Safety Data Sheet

SECTION 1: Identification

Contact information

General

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Emergency telephone number

1-(800) 535-5053 (US and Canada)
FOR CHEMICAL EMERGENCY CALL INFOTRAC 1-800-535-5053 24Hrs. per day, 7 days a week

Product identifier

Arformoterol Inhalation Solution

Synonyms

For arformoterol tartrate (the active ingredient): (R,R)-formoterol tartrate; (R,R)-(-)-N-[2-hydroxy-5-[1-hydroxy-2-[[2-(4-methoxyphenyl)-1-methylethyl]amino]ethyl] phenyl formamide (2R,3R)-dihydroxy butanedioate, 1:1 salt; (R,R)-formoterol L-tartrate; formamide, N-[2-hydroxy-5-[(1R)-1-hydroxy-2-[[(1R)-2-(4-methoxyphenyl)]-,(2R,3R)-2,3-dihydroxybutanedioate (1:1) salt

Trade name

Not applicable

Chemical family

Mixture - contains an enantiomer of formoterol

Recommended uses and restrictions

Formulated pharmaceutical product/mixture packaged in final form for patient use; used for the treatment of bronchoconstriction in patients with chronic obstructive pulmonary disease.

Note

This SDS is written to address potential worker health and safety issues associated with the handling of the formulated product/mixture. Workers manufacturing this product/mixture should consult the SDS of each hazardous ingredient for hazard information and handling recommendations. This SDS will be revisited if more data become available.

SECTION 2: Hazard(s) identification

Classification of the substance or mixture

Drugs in the finished state and intended for the final user are not subject to labeling in the US, EU or Canada. Consult prescribing/packaging information. The classification and labeling listed below is for bulk drug product.

Respiratory sensitization, Category 1
May cause an allergy or asthma symptoms or breathing difficulties if inhaled
Specific target organ toxicity (single exposure) Category 1
Causes damage to organs (cardiovascular system)
Specific target organ toxicity (repeated exposure) Category 1
Causes damage to organs (respiratory system) through prolonged or repeated exposure

Label elements

GHS Hazard pictograms

GHS Signal word

Danger

GHS Hazard statements

H334 - May cause an allergy or asthma symptoms or breathing difficulties if inhaled

H370 - Causes damage to organs (cardiovascular system)

H372 - Causes damage to organs (respiratory system) through prolonged or repeated exposure

GHS Precautionary statements

P260 - Do not breathe mist, spray, vapors. P264 - Wash hands, forearms and face thoroughly after handling. P270 - Do not eat, drink or smoke when using this product. P284 - [In case of inadequate ventilation] wear respiratory protection. P304+P341 - If inhaled: If breathing is difficult, remove person to fresh air and keep comfortable for breathing. P307+P311 - If exposed: Call a poison center/doctor. P314 - Get medical advice/attention if you feel unwell. P321 - Specific treatment (see supplemental first aid instruction on this label). P342+P311 - If experiencing respiratory symptoms: Call a poison center or doctor. P405 - Store locked up. P501 - Dispose of contents/container to hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation.

Other hazards

Arformoterol tartrate, the (R,R)-enantiomer of formoterol, is a long-acting selective $beta_2$-adrenergic agonist that has a 2-fold greater potency than racemic formoterol.

Common adverse effects include cardiovascular effects (e.g., chest pain, changes in blood pressure or heart rate, and alterations in the heart's electrical conductivity patterns), insomnia, nervousness, headache, tremors, dry mouth, muscle cramps, nausea, dizziness, fatigue, malaise, and metabolic acidosis. Cardiac arrest and even death may be associated with overdoses of arformoterol tartrate.

There is an increased risk of asthma-related death and potentially life-threatening paradoxical bronchospasm with $beta_2$-agonists, including arformoterol. There have been reports of anaphylactic reaction, hives, swelling, rash, and bronchospasm with therapeutic use of inhaled arformoterol formulations.

Based on animal studies and its mechanism of action, there is a potential for arformoterol tartrate to adversely affect a developing fetus.

Note

This mixture is classified as hazardous under GHS as implemented by Regulation EC No 1272/2008 (EU CLP), WHMIS 2015 (Health Canada), and Hazard Communication Standard No. 1910.1200 (US OSHA).

SECTION 3: Composition/Information on ingredients

Ingredient	CAS number	EINECS/ELINCS#	Amount	GHS classification
Arformoterol tartrate	200815-49-2	N/A	≈ 0.0011 %	Acute Tox. 4 (Oral), H302 Acute Tox. 2 (Inhalation:dust,mist), H330 Resp. Sens. 1, H334 Carc. 2, H351 Repr. 1B, H360D STOT SE 1, H370 STOT RE 1, H372

Note

The substance listed above is considered hazardous. See Section 16 for full text of GHS classifications. The primary ingredient in this mixture is water for injection. The remaining components are not hazardous and/or present at amounts below reportable limits. Amounts are listed as ranges; the exact percentage of composition is withheld as a trade secret.

SECTION 4: First-aid measures

Description of first aid measures

Immediate medical attention and special treatment, if necessary

Yes.

Inhalation

Immediately move exposed subject to fresh air. If not breathing, give artificial respiration. If breathing is labored, administer oxygen. Immediately notify medical personnel and supervisor.

Skin contact

Wash exposed area with soap and water and remove contaminated clothing/shoes. If irritation occurs or persists, notify medical personnel and supervisor.

Eye contact

If easy to do, remove contact lenses, if worn. Immediately flush eyes with copious quantities of water for at least 15 minutes. If irritation occurs or persists, notify medical personnel and supervisor.

Ingestion

If swallowed, call a physician immediately. Do not induce vomiting unless directed by medical personnel. Do not give anything to drink unless directed by medical personnel. Never give anything by mouth to an unconscious person. Notify medical personnel and supervisor.

Most Important Symptoms/Effects

Medical conditions aggravated by exposure: None known or reported. Treat symptomatically and supportively.

Expected Symptoms/Effects, Acute and Delayed

See Sections 2 and 11

SECTION 5: Fire-fighting measures

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media

Use water spray (fog), foam, dry powder, or carbon dioxide, as appropriate for surrounding fire and materials.

Specific hazards arising from the chemical	No information identified. May emit carbon monoxide, carbon dioxide, oxides of nitrogen and other nitrogen-containing compounds.
Fire hazard	No information identified. No information identified. As product is an aqueous solution, it is not expected to be flammable.
Explosion hazard	No information identified. As product is an aqueous solution, it is not expected to be explosive.

Special protective equipment and precautions for fire-fighters

Firefighting instructions	In case of fire in the surroundings: use the appropriate extinguishing agent. Wear full protective clothing and an approved, positive pressure, self-contained breathing apparatus. Decontaminate all equipment after use.

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

Protective equipment	If product is released or spilled, take proper precautions to minimize exposure by using appropriate personal protective equipment (see Section 8). Area should be adequately ventilated.
Emergency procedures	Do not breathe vapors/mist/spray.
Environmental precautions	Do not empty into drains. Avoid release to the environment.

Methods and material for containment and cleaning up

Methods for cleaning up	DO NOT CAUSE MATERIAL TO BECOME AIRBORNE. For small spills, soak up material with absorbent, e.g, paper towels. For large spills, cordon off spill area and minimize the spreading of spilled material. Soak up material with absorbent. Collect spilled material, absorbent, and rinse water into suitable containers for proper disposal in accordance with applicable waste disposal regulations (see Section 13). Decontaminate the area twice with an appropriate solvent (see Section 9).
Other information	Dispose of materials or solid residues at an authorized site.
Reference to other sections	See Sections 8 and 13 for more information.

SECTION 7: Handling and storage

Precautions for safe handling	Follow recommendations for handling potent pharmaceutical agents (i.e, use of engineering controls and/or other personal protective equipment if needed). Avoid contact with eyes, skin and other mucous membranes. Wash thoroughly after handling. Do not breathe vapor/mist/spray.

Conditions for safe storage, including any incompatibilities

Storage conditions	Protect from light. and excessive heat.
Storage temperature	2 – 8 °C
Specific end use(s)	Pharmaceuticals.

SECTION 8: Exposure controls/personal protection

Control parameters/Occupational Exposure Limits

Name	Issuer	Value
Arformoterol tartrate	Sunovion	150 ng/m³

Appropriate engineering controls	None required for normal handling of packaged product. If vials are crushed or broken, or if handling bulk formulation: Control exposures to below the OEL (for the active ingredient(s) if available). Selection and use of containment devices and personal protective equipment should be based on a risk assessment of exposure potential. Utilize closed and sealed systems whenever possible. Solutions used for procedures where aerosolization may occur (e.g., spraying, pumping, open transfers,) must be handled using an engineered local exhaust ventilation (LEV) and/or enclosure or isolator system. Control the potential for spills and leaks by securing all connections. Use clean-in-place systems.
Respiratory protection	None required for normal handling of packaged product. If vials are crushed or broken, or if handling bulk formulation: Choice of respiratory protection should be appropriate to the task and the level of existing engineering controls. A powered air-purifying respirator (PAPR) with HEPA filters and head cover is required when performing aerosol-generating operations. An airline respirator or self-contained breathing apparatus (SCBA) and disposable outerwear is required for spill cleanup.
Hand protection	None required for normal handling of packaged product. If vials are crushed or broken, or if handling bulk formulation:Wear nitrile or other impervious gloves if skin contact is possible. Double gloves should be considered. When the material is diluted in an organic solvent, wear gloves that provide protection against the solvent.
Eye protection	None required for normal handling of packaged product. If vials are crushed or broken, or if handling bulk formulation: Wear safety glasses with side shields, chemical splash goggles, or full face shield, if necessary. Base the choice of protection on the job activity and potential for contact with eyes or face. An emergency eye wash station should be available.

Skin and body protection	None required for normal handling of packaged product. If vials are crushed or broken, or if handling bulk formulation: Wear disposable coveralls appropriate to the task, booties, two pairs of gloves and safety glasses with side shields. Protective garments (coveralls, disposable coveralls, lab coats) are not to be worn in common areas (e.g., cafeterias) or out-of-doors. Employees must be trained in proper gowning and degowning practices. An anteroom or transition area must be used for gowning and degowning.
Other protective measures	Wash hands in the event of contact with this substance, especially before eating, drinking or smoking. Protective equipment is not to be worn outside the work area (e.g., in common areas or out-of-doors).
Environmental exposure controls	Avoid release to the environment and operate within closed systems wherever practicable. Air and liquid emissions should be directed to appropriate pollution control devices. In case of spill, do not release to drains. Implement appropriate and effective emergency response procedures to prevent release or spread of contamination and to prevent inadvertent contact by personnel.

SECTION 9: Physical and chemical properties

Physical state	Liquid
Appearance	Aqueous solution
Formula	Mixture - Not applicable
Molecular mass	Mixture - Not applicable
Color	Clear
Odor	No data available
pH	No data available
Melting point	No data available
Freezing point	No data available
Boiling point	No data available
Flash point	As an aqueous solution, it is not likely to be flammable.
Relative evaporation rate (butyl acetate=1)	No data available
Flammability (solid, gas)	No data available
Vapor pressure	No data available
Relative vapor density at 20 °C	No data available
Relative density	No data available
Solubility	No data available
Log Kow	No data available
Auto-ignition temperature	As an aqueous solution, it is not likely to auto-ignite.
Decomposition temperature	No data available
Viscosity, kinematic	No data available
Viscosity, dynamic	No data available
Explosion limits	No data available
Explosive properties	As an aqueous solution, it is not likely to be explosive.
Oxidizing properties	No data available

SECTION 10: Stability and reactivity

Reactivity	The product is non-reactive under normal conditions of use, storage and transport.
Chemical stability	Stable under normal conditions.
Possibility of hazardous reactions	No dangerous reactions known under normal conditions of use.
Conditions to avoid	(See section 7: Handling and Storage).
Incompatible materials	No data available
Hazardous decomposition products	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

Note	No data on product formulation. The following information is for arformoterol tartrate and other ingredients, where applicable.
Likely routes of exposure	May be absorbed by inhalation, skin contact and ingestion.

Toxicological information

Acute toxicity

Component	Type	Dose
Arformoterol tartrate	LD50 oral rat	> 1000 mg/kg

Serious eye damage/irritation	No data available
Skin corrosion/irritation	No data available
Sensitization	No data available
STOT-single exposure	Oral Mice, LD50 :150 mg/kg IV Rat, LD50: 50-100 mg/kg Inhalation Rat, LDLO 1.6 mg/kg Mice, LOAEL: 1.6 mg/kg Effects: heart muscle toxicity, increased and/or irregular heart rate.
STOT-repeated exposure	Mice (28-day), inhalation LOAEL: 0.1 mg/kg/day Effects: Adverse effects reported in the spleen, kidneys, and skin. Mice (28-day), oral LOAEL: 0.005 mg/kg/day Effects: Adverse effects reported in the heart, salivary gland, thymus, liver, and kidneys. Rat (6-month), inhalation LOAEL: 0.1 mg/kg/day Effects: decreased levels of glucose and amylase activity. Mortality occurred at 0.4 mg/kg/day Dog (up to 9 months), inhalation LOAEL: 0.005 mg/kg/day Effects: cardiac abnormalities, clinical signs (flushing of the body and face, reddened ears/gums). Mortality occurred at 0.070 mg/kg/day.
Reproductive toxicity	Rat, oral, males and females NOAEL: 10 mg/kg/day (highest dose tested)
Developmental toxicity	Rat oral (embryofetal development) Maternal NOAEL: 10 mg/kg/day (highest dose tested) Fetal LOAEL: 1 mg/kg/day (lowest dose tested) Effects: malformations (umbilical hernia) Rat oral (pre- and post-natal development) Maternal LOAEL: 1 mg/kg/day (lowest dose tested) Fetal LOAEL: 5 mg/kg/day Effects: increased gestation length, difficult labor, decreased pup survival and body weight; fetal malformations at 10 mg/kg/day. Rabbit oral (embryofetal development) Maternal LOAEL: 40 mg/kg/day Fetal LOAEL: 20 mg/kg/day (lowest dose tested); lethality: 80 mg/kg/day Effects: maternal toxicity; fetal malformations and decreased body weights. Fetal mortality occurred at ≥40 mg/kg/day.
Genotoxicity	*In vitro*: Bacterial reverse mutation assay (e.g. Ames test): negative Chromosomal aberration assay (Chinese hamster ovary cells): negative *In vivo*: Mouse micronucleus assay: negative
Carcinogenicity	Mice, oral, LOAEL: 1 mg/kg Effect: incidence of uterine and cervical endometrial stromal polyps and stromal cell sarcoma in females. Rat, inhalation, LOAEL: 0.1 mg/kg Effect: incidence of thyroid gland c-cell adenoma, ovarian cysts, and carcinoma in females. No tumor findings at 0.04 mg/kg. None of the components of the mixture present at levels greater than or equal to 0.1% are listed by NTP, IARC, ACGIH or OSHA as a carcinogen.
Aspiration hazard	No data available
Experience with humans	See "Section 2 - Other Hazards".

SECTION 12: Ecological information

Toxicity

Component	Type	Concentration
Arformoterol tartrate	No data available	No data available

Persistence and degradability	Formoterol is not expected to undergo hydrolysis or photolysis.
Bioaccumulative potential	Based on an estimated bioconcentration factor of 5, formoterol is not expected to bioaccumulate.
Mobility in soil	Formoterol is expected to have moderate mobility in soil (based on a pKa1 (amine) of 7.9 and a pKa2 (phenol) of 9.2)
Results of PBT assessment	No data available
Other adverse effects	No data available
Note	The environmental characteristics of this mixture have not been fully investigated. Releases to the environment should be avoided.

SECTION 13: Disposal considerations

Waste treatment methods	Used product should be disposed of according to local, state, and federal regulations. All wastes containing the material should be properly labeled. Dispose of wastes in accordance to prescribed federal, state, and local guidelines, e.g, appropriately permitted chemical waste incinerator. Rinse waters resulting from spill cleanups should be discharged in an environmentally safe manner, e.g, appropriately permitted municipal or on-site wastewater treatment facility.

SECTION 14: Transport information

Transport	Based on the available data, this mixture is not regulated as a hazardous material/dangerous good under EU ADR/RID, US DOT, Canada TDG, IATA, or IMDG.
UN number	None assigned.
UN proper shipping name	None assigned.
Transport hazard class(es) (DOT)	None assigned.
Packing group	None assigned.
Marine pollutant	Based on the available data, this mixture is not regulated as an environmental hazard or a marine pollutant.
Special transport precautions	Avoid release to the environment.
Transport in bulk according to Annex II of Marpol and the IBC Code	Not applicable

SECTION 15: Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture	This SDS generally complies with the requirements listed under current guidelines in the US, EU and Canada. Consult your local or regional authorities for more information.
Chemical safety assessment	No chemical safety assessment has been carried out
TSCA	Drugs are exempt from TSCA.
SARA Section 313 - Emission Reporting	This substance or mixture is not known to contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.
California Proposition 65	California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm
Additional information	No additional information available

SECTION 16: Other information

Full text of H phrases and GHS classification	Acute Tox. 2 (Inhalation:dust,mist) - Acute toxicity (inhalation:dust,mist) Category 2. Acute Tox. 4 (Oral) - Acute toxicity (oral) Category 4. Carc. 2 - Carcinogenicity Category 2. Repr. 1B - Reproductive toxicity Category 1B. Resp. Sens. 1 - Respiratory sensitization, Category 1. STOT RE 1 - Specific target organ toxicity (repeated exposure) Category 1. STOT SE 1 - Specific target organ toxicity (single exposure) Category 1. H302 - Harmful if swallowed. H330 - Fatal if inhaled. H334 - May cause an allergy or asthma symptoms or breathing difficulties if inhaled. H351 - Suspected of causing cancer. H360D - May damage the unborn child. H370 - Causes damage to organs. H372 - Causes damage to organs through prolonged or repeated exposure.

Data sources	Information from published literature and internal company data.
Abbreviations and acronyms	ACGIH - American Conference of Governmental Industrial Hygienists; ADR/RID - European Agreement Concerning the International Carriage of Dangerous Goods by Road/Rail; AIHA - American Industrial Hygiene Association; CAS# - Chemical Abstract Services Number; CLP - Classification, Labelling, and Packaging of Substances and Mixtures; DNEL - Derived No Effect Level; DOT - Department of Transportation; EINECS - European Inventory of New and Existing Chemical Substances; ELINCS - European List of Notified Chemical Substances; EU - European Union; GHS - Globally Harmonized System of Classification and Labeling of Chemicals; IARC - International Agency for Research on Cancer; IDLH - Immediately Dangerous to Life or Health; IATA - International Air Transport Association; IMDG - International Maritime Dangerous Goods; LOEL - Lowest Observed Effect Level; LOAEL - Lowest Observed Adverse Effect Level; NIOSH - The National Institute for Occupational Safety and Health; NOEL - No Observed Effect Level; NOAEL - No Observed Adverse Effect Level; NTP - National Toxicology Program; OEL - Occupational Exposure Limit; OSHA - Occupational Safety and Health Administration; PBT - Persistent, Bioaccumulative, and Toxic; PNEC - Predicted No Effect Concentration; SARA - Superfund Amendments and Reauthorization Act; STOT - Specific Target Organ Toxicity; STEL - Short Term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System
Issue date	30 September 2020
Current revision	2.0
Indication of changes	All sections have been updated.
Disclaimer	The above information is based on data available to us and is believed to be correct. Since the information may be applied under conditions beyond our control and with which we may be unfamiliar, we do not assume any responsibility for the results of its use and all persons receiving it must make their own determination of the effects, properties and protections which pertain to their particular conditions. No representation, warranty, or guarantee, express or implied (including a warranty of fitness or merchantability for a particular purpose), is made with respect to the materials, the accuracy of this information, the results to be obtained from the use thereof, or the hazards connected with the use of the material. Caution should be used in the handling and use of the material because it is a pharmaceutical product. The above information is offered in good faith and with the belief that it is accurate. As of the date of issuance, we are providing all information relevant to the foreseeable handling of the material. However, in the event of an adverse incident associated with this product, this Safety Data Sheet is not, and is not intended to be, a substitute for consultation with appropriately trained personnel.