.3. Specific end use(s)

If a chemical safety assessment has been completed an exposure scenario is attached as an annex to this Safety Data Sheet. Refer to this annex for the specific exposure scenario control parameters for uses identified in subsection 1.2.

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### SECTION 8: Exposure controls/personal protection

#### 8.1. Control parameters

Country	Occupational Exposure Limit
Australia, Ireland, New Zealand, United Kingdom	1 ppm (3.5 mg/m <sup>3</sup> ) as an 8-hour time-weighted average
Latvia	0.2 mg/m <sup>3</sup> as an 8-hour time-weighted average

**Air Monitoring Method:** Collection media: Charcoal; Analysis Method: GC/FID

#### Derived No Effect Levels (DNELs) – Workers:

Route	DNEL
Acute - systemic effects (dermal)	Qualitative
Acute - systemic effects (inhalation)	Covered by Long-term – Local
Long-term - systemic effects (dermal)	Qualitative
Long-term - systemic effects (inhalation)	Covered by Long-term – Local
Long-term - local effects (inhalation)	7.05 mg/m <sup>3</sup>
Acute - local effects (inhalation)	Covered by Long-term – Local
Acute and long-term - local effects (dermal, inhalation)	Qualitative

#### Derived No Effect Levels (DNELs) – General Population:

Route	DNEL
Acute - systemic effects (oral, dermal, inhalation)	No applications involving general population.
Long-term - systemic effects (dermal)	No applications involving general population.
Long-term - systemic effects (inhalation)	No applications involving general population.
Long-term - systemic effects (oral)	No applications involving general population.
Acute and long-term - local effects (dermal, inhalation)	No applications involving general population.

#### Predicted No Effect Concentrations (PNECs):

Route	PNEC
PNEC aqua (freshwater)	0.038 mg/L
PNEC aqua (marine water)	0.0038 mg/L
PNEC aqua (intermittent releases)	0.19 mg/L
PNEC aqua (STP)	100 mg/L
PNEC sediment (freshwater)	0.965 mg/kg sediment dw
PNEC sediment (marine water)	0.0965 mg/kg sediment dw
PNEC soil	0.17 mg/kg soil dw
PNEC oral (wildlife exposures)	Derivation waived due to low bioaccumulation potential

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### 8.2. Exposure controls

Also see the annex to this SDS (if applicable) for specific exposure scenario controls.

<b>Other Engineering Controls:</b>	All operations should be conducted in well-ventilated conditions. Local exhaust ventilation should be provided.
<b>Personal Protective Equipment:</b>	NIOSH-approved chemical cartridge respirator or supplied-air breathing equipment as necessary. Chemical goggles should be worn at all times; use face shields as conditions warrant. Neoprene or PVC-coated gloves. Impervious clothing and boots.
<b>Respirator Caution:</b>	Observe OSHA regulations for respirator use (29 CFR 1910.134). Air-purifying respirators must not be used in oxygen-deficient atmospheres.
<b>Thermal Hazards:</b>	Not applicable.
<b>Environmental Exposure Controls:</b>	The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. 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.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

<b>Appearance, State &amp; Odor (ambient temperature):</b>	Colorless liquid with a heavy amine-like odor; peppery odor.		
<b>Molecular Formula:</b>	C <sub>5</sub> H <sub>11</sub> N	<b>Molecular Weight:</b>	85.15
<b>Vapor Pressure:</b>	14.7 mm Hg @ 20°C	<b>Evaporation Rate:</b>	No data available.
<b>Specific Gravity or Density:</b>	0.86174 g/cm <sup>3</sup> @ 20°C	<b>Vapor Density (air = 1):</b>	3.00
<b>Boiling Point:</b>	107°C @ 760 mm Hg	<b>Freezing / Melting Point:</b>	-11°C
<b>Solubility in Water:</b>	Miscible in all proportions	<b>Octanol / Water Coefficient:</b>	0.64 @ 20°C
<b>pH:</b>	pKa @ 20°C = 11.28	<b>Odor Threshold:</b>	< 2 ppm
<b>Viscosity:</b>	1.52 mPa•s (dynamic) @ 20°C	<b>Autoignition Temperature:</b>	339°C (642°F)
<b>Flash Point and Method:</b>	45.5°F (7.5°C) Closed Cup	<b>Flammable Limits:</b>	1.1% (LEL) – 8.7% (UEL)
<b>Flammability (solid, gas):</b>	Not applicable.	<b>Decomposition Temperature:</b>	No data available.
<b>Explosive Properties:</b>	Not explosive.	<b>Oxidizing Properties:</b>	Not oxidizing.

### 9.2. Other information

Not applicable

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

Not classified as dangerously reactive.

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<u>10.2. Chemical stability</u>	Stable
<u>10.3. Possibility of hazardous reactions</u>	Will not occur.
<u>10.4. Conditions to avoid</u>	Avoid static discharge and uncontrolled exposure to high temperatures.
<u>10.5. Incompatible materials</u>	Avoid contact with strong acids and oxidizing agents.
<u>10.6. Hazardous decomposition products</u>	Toxic vapors may be released upon thermal decomposition (cyanides, nitrogen oxides, carbon monoxide).

### SECTION 11: Toxicological information

#### 11.1. Information on toxicological effects

Acute Oral LD <sub>50</sub> :	LD <sub>50</sub> (rat) = 740 mg/kg	Toxikon 1992a [KEY]
Acute Dermal LD <sub>50</sub> :	LD <sub>50</sub> (rabbit) = 275 mg/kg	Smyth 1962 [KEY]
Acute Inhalation LC <sub>50</sub> :	LC <sub>50</sub> (4h) (rat) = 4.8 mg/L	BASF 1980 [KEY]
Skin Irritation:	Corrosive to skin.	
Eye Irritation:	Corrosive to eyes.	
Skin Sensitization:	Negative for sensitizing effects in guinea pig maximization test.	
Mutagenicity:	Negative in bacterial test systems, negative in V79 gene mutation assay and ambiguous results in mouse lymphoma in vitro assay. In vivo testing negative for genotoxic effects.	
Reproductive / Developmental Toxicity:	No teratogenic activity in rat studies. Fetal NOAEC = 0.28 mg/L; material NOAEC = 0.07 mg/L. (Huntingdon 1990)	
Carcinogenicity:	No evidence of carcinogenicity in several oral and inhalation tests.	
Target Organs:	No evidence of target organ effects, either by single or repeated exposures.	
Aspiration Hazard:	No data available.	
Primary Route(s) of Exposure:	Skin contact and absorption, eye contact, and inhalation. Ingestion is not likely to be a primary route of exposure.	
Most important symptoms and effects, both acute and delayed	Piperidine is corrosive to skin and eyes on contact. This material is readily absorbed through the skin and is considered toxic via dermal exposure. Vapors may be extremely irritating to the respiratory tract and eyes. High vapor concentrations may produce weakness, dizziness, headache, nausea, vomiting, labored breathing, increased heart rate and/or elevated blood pressure. Extended exposure (i.e., via contact with saturated clothing) may lead to skin burns and systemic poisoning, with symptoms similar to those above. Delayed Effects: None known.	
Additive or Synergistic effects:	None known.	

### SECTION 12: Ecological information

<u>12.1. Toxicity</u>	LC <sub>50</sub> (96h) <i>Leuciscus idus</i> = 68 mg/L	BASF 1987 [KEY]
	EC <sub>50</sub> (48h) <i>Daphnia magna</i> = 19 mg/L	BASF 2013a [KEY]
	EC <sub>50</sub> (72h) <i>Desmodesmus subspicatus</i> = 106 mg/L	BASF 2013b [KEY]



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<u>12.2. Persistence and degradability</u>	Rapidly degraded by photochemical processes. Hydrolysis not expected. Meets "ready biodegradable" criteria (67% after 14 days).
<u>12.3. Bioaccumulative potential</u>	Significant bioaccumulation not expected; bioconcentration factor (BCF) = 2.3 to 9.3.
<u>12.4. Mobility in soil</u>	This material is soluble in water. Its adsorption to soil and sediment should not be significant.
<u>12.5. Results of PBT and vPvB assessment</u>	Substance is readily biodegradable and is therefore not persistent. Substance is not bioaccumulative. This substance is not a PBT or vPvB.
<u>12.6. Other adverse effects</u>	Not applicable.

### SECTION 13: Disposal considerations

#### 13.1. Waste treatment methods

US EPA Waste Number:	D001
Waste Classification: (per US regulations)	Ignitable.
Waste Disposal:	NOTE: Generator is responsible for proper waste characterization. State hazardous waste regulations may differ substantially from federal regulations. Dispose of this material responsibly, and in accordance with standard practice for disposal of potentially hazardous materials as required by applicable international, national, regional, state or local laws, and environmental protection duty of care principles. Do NOT dump into any sewers, on the ground, or into any body of water. For disposal within the EC, the appropriate classification code according to the European Community List of Wastes should be used. Note that disposal regulations may also apply to empty containers and equipment rinsates.

### SECTION 14: Transport information

The following information applies to all shipping modes (DOT/IATA/ICAO/IMDG/ADR/RID/ADN), unless otherwise indicated:

14.1. UN number	UN2401	14.2. UN proper shipping name	Piperidine
14.3. Transport hazard class(es)	8(3)	14.4. Packing group	PG I
14.5. Environmental hazards	Not applicable.		
14.6. Special precautions for user	No data available.		
NA Emergency Guidebook Numbers:	132	IMDG EMS:	S-C; F-E
14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.		

### SECTION 15: Regulatory information

#### 15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

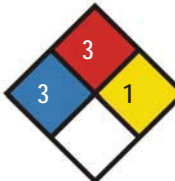
Chemical Inventory Lists:	Status:		
TSCA:	Listed	EINECS:	203-813-0
Canada(DSL/NDSL):	DSL	Japan:	5-765
Korea:	KE-28769	Australia:	Listed
China:	Listed	Philippines:	Listed
Taiwan:	Listed	New Zealand:	Listed



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WHMIS Classification:	Class B, Division 2: Flammable Liquid. Class E: Corrosive Material. Class D, Division 1, Subdivision B: Toxic Material.
German Water Hazard Classification:	WGK 1 (Piperidine)
SARA 313:	Not listed.
Reportable Quantities:	1,000 pounds (139 gallons)
State Regulations:	<ul style="list-style-type: none"> <li>This product contains chemicals listed on the Louisiana List of Extremely Hazardous Substances.</li> <li>This product contains chemicals listed on the Massachusetts Substance List for Right-to-Know Law.</li> <li>This product contains chemicals listed on the Minnesota Hazardous Substances List.</li> <li>This product contains chemicals listed on the New Jersey Department of Health Hazard Right-to-Know Program Hazardous Substance List.</li> <li>This product contains chemicals listed on the Pennsylvania Department of Labor and Industry Hazardous Substance List.</li> <li>This product contains chemicals listed on the New York State List of Hazardous Substances.</li> </ul>
Other Regulatory Listings:	<ul style="list-style-type: none"> <li>Regulated as a List I Chemical by the Drug Enforcement Agency. Distribution, export or import may require registration. See 21 CFR 1309.</li> <li>This substance is on the EPCRA Extremely Hazardous Substances List (40 CFR 355), with a threshold planning quantity (TPQ) of 1,000 lbs.</li> <li>Use of this substance may be subject to risk management planning under the Clean Air Act 112(r) rule, found at 40 CFR 68.</li> </ul>

HMIS:	<table border="1"> <tr> <td>HEALTH</td> <td>3</td> </tr> <tr> <td>FLAMMABILITY</td> <td>3</td> </tr> <tr> <td>REACTIVITY</td> <td>1</td> </tr> </table>	HEALTH	3	FLAMMABILITY	3	REACTIVITY	1
HEALTH	3						
FLAMMABILITY	3						
REACTIVITY	1						

NFPA:	
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### 15.2. Chemical safety assessment

A chemical safety assessment has been prepared for this product.

## SECTION 16: Other information

Full text of R phrases in Section 3:	R34: Causes burns. R23/24: Toxic by inhalation and in contact with skin. R11: Highly Flammable.
Key Data Sources:	<ul style="list-style-type: none"> <li><b>BASF 1980:</b> BASF AG, Determination of the acute inhalation toxicity LC 50 of piperidine as vapour after 4 hour exposure to Sprague-Dawley rats, BASF Department of Toxicology, Report#77/283, Owner: BASF, 1980.</li> <li><b>BASF 1982:</b> BASF AG, Industrial Hygiene Orienting Investigation, Report # 77/283-3, Owner: BASF AG, 1982.</li> <li><b>BASF 1987:</b> Acute Toxicity Test with Golden Orfe (<i>Leuciscus idus</i>), BASF AG, Department of Toxicology, Ludwigshafen, Germany, Report #10F0180/875094, Owner: BASF AG, 1987. Supplemented by LC50 Recalculation in the fish test, Report #10F0180/875094, BASF SE, 2011.</li> <li><b>BASF 1991:</b> Pruefbericht ueber einen Atmungshemmtest mit Belebtschlamm (Kurzzzeitatmungstest - short-term respiration test), Department of Ecology, Report# 01.91/0271/08/1, Owner: BASF SE, 1991.</li> <li><b>BASF 1993:</b> BASF AG, Study on the inhalation toxicity of Piperidine as a vapor in rats 28-day test including an abo 2-week post-exposure observation period including neurotoxicological examinations, BASF AG, Department of</li> </ul>

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Toxicology, Report # 4610523/89065, Owner: BG Chemie, 1993.

- **BASF 2013a:** Piperidine: 48h Acute Toxicity Test to *Daphnia magna*, BMG Engineering Ltd., Ifangstrasse 11, 8952 Schlieren, Switzerland, Report #50E0108/09X103, OWner: BASF SE, 2013.
- **BASF 2013b:** Piperidine - Freshwater algal growth inhibition test with *Desmodesmus subspicatus*, BMG Engineering Ltd., Ifangstrasse 11, 8952 Schlieren, Switzerland Report #: 60E0108/09X102, Owner: BASF SE, 2013.
- **CCR 1989:** CCR (Cytotest Cell Research GmbH & Co. KG), Darmstadt, Germany, Micronucleus assay in bone marrow cells of the mouse with Piperidine, Report # 129903, Owner: BG Chemie, 1989.
- **Harlan 2012:** Harlan Cytotest Cell Research GmbH, Rossdorf, Germany, Gene Mutation Assay in Chinese Hamste V79 Cells in vitro (V79/HPRT) with Piperidine, Report # 1473904, Owner: BASF SE, 2012.
- **Huntingdon 1990:** Huntingdon Research Centre Ltd., A Study of the Effect of Piperidine on Pregnancy of the Rat, Report # BGH 9/9097, Owner: BG Chemie, 1990.
- **MITI 1992:** Ministry of International Trade and Industry (MITI), Biodegradation and bioaccumulation data of existing chemicals based on the CSCL Japan: CAS 110-89-4, Edited by Chemicals Inspection & Testing Institute, Japan, 1 - 27, 5-18: CR No. 5-765, October 1992.
- **Smyth 1962:** Smyth HF Jr, et al., "Range Finding Toxicity Data List VI", Am. Ind. Hyg Assoc.J, 23,95-107, 1962
- **Sugai 1990:** Sugai, S, Murata, K, Kitagaki, T, Tomita, I, "Studies on Eye irritation caused by chemicals in rabbit", J.Toxicology Science, 15,245-262, 1990.
- **Toxikon 1992a:** Toxikon Corporation, Woburn, MA, US 1992, Acute oral toxicity study (LD50): Piperidine, Report #92G-0563 Owner; Reilly Industries (now Vertellus Specialties Inc.), 1992.
- **Toxikon 1992b:** Toxikon Corporation, Woburn, MA, US, Buehler Topical Closed Patch Sensitization Test, Report # 92G-0564, Owner; Reilly Industries (now Vertellus Specialties Inc.), 1992.

Classification Method: On basis of test data

Training Advice: Not applicable.

Legend of Abbreviations:

ACGIH = American Conference on Governmental Industrial Hygienists.

CAS = Chemical Abstracts Service.

CFR = Code of Federal Regulations.

DSL/NDSL = Domestic Substances List/Non-Domestic Substances List.

EC = European Community.

EINECS = European Inventory of Existing Commercial Chemical Substances.

ELINCS = European List of Notified Chemical Substances.

EU = European Union.

GHS = Globally Harmonized System.

LC = Lethal Concentration.

LD = Lethal Dose.

NFPA = National Fire Protection Association.

NIOSH = National Institute of Occupational Safety and Health.

NTP = National Toxicology Program.

OSHA = Occupational Safety and Health Administration

PEL = Permissible Exposure Limit.

RQ = Reportable Quantity.

SARA = Superfund Amendments and Reauthorization Act of 1986.

TLV = Threshold Limit Value.

WHMIS = Workplace Hazardous Materials Information System.

**Important Note:** Please note that the information contained herein is furnished without warranty of any kind. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. The information contained herein may change without prior notice. THIS SAFETY DATA SHEET SUPERSEDES ALL PREVIOUS EDITIONS.

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Original Date of Issue: 29 March 1985

Issued by: Regulatory Management Department

Email: SDS@Vertellus.com

Revision Details: Revised in all sections to REACH format.

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### Annex Piperidine - Summary of Uses

ES Number	Name	SU	ERC	PROC
1	Use as intermediate	3	6A	1,2,3
2	Use in laboratories, industrial	3	4	15

#### General information

In the chemical safety assessment performed according to Article 14(3) in connection with Annex I section 3 (Environmental Hazard Assessment) and section 4 (PBT/ vPvB Assessment) no hazard was identified. Therefore according to REACH Annex I (5.0), exposure estimation is not necessary. Consequently all identified uses of the substance are assessed as safe for the environment.

#### Human health – Worker

- Short-term exposure:

Based on the available data, Piperidine is considered to be corrosive to the skin and eyes. Therefore, a qualitative risk assessment was performed as recommended by the REACH Guidance on Information Requirements and Chemical Safety Assessment, Part E (Risk Characterisation) and Chapter R.13 (Risk Management Measures and Operational Conditions). Based on its corrosive properties, Piperidine was allocated to the moderate hazard class and adequate Risk Management Measures (RMMs) and Operational Conditions (OCs) have been implemented. Piperidine is harmful if swallowed and toxic if inhaled after acute exposure and in contact with skin. Nevertheless, short-term exposure is sufficiently covered by the long-term exposure assessment as no peak exposures occur during the use of Piperidine in industrial and professional settings.

- Long-term exposure:

The primary potential exposure routes to Piperidine in industrial and professional settings are skin contact and inhalation. In industrial and professional settings, ingestion is not an anticipated route of exposure. In addition, local corrosive effects of Piperidine were assessed by a qualitative risk assessment (see Short-term exposure).

#### Human health – Consumer

There are no identified uses concerning consumer exposure.

#### Exposure Scenarios

Exposure scenarios have been calculated using EasyTRA 3.5. EasyTRA uses algorithms on the basis of the latest versions of the ECHA REACH Guidance chapters R12, R14, R15, and R16 (as of March 2010) and EUSES®. EasyTRA works in compliance with ECETOC® Targeted Risk Assessment 3 (as of July 2012) for the calculation of worker and consumer exposure and complies with EU TGD 2003 Risk Assessment Spreadsheet Model 1.24a for the environmental exposure (see ECHA REACH Guidance chapter R16.6.2).

Names of contributing environmental scenarios and corresponding ERC:

- ERC 4 - Industrial use of processing aid
- ERC 6A - Industrial use of intermediates

Names of contributing worker scenarios and corresponding PROCs:

- PROC 1 - Use in closed process, no likelihood of exposure
- PROC 2 - Use in closed, continuous process with occasional controlled exposure
- PROC 3 - Use in closed batch processes (synthesis or formulation)
- PROC 4 - Use in batch and other process (synthesis) where opportunity for exposure exists
- PROC 15 - Use of laboratory reagents in small scale laboratories

## SAFETY DATA SHEET

The following qualitative Risk Management Measures (RMMs) are assumed for all exposures:

### General

- Containment as appropriate
- Ensure minimization of manual phases
- Avoid contact with contaminated tools
- Clean equipment and the work area every day
- Supervision in place to check that the RMMs in place are being used correctly and operational conditions followed
- Ensure good work practices are implemented

### Eyes

- Use suitable eye protection

### Dermal

- Use suitable chemically resistant gloves
- Wear suitable working clothes
- Wear suitable face shield

The following substance characteristics are assumed for all exposures:

- Physical state: liquid
- Concentration: 100% except as noted below
- Fugacity/Dustiness: medium

All exposures are assumed to have a frequency of five days per week.

### Exposure Scenarios, Operating Conditions, Risk Management Measures, Predicted Exposures and Risk Characterization Ratio

ES1	Use as intermediate			ERC 6A				
	Indoors/ outdoors	Duration	Exposed Skin surface cm <sup>2</sup>	Local Exhaust Ventilation?	Respiratory Protection?	PEC	RCR	Other
1	out	>4h	240	no	no	0.024835	0.003523	
1	in	>4h	240	no	no	0.035478	0.005032	
2	out	15m-1h	480	no	no	2.483	0.352265	
2	out	<210m	480	no	no	5.433	0.77058	
2	out	>4h	480	90%	no	1.242	0.176133	
2	out	>4h	480	no	90%	1.242	0.176133	
2	in	>4h	480	90%	no	1.774	0.251618	
3	out	15m-1h	240	no	no	4.967	0.70453	
3	out	>4h	240	no	90%	2.483	0.352265	
3	out	>4h	240	90%	no	2.483	0.352265	
3	out	<120 m	240	no	no	6.209	0.880633	
3	in	>4h	240	90%	no	3.548	0.503236	
3	in	1-4 h	240	enhanced	no	6.386	0.905824	

PEC: Predicted Exposure Concentration; RCR: Risk Characterization Ratio = PEC/DNEL

## SAFETY DATA SHEET

ES2	Use in Laboratories, industrial			ERC 4				
PROC	Indoors/ outdoors	Duration	Exposed Skin surface cm2	Local Exhaust Ventilation?	Respiratory Protection?	PEC	RCR	Other
15	in	>4h	240	90%	no	3.548	0.503236	
15	in	1-4h	240	enhanced	no	6.386	0.905824	
15	in	<15min	240	no	no	3.548	0.703236	

PEC: Predicted Exposure Concentration; RCR: Risk Characterization Ratio = PEC/DNEL