3796-01

Hospira

MATERIAL SAFETY DATA SHEET

Product Name: Ketorolac Tromethamine Injection, USP

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Toradol

Manufacturer Name And Address	Hospira, Inc. 275 North Field Drive Lake Forest, Illinois 60045 USA
Emergency Telephone Hospira, Inc., Non-emergency	CHEMTREC: North America: 800-424-9300; International: 1-703-527-3887 224 212-2055
Product Name	Ketorolac Tromethamine Injection, USP
Synonyms	Ketorolac trometamol; (±)-5-benzoyl-2, 3-dihydro-1H-pyrrolizine-1-carboxylic acid, compound with 2-amino-2-(hydroxymethyl)-1,3-propanediol.

2. COMPOSITION INFORMATION ON INGREDIENTS

Ingredient Name	Ketorolac Tromethamine
Chemical Formula	$C_{19}H_{24}N_2O_6$

Component	Approximate Percent by Weight	CAS Number	RTECS Number
Ketorolac Tromethamine	≤3	74103-07-4	UY7759900
Ethyl Alcohol	10	64-17-5	KQ6300000

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

3. HAZARD INFORMATION

Emergency Overview	Ketorolac Tromethamine Injection, USP, contains ketorolac tromethamine, a non-steroidal anti-inflammatory agent. Clinically, this product is used for the management of pain. In the workplace, ketorolac tromethamine should be considered a potent drug, and possibly irritating to the eyes. Possible target organs include the gastrointestinal system, hematopoietic system, central nervous system, cardiovascular system, kidneys, liver, and possibly the eyes.
Occupational Exposure Potential	Information on the absorption of this product via inhalation or skin contact is not available. Published reports have indicated that ketorolac acid has some potential to be absorbed through intact skin. Avoid liquid aerosol generation and skin contact.
Signs and Symptoms	During occupational use, this material should be considered potentially irritating to the eyes and respiratory tract. In clinical use, adverse effects have included edema and hypertension, nausea, gastrointestinal pain, heartburn and headache. More severe side effects may include gastrointestinal ulceration. Exacerbation of existing renal ailments, leading to hematuria, proteinuria, polyuria, glomerular nephritis, interstitial nephritis, renal papillary necrosis, acute renal failure, and nephrotic syndrome may also occur. This drug affects platelet aggregation and clinical use has produced prolonged bleeding times and hemorrhages. Hypersensitivity reactions such as anaphylaxis, rash, bronchospasm, laryngeal edema, and hypotension have also occurred. Rarely, use of ketorolac can cause elevations in liver enzymes. Direct contact of this product with the eyes could result in eye irritation and stinging.
Medical Conditions Aggravated by Exposure	Pre-existing hypersensitivity to ketorolac, other non-steroidal anti-inflammatory agents, or aspirin. Pre-existing gastrointestinal, hematopoietic system, central nervous system, cardiovascular system, liver, or kidney ailments.
Carcinogen Lists:	**IARC:** Not listed **NTP:** Not listed **OSHA:** Not listed

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	Flash Point: 43°C (109°F)
Fire & Explosion Hazard	Combustible liquid. Keep away from flames, sparks, or other sources of ignition. When heated, product may produce combustible vapors due to the alcohol content.
Extinguishing Media	As with any fire, use extinguishing media appropriate for primary cause of fire.
Special Fire Fighting Procedures	No special provisions required beyond normal fire fighting equipment such as flame and chemical resistant clothing and self contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

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

7. HANDLING AND STORAGE

Handling	No special handling required under conditions of normal product use.
Storage	No special storage required for hazard control. 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	Protect from freezing and extreme heat. In addition, persons with known hypersensitivities to aspirin or other non-steroidal anti-inflammatory agents 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**
Ketorolac Tromethamine	8 hr TWA: Not Established	8 hr TWA: Not Established	8 hr TWA: 40 mcg/m3 STEL: Not Established
Ethyl Alcohol	8 hr TWA: 1000 ppm; 1900 mg/m3	8 hr TWA: 1000 ppm	8 hr TWA: Not Established

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 not needed during the normal use of this product. However, if the generation of aerosols is likely, or respiratory protection is desired, and engineering controls are not considered adequate to control potential airborne exposures, the use of an approved air-purifying respirator with a HEPA cartridge (N95 or equivalent) and an organic vapor cartridge may be needed if excess volatiles are generated. Personnel who wear respirators should be fit tested and approved for respirator use as required.
Skin Protection	If skin contact with the product solution is likely, the use of latex or nitrile gloves is recommended.
Eye Protection	Eye protection is normally not required during intended product use. However, if eye contact is likely to occur, the use of chemical safety goggles (as a minimum) is recommended.
Engineering Controls	Engineering controls are normally not needed during the normal use of this product.

9 PHYSICAL/CHEMICAL PROPERTIES

Appearance/Physical State	Clear to slightly yellow solution.
Odor	NA
Odor Threshold:	NA
pH:	7.4 (6.9-7.9)
Melting point/Freezing point:	NA
Initial Boiling Point/Boiling Point Range	91°C at 760 mm Hg
Evaporation Rate:	NA
Flammability (solid, gas):	NA
Upper/Lower Flammability or Explosive Limits:	LEL: 3.3% based on ethanol UEL: 19% based on ethanol
Vapor Pressure	NA
Vapor Density (Air = 1)	NA
Evaporation Rate	NA

9. PHYSICAL/CHEMICAL PROPERTIES-continued

Specific Gravity	0.991
Solubility	Water, ethyl alcohol
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

Acute Toxicity
Not determined for the product formulation. Information for the ingredients is as follows:

Ingredient(s)	Percent	Test Type	Route of Administration	Value	Units	Species
Ketorolac Tromethamine	100	LD50	Oral	189	mg/kg	Rat
Ketorolac Tromethamine	100	LD50	Oral	293	mg/kg	Mouse
Ketorolac Tromethamine	100	LD50	Intraperitoneal	225	mg/kg	Mouse
Ethyl Alcohol	100	LD50	Oral	3450 to 11,500	mg/kg	Guinea Pig, Rat, Mouse, Dog

LD 50: Dosage that produces 50% mortality.
Product contains between approximately 1.5 to 3.0% ketorolac tromethamine.

Aspiration Hazard	None anticipated from normal handling of this product.
Dermal Irritation/Corrosion	None anticipated from normal handling of this product. Skin contact with ethanol may produce mild irritation with redness and dryness.
Ocular Irritation/Corrosion	None anticipated from normal handling of this product. Inadvertent contact of this product with eyes may produce irritation.
Dermal or Respiratory Sensitization	None anticipated from normal handling of this product. In clinical use, hypersensitivity reactions such as anaphylaxis, rash, bronchospasm, laryngeal edema, and hypotension have been reported.

11. TOXICOLOGICAL INFORMATION (continued)

Reproductive Effects	In studies in rodents, impairment of fertility did not occur in male or female rats given oral dosages of 9 mg/kg and 16 mg/kg of ketorolac tromethamine, respectively. Reproduction studies were conducted during organogenesis using ketorolac tromethamine at daily oral dosages of 3.6 mg/kg in rabbits and 10 mg/kg in rats; no adverse developmental effects on the fetus were noted in these studies. Dosages of ketorolac tromethamine tablets at 1.5 mg/kg administered after gestation day 17, caused dystocia and higher pup mortality in rats. Ethanol, an ingredient in this product, is a known human developmental toxicant. Ingestion of large amounts of ethanol during pregnancy is generally contra-indicated.
Mutagenicity	Ketorolac tromethamine was not mutagenic in the Ames test, unscheduled DNA synthesis and repair, and in forward mutation assays. Ketorolac tromethamine did not cause chromosome breakage in the in vivo mouse micronucleus assay. At concentrations ≥ 1590 mcg/ml, ketorolac tromethamine increased the incidence of chromosomal aberrations in Chinese hamster ovarian cells.
Carcinogenicity	An 18-month oral-dose study in mice with ketorolac tromethamine at dosages of 2 mg/kg/day, and a 24-month oral-dose study in rats at dosages of 5 mg/kg/day, produced no evidence of tumorigenicity.
Target Organ Effects	Based on clinical use, possible target organs include the gastrointestinal system, hematopoietic system, central nervous system, cardiovascular system, liver, kidneys, and possibly the eyes.

12. ECOLOGICAL INFORMATION

Aquatic Toxicity	Not determined for product. Information for ingredients is listed below: *LC50(96h) = 1480 mg/L in bluegill sunfish for ketorolac tromethamine LC50(24 hr) = 12,900-15,300 mg/L in rainbow trout LC50 (24 hr) = 11,200 mg/L in fingerling trout LC50(48-hr) = 9,268 – 14,221 mg/L in Daphnia magna EC50 = 9310 mg/L in Chlorella pyrenoidosa
Persistence/Biodegradability	*Ketorolac tromethamine was not inherently biodegradable. Ethanol, an ingredient in this product, was reported to be degraded between 45% and 74% in five days in two aqueous biodegradation assays.
Bioaccumulation	Not determined for product. Because of its low octanol:water partition coefficient, ethanol is not anticipated to bioaccumulate.
Mobility in Soil	Not determined.

*Roche MSDS

Notes:

1. LC50: Concentration in water that produces 50% mortality in fish or Daphnia
2. EC50: Concentration in water that produces 50% inhibition of growth in algae.

13. DISPOSAL CONSIDERATIONS

Waste Disposal	All wastes must be properly characterized by the waste generator. Disposal should be performed in accordance with the federal, state or local regulatory requirements.
Container Handling and Disposal	Dispose of container 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.)	Not listed

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

U.S. OSHA Classification Possible Irritant
Target Organ Toxin
Combustible Liquid

15. REGULATORY INFORMATION (continued)

GHS Classification* *In circumstances where medicinal products are not exempt, the recommended GHS workplace classification is as follows:

Hazard Class	Acute Oral Toxicity	Eye Irritation	Target Organ Toxicity	Flammable Liquid
Hazard Category	Unclassified	2B	2	3
Symbol	NA	NA		
Signal Word	NA	Warning	Warning	Warning
Hazard Statement	NA	Causes eye irritation	May cause damage to the gastrointestinal system, hematopoietic system, central nervous system, cardiovascular system, liver, and kidneys through prolonged or repeated exposure.	Flammable liquid and vapor

Prevention:
Keep container tightly closed
Keep away from ignitions sources such as heat/sparks/open flame – No smoking
Wear protective gloves and eye/face protection
Take precautionary measures against static discharge.

Response:
In case of fire, use media appropriate for the primary cause of the fire for extinction
IF ON SKIN: Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.

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.
Wash hands after handling.

EU Classification*

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

Classification(s):	Toxic	Irritant
Symbol:		
Indication of Danger:	T	Xi

15. REGULATORY INFORMATION continued

EU Classification: continued

Risk Phrases:	R25 - Toxic if swallowed R36/37 - Irritating to eyes and respiratory system
Safety Phrases:	S24: Avoid contact with the skin S25: Avoid contact with eyes S37/39 Wear suitable gloves and eye/face protection.

16. OTHER INFORMATION

Notes:

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

MSDS Coordinator:	Global Occupational Toxicology
Date Prepared:	September 15, 2005
Date Revised:	May 26, 2009

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