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Section 1 - Identification



- (a) **Product Identifier:** Ketorolac Tromethamine Inj., USP
- (b) **Product Code:** 70860-700
70860-701
- Common/Trade Name:** Ketorolac Tromethamine Injection
- Chemical Name:** \pm -5-benzoyl-2,3-dihydro-1H-pyrrolizine-1-carboxylic acid, compound with 2-amino-2-(hydroxymethyl)-1,3-propanediol(1:1)
- Chemical Family:** Nonsteroidal anti-inflammatory drug (NSAID)
- (c) **Product Use:** Short-term (up to 5 days in adults), management of moderately severe acute pain that requires analgesia at the opioid level.
- Product Type:** Prescription Drug, Injectable
- Container Information:** Vial
- (d) **Distributor:** Athenex Pharmaceutical Division, 10 N. Martingale Road, Suite 230, Schaumburg, IL 60173, 847-886-9515
- (e) **Emergency Telephone:** 855-273-0154

Section 2 - Hazards Identification


- (a) **Classification:**
- OSHA:** Possible Irritant, Target Organ Toxin, Combustible Liquid

(b) Signal Word, Hazard statement(s), Symbol(s), and/or Precautionary statement(s):	(c) Description of Hazards:
Signal Word:	- WARNING

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(b) Signal Word, Hazard statement(s), Symbol(s), and/or Precautionary statement(s):	(c) Description of Hazards:
<u>GHS Symbols:</u> N/A N/A  	<u>GHS Hazard Statements:</u> <ul style="list-style-type: none"> - Acute Oral Toxicity (Unclassified) - Causes eye irritation (Category 2B) - May cause damage to the gastrointestinal system, hematopoietic system, central nervous system, cardiovascular system, liver, and kidneys through prolonged or repeated exposure (Category 2) - Flammable liquid and vapor (Category 3)
<u>Precautionary Statements</u> Prevention: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 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. 	

(d) Unknown Acute Toxicity N/A

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Section 3 – Composition / Information on Ingredients


(a) Chemical Name	(b) Common Name / Synonym	% Composition or other measure (1 mL fill)	% Composition or other measure (1 mL fill)	% Composition or other measure (2 mL fill)	(c) CAS No.	(d) Impurities/ Stabilizing Additives
±-5-benzoyl-2,3-dihydro- 1H-pyrrolizine-1-carboxylic acid, compound with 2-amino-2-(hydroxymethyl)-1,3-propanediol(1:1)	Ketorolac Tromethamine	15.0 mg/mL	30.0 mg/mL	30.0 mg/mL	74103-07-4	N/A
Ethanol	Ethanol	100.0 mg/mL	100.0 mg/mL	100.0 mg/mL	64-17-5	N/A
Sodium Chloride	Sodium Chloride	6.68 mg/mL	4.35 mg/mL	4.35 mg/mL	7647-14-5	N/A
Water	Water for Injection	q.s. to 1.0 mL	q.s. to 1.0 mL	q.s. to 1.0 mL	7732-18-5	N/A

Section 4 - First Aid Measures

- Eye Exposure:** Flush with water while holding eyelids open for at least 15 minutes. Seek medical attention immediately.
- Skin Exposure:** Remove contaminated clothing. Wash area with cool, soapy water.
- Ingestion:** Wash out mouth with water. Do not induce vomiting unless directed by medical personnel. Seek medical attention immediately.
- Injection:** See patient package insert in shipping carton for complete information.
- Inhalation:** If difficulty breathing, administer oxygen. Seek medical attention immediately. If necessary, provide artificial respiration.
- Notes to Physician:** See patient package insert in shipping carton for complete information.

Section 5 –Fire-fighting Measures

- (a) **Extinguishing Media** Use a multi-purpose extinguisher, or water spray

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- (b) **Hazardous Combustion Products:** Decomposition production of this product may include carbon monoxide, carbon dioxide, and sulfur oxides.
- (c) **Special Protective Equipment / Precautions:** During all fire-fighting activities, wear appropriate protective equipment, including self-contained breathing apparatus. As with all fires, evacuate personnel to a safe area.

Section 6 - Accidental Release Measures

- Spill:** 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.
- Release to Air:** If aerosolized, reduce exposures by ventilating the area; clean up spill immediately to prevent evaporation.
- Release to Water:** Refer to local water authority. Drain disposal is not recommended; refer to local, state, and federal disposal guidelines.

Section 7 - Handling and Storage

- General Handling:** Avoid breathing vapor or mist. Avoid contact with eyes, skin and clothing. Use appropriate personal protective equipment (PPE) while handling (see section 8). Wash hands and any exposed skin after removal of PPE. Releases to the environment should be avoided. A dust/mist respirator (N95) with organic vapor cartridges may be necessary if excess volatiles are generated.
- Storage Conditions:** Store at 20° to 25°C (68° to 77°F). [See USP Controlled Room Temperature.] Protect from light. Retain in carton until time of use.

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Section 8 - Exposure Controls / Personal Protection

(a) Exposure Limits


Compound	Issuer	Type	Exposure Limit
Ketorolac Tromethamine	OSHA	PEL	NE
	ACGIH	TLV	NE
	-----	STEL	NE
Ethanol	OSHA	PEL	1000ppm
	ACGIH	TLV	1000ppm
	-----	STEL	NE
Sodium Chloride	OSHA	PEL	NE
	ACGIH	TLV	NE
	-----	STEL	NE

(b) Engineering Controls

Ventilation: Engineering controls are normally not needed during the normal use of this product. General room ventilation is adequate unless the process generates dust, mist or fumes.

(c) Individual Protection Measures

Respiratory Protection:	Under normal use, respirators are not required. If aerosols are generated, a disposable dust/mist respirator (N95) with organic vapor cartridges may be used. Personnel wearing respirators should be fit tested and approved for respirator use under the OSHA Respiratory Protection Standard 29 CFR 1910.134.
Eye Protection:	Wear safety glasses or goggles if eye contact is possible.
Skin Protection:	Impervious protective clothing is recommended if skin contact with drug product is possible and for bulk processing operations; use latex or nitrile gloves.
Other Protective Equipment:	Refer to applicable national standards and regulations in the selection and use of personal protective equipment (PPE).
Additional Exposure Precautions:	Not applicable

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Section 9 - Physical and Chemical Properties

(a)	Appearance	Colorless to slightly yellow liquid
(b)	Odor	No odor
(c)	Odor Threshold	None
(d)	pH	6.9 – 7.9
(e)	Melting Point:	Not available
(f)	Initial Boiling Point:	Similar to water
(g)	Flash Point	109°F (43°C)
(h)	Evaporation Rate:	Approx to water
(i)	Flammability	See flash point
(j)	Upper Lower Flammability or Explosion Limits	Lower: 3.3% Upper: 19% based on ethanol
(k)	Vapor Pressure:	Approx to water
(l)	Vapor Density:	Approx to water
(m)	Relative Density	Approx to water (about 1.0)
(n)	Solubility(ies)	Soluble in water and ethyl alcohol
(o)	Partition Coefficient: n-octanol/water	Not available
(p)	Auto-ignition Temperature	Not established
(q)	Decomposition Temperature	Not available
(r)	Viscosity	Not available

Section 10 - Stability and Reactivity

(a)	Reactivity	Not Available
(b)	Chemical Stability	Stable under normal conditions of use.
(c)	Possibility of Hazardous Reactions	Hazardous polymerization will not occur
(d)	Conditions to Avoid	Storage with water-reactive materials. Avoid fine particles (such as dust and mists) – may fuel fires/explosions.



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(e) Incompatible Materials

As a precautionary measure, keep away from strong oxidizers and water-reactive materials.

(f) Hazardous Decomposition Products

Decomposition products of this product may include carbon monoxide, carbon dioxide, and sulfur oxides.

Section 11 - Toxicological Information

(a) Likely Routes of Exposure

Skin and eye absorption, ingestion, inhalation


(b) Symptoms related to the physical, chemical and toxicological characteristics

Common adverse effects to excessive exposure include nausea, vomiting, gastrointestinal irritation, diarrhea, fatigue, insomnia, headache and dizziness.

(c) Delayed and immediate effects and also chronic effects from short and long term exposure

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.

Ketorolac affects the central nervous system and has relatively low acute toxicity. Chronic toxicity will result only on excessive repetitive exposure. Chronic Toxicity effects may be seen at the digestive system.

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(d) Acute Toxicity

Component	Type	Route	Species	Dosage
Ketorolac Tromethamine	LD ₅₀	Oral	Rat	189 mg/kg
Ketorolac Tromethamine	LD ₅₀	Oral	Mouse	293 mg/kg
Ketorolac Tromethamine	LD ₅₀	Intraperitoneal	Mouse	225 mg/kg
Ethyl Alcohol	LD ₅₀	Oral	Mouse	3450 g/m ³
Ethyl Alcohol	LD ₅₀	Oral	Rat	7060 mg/kg
Ethyl Alcohol	LC ₅₀ , 4h	Inhalation	Mouse	39 g/m ³
Ethyl Alcohol	LC ₅₀ , 10h	Inhalation	Rat	20,000 ppm
Sodium Chloride	LD ₅₀	Oral	Mouse	4000 mg/kg
Sodium Chloride	LD ₅₀	Oral	Rat	3000 mg/kg
Sodium Chloride	LD ₅₀	Dermal	Rabbit	>10 g/kg
Water	LD ₅₀	Oral	Rat	>50000 mg/kg

(e) Hazardous Chemical Listings

NTP: No

IARC: No

OSHA: No

Section 12 - Ecological Information

(a) Ecotoxicity

The environmental characteristics of this mixture have not been fully evaluated. Releases to the environment should be avoided.

Ketorolac Tromethamine

LC50 (96 hr) = 1480 mg/L in bluegill sunfish for ketorolac tromethamine


Ethyl Alcohol

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

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(b)	Persistence and degradability	<p>Ketorolac tromethamine was not inherently biodegradable.</p> <p>Ethanol, an ingredient in this product, was reported to be degraded between 45% and 74% in five days in two aqueous biodegradation assays.</p>
(c)	Bioaccumulative potential	Not determined for product. Because of its low octanol:water partition coefficient, ethanol is not anticipated to bioaccumulate.
(d)	Mobility in soil	Not determined.
(e)	Other Adverse Effects	Not available

Section 13 - Disposal Considerations

Waste Disposal: Dispose of by incineration at an approved/permitted incinerator. Any cleanup materials and waste residue should be disposed of according to all applicable laws and regulations.


Section 14 - Transport Information

(a)	UN Number	Not available
(b)	UN Proper Shipping Name	Not available
(c)	Transport Hazard Class(es)	Not available
(d)	Packing Group	Not available
(e)	Environmental Hazards	Not available
(f)	Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code)	Not available
(g)	Special Precautions	Not available

DOT: Not Regulated

ICAO/IATA: Not Regulated

IMDG: Not Regulated

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Section 15 - Regulatory Information

Below is selected regulatory information chosen primarily for possible Athenex Pharmaceutical Division usage. This section is not a complete analysis or reference to all applicable regulatory information. Please consider all applicable laws and regulations for your country/state.

U.S. Regulations:

TSCA - No

CERCLA - Not on this list

SARA 302 - Not on this list

SARA 313 – Not listed

OSHA Substance Specific – Possible Irritant, Target Organ Toxin, Combustible Liquid

RCRA – Not listed

California Proposition 65 – Not Listed


Section 16 - Other Information

As of the date of effectiveness, we are providing available information relevant to the handling of this material in the workplace. All information contained herein is offered with the good faith belief that it is accurate. THIS SAFETY DATA SHEET SHALL NOT BE DEEMED TO CREATE ANY WARRANTY OF ANY KIND (INCLUDING WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE). In the event of an adverse incident associated with this material, this safety data sheet is not intended to be a substitute for consultation with appropriately trained personnel. Nor is this safety data sheet intended to be a substitute for product literature which may accompany the finished product. For additional information contact:

Athenex Pharmaceutical Division
 10 N. Martingale Road, Suite 230
 Schaumburg, IL 60173
 847-886-9515

Glossary: This glossary contains definitions of general terms used in SDSs. Not all of these Glossary Terms will apply to this SDS.

ACGIH	American Conference of Governmental Industrial Hygienists
AICS	Australian Inventory of Chemical Substances
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
CAS Number	Chemical Abstract Service Registry Number
CERCLA	Comprehensive Environmental Response Compensation and Liability Act (of 1980)
CHAN	Chemical Hazard Alert Notice
CHEMTREC	Chemical Transportation Emergency Center
DOT	Department of Transportation
DSL	Domestic Substances List
ECHA	European Chemicals Agency
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of Notified Chemical Substances
EPA	Environmental Protection Agency

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GHS	Globally Harmonized System of Classification and Labelling of Chemicals
HEPA	High Efficiency Particulate Air (Filter)
HMIS	Hazardous Materials Identification System
IARC	International Agency for Research on Cancer
ICAO/IATA	International Civil Aviation Organization/International Air Transport Association
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
KOW	Octanol/Water Partition Coefficient
LEL	Lower Explosive Limit
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
NA	Not Applicable, except in Section 14 where NA = North America
NE	Not Established
NADA	New Animal Drug Application
NAIF	No Applicable Information Found
NCI	National Cancer Institute
NDSL	Non-Domestic Substances List
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NOS	Not Otherwise Specified
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
OEL	Occupational Exposure Limit
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act
RQ	Reportable Quantity
RTECS	Registry of Toxic Effects of Chemical Substances
SARA	Superfund Amendments and Reauthorization Act
SDS	Safety Data Sheet
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value (ACGIH)
TPQ	Threshold Planning Quantity
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average/8 Hours Unless Otherwise Noted
UEL	Upper Explosive Limit
UN	United Nations
USP	United States Pharmacopeia
WEEL	Workplace Environmental Exposure Level (AIHA)
WHMIS	Workplace Hazardous Materials Information System

Signature Manifest

Document Number: SDS013

Revision: 02

Title: Ketorolac Tromethamine Inj., USP (15 mg/mL, 30 mg/mL, and 60 mg/2 mL)

All dates and times are in Eastern Standard Time.

SDS013

Change Request

Name/Signature	Title	Date	Meaning/Reason
Michael Scribner (MSCRIBNER)	Director of Quality	30 Jun 2017, 11:14:36 AM	Approved

Dept Approval

Name/Signature	Title	Date	Meaning/Reason
Tom Moutvic (TMOUTVIC)	VP of Regulatory Affairs		
John Andre (JANDRE)	Regulatory Affairs Consultant	30 Jun 2017, 01:48:52 PM	Approved

Final QA Approval/Set Effective Date

Name/Signature	Title	Date	Meaning/Reason
Sheila Moran (SMORAN)	VP of Quality Assurance	30 Jun 2017, 01:55:00 PM	Approved