MATERIAL SAFETY DATA SHEET

Product Name: Cytarabine Injection

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Manufacturer Name And Address	Hospira, Inc. 275 North Field Drive Lake Forest, Illinois 60045 USA	Hospira Australia Pty Ltd 1 Lexia Place Mulgrave VIC 3170 AUSTRALIA
Emergency Telephone #'s	CHEMTREC: North America: 800-424-9300; International 1-703-527-3887; Australia (02) 8014 4880	
Hospira, Inc., Non-Emergency	224 212-2055	
Material Name	Cytarabine Injection	
Synonyms	4-amino-1-β-D-arabinofuranosyl-2(1H)-pyrimidinone; 1-β-D-Arabinofuranosylcytosine; 4-Amino-1-β-D-arabinofuranosylpyrimidin-2(1*H*)-one; Ara-C; Cytosar.	

2. HAZARD INFORMATION / CLASSIFICATION

Emergency Overview

Cytarabine Injection contains cytarabine, a synthetic pyrimidine nucleoside anti-metabolite used in combination chemotherapy to treat some types of cancer. It is a cytotoxic agent. In the workplace, this preparation should be considered potentially irritating to the skin, eyes, and respiratory tract, a potential occupational reproductive hazard, harmful to the fetus, and a potential human carcinogen. Following an accidental over-exposure, possible target organs may include the bone marrow, gastrointestinal tract, central nervous system, skin, eyes, lungs, and the fetus.

Occupational Exposure Potential

There are scientific studies that suggest that personnel (e.g. nurses, pharmacists, etc.) who prepare and administer parenteral antineoplastics (e.g. in hospitals) may be at some risk due to potential mutagenicity, teratogenicity, and/or carcinogenicity of these materials if workplace exposures are not properly controlled. The actual risk in the workplace is not known.

Signs and Symptoms

This material should be considered irritating to the skin, eyes, and respiratory tract. In clinical use, adverse effects have included severe nausea and vomiting, bone marrow depression, rash and hair loss, pain and redness of the palms and feet, respiratory distress, and neurological effects such as ataxia, dysphasia, and nystagmus.

Medical Conditions Aggravated by Exposure

Pre-existing hypersensitivity to cytarabine. Pre-existing gastrointestinal, pulmonary, skin, central nervous system, bone marrow, and ocular ailments; pregnancy.

Carcinogen Lists: **IARC:** Not listed **NTP:** Not listed **OSHA:** Not listed

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient Name Cytarabine
Chemical Formula $C_9H_{13}N_3O_5$

Component	Approximate Percent by Weight	CAS Number	RTECS Number
Cytarabine	≤10	147-94-4	HA5425000

Non hazardous ingredients include water. Hazardous ingredients present at less than 1% include sodium chloride; sodium hydroxide and/or hydrochloric acid are added to adjust the pH.

4. FIRST AID MEASURES

Eye Contact	Remove from source of exposure. Flush with copious amounts of water. If irritation persists or signs of toxicity occur, seek medical attention. Provide symptomatic/supportive care as necessary.
Skin Contact	Remove from source of exposure. Flush with copious amounts of water. If irritation persists or signs of toxicity occur, seek medical attention. Provide symptomatic/supportive care as necessary.
Inhalation	Remove from source of exposure. If signs of toxicity occur, seek medical attention. Provide symptomatic/supportive care as necessary.
Ingestion	Remove from source of exposure. If signs of toxicity occur, seek medical attention. Provide symptomatic/supportive care as necessary.

5. FIRE FIGHTING MEASURES

Flammability	None anticipated for this aqueous product.
Fire & Explosion Hazard	None anticipated for this aqueous product.
Extinguishing Media	As with any fire, use extinguishing media appropriate for primary cause of fire.
Special Fire Fighting Procedures	Firefighters should wear self-contained breathing apparatus. Protective equipment and clothing should be worn to minimize contact with the respiratory tract, skin and eyes.

6. ACCIDENTAL RELEASE MEASURES

Spill Cleanup and Disposal	Put on suitable protective clothing and equipment as specified by site spill procedures. Isolate area around the spill. Absorb liquid with suitable material and clean affected area with soap and water. Dispose of materials according to the applicable federal, state, or local regulations.

7. HANDLING AND STORAGE

Handling

Cytarabine is a cytotoxic agent. Appropriate procedures should be implemented during the handling and disposal of cytotoxic antineoplastics agents to minimize potential exposures. Several guidelines on handling cytotoxic antineoplastic agents have been published. There is no general agreement that all of the procedures recommended in the guidelines are necessary or appropriate. Consult your site hygienist or safety professional for your site requirements.

Avoid ingestion, inhalation, skin contact, and eye contact. When handling this product, precautions may include the use of a containment cabinet. The use of disposable gloves and respiratory protection is recommended. Proper disposal of contaminated vials, syringes, or other materials is required when working with this material.

7. HANDLING AND STORAGE: continued

Storage

No special storage is required for hazard control. However, employees should be trained on the proper storage procedures for antineoplastic agents. For product protection, follow USP controlled room temperature storage recommendations noted on the product case label, the primary container label, or the product insert.

Special Precautions

Persons with known hypersensitivity to cytarabine, or who may be immunocompromised. Women who are pregnant, or women who want to become pregnant, should consult a health and/or safety professional prior to handling this material.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

	Exposure limits			
Component	**OSHA-PEL**	**ACGIH-TLV**	**Hospira EEL**	**Other Limits**
Cytarabine	8-hr TWA: Not established	8-hr TWA: Not established	8-hr TWA: Not Established	NA

Notes: OSHA PEL: US Occupational Safety and Health Administration – Permissible Exposure Limit
ACGIH TLV: American Conference of Governmental Industrial Hygienists – Threshold Limit Value.
EEL: Employee Exposure Limit.
TWA: 8 hour Time Weighted Average.
STEL: 15-minute Short Term Exposure Limit.

Respiratory Protection

Respiratory protection is normally not needed during intended product use. However, if the generation of aerosols or vapors is likely, and engineering controls are not considered adequate to control potential airborne exposures, the use of an approved air-purifying respirator with a HEPA cartridge (N99 or equivalent) is recommended under conditions where airborne aerosol concentrations are not expected to be excessive. For uncontrolled release events, or if exposure levels are not known, provide respirators that offer a high protection factor such as a powered air purifying respirator or supplied air. A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions require respirator use. Personnel who wear respirators should be fit tested and approved for respirator use as required.

Skin Protection

When handling this material, disposable gloves should be worn at all times. Further, the use of double gloves is recommended. Disposable gloves made from nitrile, neoprene, polyurethane or natural latex generally have low permeability to oncolytic agents. Persons known to be allergic to latex rubber should select a non-latex glove. Gloves should be changed regularly, and removed immediately after known contamination. Care should be taken to minimize inadvertent contamination when removing and/or disposing of gloves.

Eye Protection

As a minimum, the use of chemical safety goggles is recommended when handling this material.

Engineering Controls

If the generation of aerosols is likely, local exhaust ventilation is recommended to minimize employee exposures. The use of an enclosure, such as an approved ventilated cabinet designed to minimize airborne exposures, is recommended.

9. PHYSICAL/CHEMICAL PROPERTIES

Appearance/Physical State	Clear and colorless sterile isotonic solution
Odor	Odorless
Odor Threshold:	NA
pH:	7.4
Melting point/Freezing point:	NA
Initial Boiling Point/Boiling Point Range	NA
Evaporation Rate:	NA
Flash Point:	NA
Flammability (solid, gas):	NA
Upper/Lower Flammability or Explosive Limits:	NA
Vapor Pressure	NA
Vapor Density (Air =1)	NA
Evaporation Rate	NA
Specific Gravity	NA
Solubility	Soluble in water. Slightly soluble in alcohol and chloroform
Partition coefficient: n-octanol/water:	NA
Auto-ignition temperature	NA
Decomposition temperature	NA

10. STABILITY AND REACTIVITY

Reactivity	Not determined.
Chemical Stability	Stable under standard use and storage conditions.
Hazardous Reactions	Not determined
Conditions to avoid	Not determined
Incompatibilities	Not determined
Hazardous Decomposition Products	Not determined. During thermal decomposition, it may be possible to generate irritating vapors and/or toxic fumes of carbon oxides (COx) and nitrogen oxides (NOx).
Hazardous Polymerization	Not anticipated to occur with this product.

11. TOXICOLOGICAL INFORMATION

Information for the product is not available. Information for the active ingredient (and the hydrochloride salt) is as follows:

Acute Toxicity

Ingredient(s)	Percent	Test Type	Route of Administration	Value	Units	Species
Cytarabine	100	LD50	Oral	> 5000	mg/kg	Rat
Cytarabine	100	LD50	Oral	3150	mg/kg	Mouse
Cytarabine Hydrochloride	100	LD50	Oral	> 3200	mg/kg	Rat
Cytarabine Hydrochloride	100	LD50	Oral	826	mg/kg	Mouse
Cytarabine	100	LD50	Intravenous	> 5000	mg/kg	Rat
Cytarabine	100	LD50	Intravenous	> 7000	mg/kg	Mouse
Cytarabine Hydrochloride	100	LD50	Intravenous	172	mg/kg	Dog
Cytarabine Hydrochloride	100	LD50	Intravenous	396	mg/kg	Monkey
Cytarabine	100	LD50	Intraperitoneal	1000 > 5000	mg/kg mg/kg	Rat Rat
Cytarabine	100	LD50	Intraperitoneal	1000 3379	mg/kg mg/kg	Mouse Mouse
Cytarabine Hydrochloride	100	LD50	Intraperitoneal	5500	mg/kg	Rat
Cytarabine Hydrochloride	100	LD50	Intraperitoneal	825	mg/kg	Mouse

LD50 is the dosage producing 50% mortality.

Aspiration Hazard None anticipated from normal handling of this product.

Dermal Irritation/Corrosion None anticipated from normal handling of this product. Inadvertent skin contact with this product may produce irritation and redness.

Ocular Irritation/Corrosion None anticipated from normal handling of this product. Inadvertent eye contact with this product may produce irritation, redness, and discomfort.

Dermal or Respiratory Sensitization None anticipated from normal handling of this product. In clinical use, allergic edema has been reported infrequently.

Reproductive Effects In animal studies, cytarabine was embryotoxic in mice and teratogenic in mice and rats when given during the period of organogenesis. In mice, cleft palate, phocomelia, deformed appendages, and skeletal abnormalities were noted in offspring of mice given intraperitoneal dosages ≥ 2 mg/kg/day during organogenesis. In rats, deformed appendages were noted in the offspring after dams were given cytarabine as a single intraperitoneal dosage of 20 mg/kg on day 12 of gestation. Reduced prenatal and postnatal brain size, and permanent impairment of learning ability, was noted in the offspring of rats given a single intraperitoneal dosage of 50 mg/kg on day 14 of gestation. In mice, cytarabine produced embryotoxicity, characterized by decreased fetal weight, when given at a dosage of 0.5 mg/kg/day during organogenesis; it also caused an increase in early and late resorptions, and decreased live litter sizes, at a dosage of 8 mg/kg/day. FDA Pregnancy Category D.

Mutagenicity Cytarabine was mutagenic in *in vitro* tests, and was clastogenic *in vitro* (chromosome aberrations and SCE in human leukocytes) and *in vivo* (chromosome aberrations and SCE assay in rodent bone marrow, mouse micronucleus assay). Cytarabine caused the transformation of hamster embryo cells and rat H43 cells *in vitro.* Cytarabine caused a dose-dependent increase in sperm-head abnormalities and chromosomal aberrations occurred in mice given intraperitoneal cytarabine.

Carcinogenicity The carcinogenic potential of cytarabine has not been fully evaluated.

Target Organ Effects This material should be considered irritating to the skin, eyes, and respiratory tract. Following an accidental over-exposure, possible target organs may include the bone marrow, gastrointestinal tract, central nervous system, skin, eyes, lungs, and the fetus.

12. ECOLOGICAL INFORMATION

Aquatic Toxicity	Not determined for product.
Persistence/Biodegradability	Not determined for product.
Bioaccumulation	Not determined for product.
Mobility in Soil	Not determined for product.

13. DISPOSAL CONSIDERATIONS

Waste Disposal	Disposal should be performed in accordance with the federal, state or local regulatory requirements.
Container Handling and Disposal	Dispose of containers and unused contents in accordance with federal, state and local regulations.

14. TRANSPORTATION INFORMATION

DOT STATUS:	Not Regulated
Proper Shipping Name:	NA
Hazard Class:	NA
UN Number:	NA
Packing Group:	NA
Reportable Quantity:	NA
ICAO/IATA STATUS	Not Regulated
Proper Shipping Name:	NA
Hazard Class:	NA
UN Number:	NA
Packing Group:	NA
Reportable Quantity:	NA
IMDG STATUS	Not Regulated
Proper Shipping Name:	NA
Hazard Class:	NA
UN Number:	NA
Packing Group:	NA
Reportable Quantity:	NA

Notes: DOT – US Department of Transportation Regulations

15. REGULATORY INFORMATION

TSCA Status	Exempt
CERCLA Status	Not listed
SARA 302 Status	Not listed
SARA 313 Status	Not listed
RCRA Status	Not listed
PROP 65 (Calif.)	This product is, or contains chemical(s) known to the State of California to cause developmental toxicity.

Notes: TSCA, Toxic Substance Control Act; CERCLA, US EPA law, Comprehensive Environmental Response, Compensation, and Liability Act; SARA, Superfund Amendments and Reauthorization Act; RCRA, US EPA, Resource Conservation and Recovery Act; Prop 65, California Proposition 65.

15. REGULATORY INFORMATION: continued

U.S. OSHA Classification Possible Irritant
Reproductive Toxin
Target Organ Toxin

GHS Classification *Where medicinal products are not exempt, the recommended GHS workplace classification for this product is as follows:

Hazard Class	Acute Oral Toxicity	Eye Irritation	Skin Irritation	Toxic to Reproduction	Mutagenicity	Target Organ Toxicity
Hazard Category	Not Classified	2B	2	2	2	2
Symbol						
Signal Word		Warning	Warning	Warning	Warning	Warning
Hazard Statement		Causes eye irritation	Causes skin irritation	Suspected of damaging fertility or the unborn child	Suspected of causing genetic defects if ingested.	May cause damage to the bone marrow, gastrointestinal tract, central nervous system, skin, eyes, and lungs through prolonged or repeated exposure.

GHS Precautionary Statements:

Prevention:

Do not eat, drink or smoke when using this product.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Use personal protective equipment as required.
Avoid breathing vapors or aerosols.
In case of inadequate ventilation wear respiratory protection.
Wear protective gloves.
Wash hands thoroughly after handling.
Contaminated work clothing should not be allowed out of the workplace.

Response:

IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell.

IF INHALED: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. If experiencing respiratory symptoms call a POISON CENTER or a doctor.

IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs, seek medical attention. Take off contaminated clothing and wash before reuse.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing. If eye irritation persists, get medical attention.

If exposed or concerned, get medical attention.

15. REGULATORY INFORMATION: continued

EU Classification

*Medicinal products are exempt from the requirements of the EU Dangerous Preparations Directive. Information provided below is for the pure drug substance cytarabine.

Classification(s):	Irritant	Mutagen Category 2	Toxic for Reproduction Category 2
Symbol:			
Indication of Danger:	Xi	T	T

Risk Phrases:

R36/37/38 - Irritating to eyes, respiratory system and skin
R46 - May cause heritable genetic damage
R48/25 - Danger of serious damage to health by prolonged exposure if swallowed
R60 - May impair fertility
R61 - May cause harm to the unborn child
R64 - May cause harm to breastfed babies

Safety Phrases:

S23: Do not breathe vapor or spray
S24: Avoid contact with the skin
S36/37/39: Wear suitable protective clothing, gloves and eye/face protection.
S60: This material and its container must be disposed of as hazardous waste

16. OTHER INFORMATION

Notes: NA

ACGIH TLV	American Conference of Governmental Industrial Hygienists – Threshold Limit Value
CAS	Chemical Abstracts Service Number
CERCLA	US EPA law, Comprehensive Environmental Response, Compensation, and Liability Act
DOT	US Department of Transportation Regulations
EEL	Employee Exposure Limit
IATA	International Air Transport Association
LD_{50}	Dosage producing 50% mortality
NA	Not applicable/Not available
NE	Not established
NIOSH	National Institute for Occupational Safety and Health
OSHA PEL	US Occupational Safety and Health Administration – Permissible Exposure Limit
Prop 65	California Proposition 65
RCRA	US EPA, Resource Conservation and Recovery Act
RTECS	Registry of Toxic Effects of Chemical Substances
SARA	Superfund Amendments and Reauthorization Act
STEL	15-minute Short Term Exposure Limit
TSCA	Toxic Substance Control Act
TWA	8-hour Time Weighted Average

16. OTHER INFORMATION: continued

MSDS Coordinator: Global Occupational Toxicology
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