

## SAFETY DATA SHEET

**Product Name: Ketorolac Tromethamine Injection, USP**

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

<b>Manufacturer Name And Address</b>	Hospira, Inc. 275 North Field Drive Lake Forest, Illinois 60045 USA
<b>Emergency Telephone</b>	CHEMTREC: North America: 800-424-9300; International 1-703-527-3887; Australia - 61-290372994; UK - 44-870-8200418
<b>Hospira, Inc., Non-emergency</b>	224 212-2000
<b>Product Name</b>	Ketorolac Tromethamine Injection, USP
<b>Synonyms</b>	Ketorolac trometamol; (±)-5-benzoyl-2, 3-dihydro-1H-pyrrolizine-1-carboxylic acid, compound with 2-amino-2-(hydroxymethyl)-1,3-propanediol.

### 2. HAZARD(S) IDENTIFICATION

<b>Emergency Overview</b>	Ketorolac Tromethamine Injection, USP, is a solution containing 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 combustible liquid, a potent drug, and potentially irritating to the eyes and respiratory tract. Based on clinical use, possible target organs include the gastrointestinal system, hematopoietic system, nervous system, cardiovascular system, liver, and kidneys.
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#### U.S. OSHA GHS Classification

Physical Hazards	Hazard Class	Hazard Category
	Flammable Liquid	3
Health Hazards	Hazard Class	Hazard Category
	Eye Damage / Irritation	2B
	Toxic to Reproduction	2
	STOT – RE	2

#### Label Element(s)

**Pictogram**



**Signal Word**

Warning

**Hazard Statement(s)**

Flammable liquid and vapor  
Causes eye irritation  
Suspected of damaging fertility or the unborn child  
May cause damage to organs through prolonged or repeated exposure

## 2. HAZARD(S) IDENTIFICATION: continued

### Precautionary Statement(s)

#### Prevention

Keep away from heat/sparks/open flames/hot surfaces.– No smoking  
 Keep container tightly closed  
 Ground/bond container and receiving equipment  
 Use explosion-proof equipment  
 Use only non-sparking tools  
 Take precautionary measures against static discharge

Obtain special instructions before use  
 Do not handle until all safety precautions have been read and understood  
 Wear protective gloves/protective clothing/eye protection/face protection  
 Do not breathe vapor or spray  
 Wash hands thoroughly after handling

#### Response

Get medical attention if you feel unwell.

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.

IN CASE OF FIRE: For small fires, use water fog or fire extinguishing media suitable for Class B fires (e.g. dry chemical, carbon dioxide or foam). For large fires, apply water from as far away as possible; use very large quantities of water applied as a mist or spray.

## 3. 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 for Injection (~90). Hazardous ingredients present at less than 1% include sodium chloride; sodium hydroxide and/or hydrochloric acid are used 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

<b>Flammability</b>	Flash Point: 43°C (109°F)
<b>Fire &amp; Explosion Hazard</b>	GHS Flammable Liquid – Category 3. Keep away from flames, sparks, or other sources of ignition. When heated, product may produce combustible vapors due to the alcohol content.
<b>Extinguishing Media</b>	As with any fire, use extinguishing media appropriate for primary cause of fire such as carbon dioxide, dry chemical extinguishing powder or foam.
<b>Special Fire Fighting Procedures</b>	No special provisions required beyond normal firefighting equipment such as flame and chemical resistant clothing and self contained breathing apparatus.

## 6. ACCIDENTAL RELEASE MEASURES

<b>Spill Cleanup and Disposal</b>	Isolate area around spill. Remove potential sources of ignition. Put on suitable protective clothing and equipment as specified by site spill control 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.
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## 7. HANDLING AND STORAGE

<b>Handling</b>	No special handling required for hazard control under conditions of normal product use.
<b>Storage</b>	No special storage required for hazard control. For product protection, follow storage recommendations noted on the product case label, the primary container label, or the product insert.
<b>Special Precautions</b>	No special precautions required for hazard control.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### Exposure Guidelines

Component	Exposure Limits			
	OSHA-PEL	ACGIH-TLV	AIHA WEEL	Hospira EEL
Ketorolac Tromethamine	8-hr TWA: Not Established	8-hr TWA: Not Established	8-hr TWA: Not Established	8-hr TWA: Not Established
Ethyl Alcohol	8 hr TWA: 1000 ppm; 1900 mg/m3	8 hr TWA: 1000 ppm	8-hr TWA: Not Established	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.  
AIHA WEEL: Workplace Environmental Exposure Level  
EEL: Employee Exposure Limit.  
TWA: 8-hour Time Weighted Average

<b>Respiratory Protection</b>	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 (N95 or equivalent) with an organic vapor cartridge is recommended under conditions where airborne aerosol or vapor 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.
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## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION: continued

<b>Skin Protection</b>	If skin contact with the product solution is likely, the use of latex or nitrile gloves is recommended.
<b>Eye Protection</b>	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.
<b>Engineering Controls</b>	Engineering controls are normally not needed during the normal use of this product.

## 9. PHYSICAL/CHEMICAL PROPERTIES

<b>Appearance/Physical State</b>	Clear to slightly yellow solution
<b>Odor</b>	NA
<b>Odor Threshold</b>	NA
<b>pH</b>	7.4 (6.9-7.9)
<b>Melting point/Freezing Point</b>	NA
<b>Initial Boiling Point/Boiling Point Range</b>	91°C at 760 mm Hg
<b>Flash Point</b>	43°C (109°F)
<b>Evaporation Rate</b>	NA
<b>Flammability (solid, gas)</b>	NA
<b>Upper/Lower Flammability or Explosive Limits</b>	LEL: 3.3% based on ethanol UEL: 19% based on ethanol
<b>Vapor Pressure</b>	NA
<b>Vapor Density (Air =1)</b>	NA
<b>Relative Density</b>	NA
<b>Solubility</b>	Water, ethyl alcohol
<b>Partition Coefficient: n-octanol/water</b>	NA
<b>Auto-ignition Temperature</b>	NA
<b>Decomposition Temperature</b>	NA
<b>Viscosity</b>	NA

## 10. STABILITY AND REACTIVITY

<b>Reactivity</b>	Not determined.
<b>Chemical Stability</b>	Stable under standard use and storage conditions.
<b>Hazardous Reactions</b>	Not determined
<b>Conditions to Avoid</b>	Not determined
<b>Incompatibilities</b>	Not determined
<b>Hazardous Decomposition Products</b>	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).
<b>Hazardous Polymerization</b>	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 - 11,500	mg/kg	Guinea Pig, Rat, Mouse, Dog
Ethyl Alcohol	100	LC50 (10h)	Inhalation	20,000	ppm	Rat
Ethyl Alcohol	100	LC50 (4h)	Inhalation	39,000	mg/m3	Mouse

LD 50: Dosage that produces 50% mortality.

Product contains between approximately 1.5 to 3.0% ketorolac tromethamine.

### 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

None anticipated from normal handling of this product. 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.

### 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.

### Reproductive Effects

None anticipated from normal handling of this product. 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 has been shown to produce fetotoxicity in the embryo or fetus of laboratory animals. Chronic prenatal exposure to ethanol has been associated with a distinct pattern of congenital malformations that have collectively been termed the "fetal alcohol syndrome".

## 11. TOXICOLOGICAL INFORMATION: continued

<b>Mutagenicity</b>	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 $\geq 1590$ mcg/ml, ketorolac tromethamine increased the incidence of chromosomal aberrations in Chinese hamster ovarian cells.		
<b>Carcinogenicity</b>	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.		
<b>Carcinogen Lists</b>	<b>IARC:</b> Not listed	<b>NTP:</b> Not listed	<b>OSHA:</b> Not listed
<b>Specific Target Organ Toxicity – Single Exposure</b>	NA		
<b>Specific Target Organ Toxicity – Repeat Exposure</b>	Based on clinical use, possible target organs include the gastrointestinal system, hematopoietic system, nervous system, cardiovascular system, liver, and kidneys.		

## 12. ECOLOGICAL INFORMATION

<b>Aquatic Toxicity</b>	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 for ethanol LC50 (24 hr) = 11,200 mg/L in fingerling trout for ethanol LC50(48 hr) = 9,268 - 14,221 mg/L in Daphnia magna for ethanol EC50 = 9310 mg/L in Chlorella pyrenoidosa (green algae) for ethanol
<b>Persistence/Biodegradability</b>	*Ketorolac tromethamine was not inherently biodegradable.  Ethanol was reported to be degraded between 45% and 74% in five days in two aqueous biodegradation assays.
<b>Bioaccumulation</b>	Not determined for product. Because of its low octanol:water partition coefficient, ethanol is not anticipated to bioaccumulate.
<b>Mobility in Soil</b>	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

<b>Waste Disposal</b>	All waste materials must be properly characterized. Further, disposal should be performed in accordance with the federal, state or local regulatory requirements.
<b>Container Handling and Disposal</b>	Dispose of container and unused contents in accordance with federal, state and local regulations.

## 14. TRANSPORTATION INFORMATION

ADR/ADG/ 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

IMDG STATUS Not regulated  
 Proper Shipping Name NA  
 Hazard Class NA  
 UN Number NA  
 Packing Group NA

Notes: DOT - US Department of Transportation Regulations

Transport Comments: DOT: 49 CFR, 173.150(e) excepts aqueous solutions of alcohol containing no more than 24% ethanol and more than 50% water. 173.150(f) excepts combustible liquids having a flash point of 100°F or higher in non-bulk packagings of 119 gallons or less which also meet no other hazard class. 173.150(g) excepts retail products containing less than 70% ethanol in 8 oz bottles or less.

IATA: A58 excepts aqueous solutions of no more than 24% ethanol.

IMDG: Special provision 144 excepts aqueous solutions of no more than 24% ethanol.

## 15. REGULATORY INFORMATION

US TSCA Status Exempt  
 US CERCLA Status Not listed  
 US SARA 302 Status Not listed  
 US SARA 313 Status Not listed  
 US RCRA Status Not listed  
 US 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

### GHS/CLP Classification\*

\*In the EU, classification under GHS/CLP does not apply to certain substances and mixtures, such as medicinal products as defined in Directive 2001/83/EC, which are in the finished state, intended for the final user.

Hazard Class	Hazard Category	Pictogram	Signal Word	Hazard Statement
NA	NA	NA	NA	NA
Prevention	Keep away from heat/sparks/open flames/hot surfaces.– No smoking Keep container tightly closed Ground/bond container and receiving equipment Use explosion-proof equipment Use only non-sparking tools Take precautionary measures against static discharge Obtain special instructions before use Do not handle until all safety precautions have been read and understood Wear protective gloves/protective clothing/eye protection/face protection Do not breathe vapor or spray Wash hands thoroughly after handling			

## 15. REGULATORY INFORMATION: continued

**Response**

Get medical attention if you feel unwell.

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.

IN CASE OF FIRE: For small fires, use water fog or fire extinguishing media suitable for Class B fires (e.g. dry chemical, carbon dioxide or foam). For large fires, apply water from as far away as possible; use very large quantities of water applied as a mist or spray.

**EU Classification\***

\*Medicinal products are exempt from the requirements of the EU Dangerous Preparations Directive.

**Classification(s)**

NA

**Symbol**

NA

**Indication of Danger**

NA

**Risk Phrases**

NA

**Safety Phrases**

S17: Keep away from sources of ignition - No smoking  
S23: Do not breathe vapor/spray  
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<sub>50</sub>

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

STOT - SE

Specific Target Organ Toxicity – Single Exposure

STOT - RE

Specific Target Organ Toxicity – Repeated Exposure

TSCA

Toxic Substance Control Act

TWA

8-hour Time Weighted Average



**16. OTHER INFORMATION:** continued

MSDS Coordinator:	Hospira GEHS
Date Prepared:	June 02, 2014
Date Revised:	January 29, 2015

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