1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Timolol Formulation

Manufacturer or supplier’s details

Company name of supplier : MSD
Address : Kumagaya, Saitama Prefecture, Xicheng 810 MSD Co., Ltd. Menuma factory
Telephone : 048-588-8411
E-mail address : EHSDATASTeward@msd.com
Emergency telephone number : 1-908-423-6000

Recommended use of the chemical and restrictions on use
Recommended use : Pharmaceutical

2. HAZARDS IDENTIFICATION

GHS Classification
Specific target organ toxicity - repeated exposure : Category 1 (Cardio-vascular system, Lungs)

GHS label elements
Hazard pictograms :

Signal word : Danger

Hazard statements : H372 Causes damage to organs (Cardio-vascular system, Lungs) through prolonged or repeated exposure.

Precautionary statements : Prevention:
P260 Do not breathe mist or vapours.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product. Response:
P314 Get medical advice/attention if you feel unwell.
Disposal:
P501 Dispose of contents/container to an approved waste disposal plant.

Other hazards which do not result in classification
None known.
SAFETY DATA SHEET

Timolol Formulation

Version 4.3 Revision Date: 09/13/2019 SDS Number: 1598367-00008 Date of last issue: 2019/04/24 Date of first issue: 2017/05/01

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

<table>
<thead>
<tr>
<th>Components</th>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>Concentration (% w/w)</th>
<th>ENCS No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Benzodecinium bromide</td>
<td>7281-04-1</td>
<td>&gt;= 0.0025 - &lt; 0.025</td>
<td>3-2694 / 1-105, 3-326 / 1-105</td>
</tr>
<tr>
<td></td>
<td>Benzododecinium chloride</td>
<td>139-07-1</td>
<td>&gt;= 0.0025 - &lt; 0.025</td>
<td>1-215 / 3-2694, 3-326 / 1-215</td>
</tr>
<tr>
<td></td>
<td>Miristalkonium chloride</td>
<td>139-08-2</td>
<td>&gt;= 0.0003 - &lt; 0.0025</td>
<td>1-215 / 3-2694, 3-326 / 1-215</td>
</tr>
<tr>
<td></td>
<td>(S)-3-[3-(tert-butylamino)-2-hydroxypropoxy]-4-morpholino-1,2,5-thiadiazole monomaleate</td>
<td>26921-17-5</td>
<td>&gt;= 0.1 - &lt; 1</td>
<td></td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice : In the case of accident or if you feel unwell, seek medical advice immediately. When symptoms persist or in all cases of doubt seek medical advice.

If inhaled : If inhaled, remove to fresh air. Get medical attention.

In case of skin contact : In case of contact, immediately flush skin with soap and plenty of water. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

In case of eye contact : Flush eyes with water as a precaution. Get medical attention if irritation develops and persists.

If swallowed : If swallowed, DO NOT induce vomiting. Get medical attention. Rinse mouth thoroughly with water.

Most important symptoms and effects, both acute and delayed : Causes damage to organs through prolonged or repeated exposure.

Protection of first-aiders : First Aid responders should pay attention to self-protection, and use the recommended personal protective equipment when the potential for exposure exists (see section 8).

Notes to physician : Treat symptomatically and supportively.

5. FIREFIGHTING MEASURES

Suitable extinguishing media : Water spray Alcohol-resistant foam Carbon dioxide (CO2) Dry chemical

Unsuitable extinguishing media : None known.
Specific hazards during fire-fighting:

- Exposure to combustion products may be a hazard to health.

Hazardous combustion products:

- Carbon oxides
- Metal oxides
- Phosphorus compounds

Specific extinguishing methods:

- Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
- Use water spray to cool unopened containers.
- Remove undamaged containers from fire area if it is safe to do so.
- Evacuate area.

Special protective equipment for firefighters:

- In the event of fire, wear self-contained breathing apparatus.
- Use personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures:

- Use personal protective equipment.
- Follow safe handling advice and personal protective equipment recommendations.

Environmental precautions:

- Discharge into the environment must be avoided.
- Prevent further leakage or spillage if safe to do so.
- Prevent spreading over a wide area (e.g. by containment or oil barriers).
- Retain and dispose of contaminated wash water.
- Local authorities should be advised if significant spillages cannot be contained.

Methods and materials for containment and cleaning up:

- Soak up with inert absorbent material.
- For large spills, provide dyking or other appropriate containment to keep material from spreading. If dyked material can be pumped, store recovered material in appropriate container.
- Clean up remaining materials from spill with suitable absorbent.
- Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable.
- Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

7. HANDLING AND STORAGE

Handling:

Technical measures:

- See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.

Local/Total ventilation:

- Use only with adequate ventilation.

Advice on safe handling:

- Avoid inhalation of vapour or mist.
- Do not swallow.
- Avoid contact with eyes.
- Avoid prolonged or repeated contact with skin.
- Handle in accordance with good industrial hygiene and safety practices.
practice, based on the results of the workplace exposure assessment.
Take care to prevent spills, waste and minimize release to the environment.

Avoidance of contact:
 Oxidizing agents

Hygiene measures:
 If exposure to chemical is likely during typical use, provide eye flushing systems and safety showers close to the working place.
When using do not eat, drink or smoke.
Wash contaminated clothing before re-use.

Storage
 Conditions for safe storage:
 Keep in properly labelled containers.
Store in accordance with the particular national regulations.

Materials to avoid:
 Do not store with the following product types:
 Strong oxidizing agents

Packaging material:
 Unsuitable material: None known.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Threshold limit value and permissible exposure limits for each component in the work environment

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value type (Form of exposure)</th>
<th>Control parameters / Permissible concentration</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>(S)-3-[3-(tert-buty lamino)-2-hydroxypropoxy]-4-morpholino-1,2,5-thiadiazole monomaleate</td>
<td>26921-17-5</td>
<td>TWA</td>
<td>10 µg/m3 (OEB 3)</td>
<td>Internal</td>
</tr>
</tbody>
</table>

Further information: Eye, Skin

Wipe limit 100 µg/100 cm² Internal

Engineering measures:
 Ensure adequate ventilation, especially in confined areas.
Minimize workplace exposure concentrations.

Personal protective equipment

Respiratory protection:
 If adequate local exhaust ventilation is not available or exposure assessment demonstrates exposures outside the recommended guidelines, use respiratory protection.

Filter type
 Particulates type

Hand protection
 Material
 Chemical-resistant gloves

Remarks:
 Choose gloves to protect hands against chemicals depending on the concentration and quantity of the hazardous substance and specific to place of work. Breakthrough time is not determined for the product. Change gloves often! For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday.
Eye protection: Wear the following personal protective equipment: Safety glasses

Skin and body protection: Select appropriate protective clothing based on chemical resistance data and an assessment of the local exposure potential. Skin contact must be avoided by using impervious protective clothing (gloves, aprons, boots, etc).

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Aqueous solution

Colour: Colorless to pale yellow

Odour: No data available

Odour Threshold: No data available

pH: No data available

Melting point/freezing point: No data available

Initial boiling point and boiling range: No data available

Flash point: No data available

Evaporation rate: No data available

Flammability (solid, gas): Not applicable

Flammability (liquids): No data available

Upper explosion limit / Upper flammability limit: No data available

Lower explosion limit / Lower flammability limit: No data available

Vapour pressure: No data available

Relative vapour density: No data available

Density: No data available

Solubility(ies): Water solubility: soluble

Partition coefficient: n-octanol/water: No data available

Auto-ignition temperature: No data available

Decomposition temperature: No data available

Viscosity: Viscosity, kinematic: No data available
Explosive properties: Not explosive

Oxidizing properties: The substance or mixture is not classified as oxidizing.

Molecular weight: Not applicable

Particle size: Not applicable

10. STABILITY AND REACTIVITY

Reactivity: Not classified as a reactivity hazard.
Chemical stability: Stable under normal conditions.
Possibility of hazardous reactions: Can react with strong oxidizing agents.
Conditions to avoid: None known.
Incompatible materials: Oxidizing agents
Hazardous decomposition products: No hazardous decomposition products are known.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure: Inhalation
Skin contact
Ingestion
Eye contact

Acute toxicity
Not classified based on available information.

Components:

Benzodecinium bromide:
Acute oral toxicity: LD50 (Rat): 344 mg/kg
Remarks: Based on data from similar materials

Acute inhalation toxicity: LC50 (Rat): 0.25 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 403
Assessment: Corrosive to the respiratory tract.
Remarks: Based on data from similar materials

Acute dermal toxicity: LD50 (Rabbit): 3,412.5 mg/kg
Remarks: Based on data from similar materials

Benzododecinium chloride:
Acute oral toxicity: LD50 (Rat): > 300 - 2,000 mg/kg
Remarks: Based on data from similar materials

Acute inhalation toxicity: Assessment: Corrosive to the respiratory tract.

Acute dermal toxicity: LD50 (Rabbit): > 2,000 mg/kg
Remarks: Based on data from similar materials

**Miristalkonium chloride:**

- **Acute oral toxicity**: LD50 (Rat): 397.5 mg/kg  
  Method: OECD Test Guideline 401  
  Remarks: Based on data from similar materials

- **Acute inhalation toxicity**: Assessment: Corrosive to the respiratory tract.  
  Remarks: Based on data from similar materials

- **Acute dermal toxicity**: LD50 (Rabbit): 3,412 mg/kg  
  Remarks: Based on data from similar materials

**Acute toxicity (other routes of administration)**

- **LD50 (Mouse)**:  
  - Oral: 1,000 mg/kg  
  - Intraperitoneal: 1,140 mg/kg

**Skin corrosion/irritation**

- Not classified based on available information.

**Components:**

**Benzodecinium bromide:**

- **Species**: Rabbit  
  - **Result**: Corrosive after 3 minutes to 1 hour of exposure  
  - **Remarks**: Based on data from similar materials

**Benzododecinium chloride:**

- **Species**: Rabbit  
  - **Result**: Corrosive after 3 minutes to 1 hour of exposure  
  - **Remarks**: Based on data from similar materials

**Miristalkonium chloride:**

- **Species**: Rabbit  
  - **Result**: Corrosive after 3 minutes to 1 hour of exposure  
  - **Remarks**: Based on data from similar materials

**Acute toxicity (other routes of administration)**

- **LD50 (Mouse)**:  
  - Oral: 800 mg/kg  
  - Subcutaneous: 300 mg/kg

**Skin irritation**

- Not classified based on available information.

**Benzodecinium chloride:**

- **Species**: Rabbit  
  - **Result**: Corrosive after 3 minutes to 1 hour of exposure  
  - **Remarks**: Based on data from similar materials

**Miristalkonium chloride:**

- **Species**: Rabbit  
  - **Result**: Corrosive after 3 minutes to 1 hour of exposure  
  - **Remarks**: Based on data from similar materials

**Acute toxicity (other routes of administration)**

- **LD50 (Mouse)**:  
  - Oral: 1,000 mg/kg  
  - Intraperitoneal: 1,140 mg/kg

**Skin irritation**

- Not classified based on available information.

**Benzodecinium chloride:**

- **Species**: Rabbit  
  - **Result**: Corrosive after 3 minutes to 1 hour of exposure  
  - **Remarks**: Based on data from similar materials

**Miristalkonium chloride:**

- **Species**: Rabbit  
  - **Result**: Corrosive after 3 minutes to 1 hour of exposure  
  - **Remarks**: Based on data from similar materials

**Acute toxicity (other routes of administration)**

- **LD50 (Mouse)**:  
  - Oral: 800 mg/kg  
  - Subcutaneous: 300 mg/kg

**Skin irritation**

- Not classified based on available information.

**Benzodecinium chloride:**

- **Species**: Rabbit  
  - **Result**: Corrosive after 3 minutes to 1 hour of exposure  
  - **Remarks**: Based on data from similar materials

**Miristalkonium chloride:**

- **Species**: Rabbit  
  - **Result**: Corrosive after 3 minutes to 1 hour of exposure  
  - **Remarks**: Based on data from similar materials

**Acute toxicity (other routes of administration)**

- **LD50 (Mouse)**:  
  - Oral: 1,000 mg/kg  
  - Intraperitoneal: 1,140 mg/kg

**Skin irritation**

- Not classified based on available information.

**Benzodecinium chloride:**

- **Species**: Rabbit  
  - **Result**: Corrosive after 3 minutes to 1 hour of exposure  
  - **Remarks**: Based on data from similar materials

**Miristalkonium chloride:**

- **Species**: Rabbit  
  - **Result**: Corrosive after 3 minutes to 1 hour of exposure  
  - **Remarks**: Based on data from similar materials

**Acute toxicity (other routes of administration)**

- **LD50 (Mouse)**:  
  - Oral: 800 mg/kg  
  - Subcutaneous: 300 mg/kg

**Skin irritation**

- Not classified based on available information.

**Benzodecinium chloride:**

- **Species**: Rabbit  
  - **Result**: Corrosive after 3 minutes to 1 hour of exposure  
  - **Remarks**: Based on data from similar materials

**Miristalkonium chloride:**

- **Species**: Rabbit  
  - **Result**: Corrosive after 3 minutes to 1 hour of exposure  
  - **Remarks**: Based on data from similar materials

**Acute toxicity (other routes of administration)**

- **LD50 (Mouse)**:  
  - Oral: 1,000 mg/kg  
  - Intraperitoneal: 1,140 mg/kg

**Skin irritation**

- Not classified based on available information.

**Benzodecinium chloride:**

- **Species**: Rabbit  
  - **Result**: Corrosive after 3 minutes to 1 hour of exposure  
  - **Remarks**: Based on data from similar materials

**Miristalkonium chloride:**

- **Species**: Rabbit  
  - **Result**: Corrosive after 3 minutes to 1 hour of exposure  
  - **Remarks**: Based on data from similar materials

**Acute toxicity (other routes of administration)**

- **LD50 (Mouse)**:  
  - Oral: 800 mg/kg  
  - Subcutaneous: 300 mg/kg

**Skin irritation**

- Not classified based on available information.
Serious eye damage/eye irritation
Not classified based on available information.

Components:

Benzodecinium bromide:
Species : Rabbit
Result : Irreversible effects on the eye
Remarks : Based on data from similar materials

Benzododecinium chloride:
Species : Rabbit
Result : Irreversible effects on the eye
Remarks : Based on data from similar materials

Miristalkonium chloride:
Species : Rabbit
Result : Irreversible effects on the eye
Remarks : Based on data from similar materials

(S)-3-[3-(tert-butylamino)-2-hydroxypropoxy]-4-morpholino-1,2,5-thiadiazole monomaleate:
Species : Rabbit
Result : Mild eye irritation
Species : Dog
Result : No eye irritation

Respiratory or skin sensitisation

Skin sensitisation
Not classified based on available information.

Respiratory sensitisation
Not classified based on available information.

Components:

Benzodecinium bromide:
Test Type : Buehler Test
Exposure routes : Skin contact
Species : Guinea pig
Method : OECD Test Guideline 406
Result : negative
Remarks : Based on data from similar materials

Benzododecinium chloride:
Test Type : Buehler Test
Exposure routes : Skin contact
Species : Guinea pig
Method : OECD Test Guideline 406
Result : negative
Remarks : Based on data from similar materials
Miristalkonium chloride:
Test Type : Buehler Test
Exposure routes : Skin contact
Species : Guinea pig
Method : OECD Test Guideline 406
Result : negative
Remarks : Based on data from similar materials

Germ cell mutagenicity
Not classified based on available information.

Components:

Benzodecinium bromide:
Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)
Method: OECD Test Guideline 471
Result: negative
Remarks: Based on data from similar materials

Test Type: In vitro mammalian cell gene mutation test
Method: OECD Test Guideline 476
Result: negative
Remarks: Based on data from similar materials

Test Type: Chromosome aberration test in vitro
Method: OECD Test Guideline 473
Result: negative
Remarks: Based on data from similar materials

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: Ingestion
Method: OECD Test Guideline 474
Result: negative
Remarks: Based on data from similar materials

Benzododecinium chloride:
Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)
Method: OECD Test Guideline 471
Result: negative
Remarks: Based on data from similar materials

Test Type: In vitro mammalian cell gene mutation test
Method: OECD Test Guideline 476
Result: negative
Remarks: Based on data from similar materials

Test Type: Chromosome aberration test in vitro
Method: OECD Test Guideline 473
Result: negative
Remarks: Based on data from similar materials
SAFETY DATA SHEET

Timolol Formulation

Genotoxicity in vivo :  Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: Ingestion
Method: OECD Test Guideline 474
Result: negative
Remarks: Based on data from similar materials

Miristalkonium chloride:
Genotoxicity in vitro :  Test Type: Bacterial reverse mutation assay (AMES)
Method: OECD Test Guideline 471
Result: negative
Remarks: Based on data from similar materials

Genotoxicity in vitro :  Test Type: In vitro mammalian cell gene mutation test
Method: OECD Test Guideline 476
Result: negative
Remarks: Based on data from similar materials

Genotoxicity in vitro :  Test Type: Chromosome aberration test in vitro
Method: OECD Test Guideline 473
Result: negative
Remarks: Based on data from similar materials

Genotoxicity in vivo :  Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: Ingestion
Method: OECD Test Guideline 474
Result: negative
Remarks: Based on data from similar materials

(S)-3-[3-(tert-butylamino)-2-hydroxypropoxy]-4-morpholino-1,2,5-thiadiazole monomaleate:
Genotoxicity in vitro :  Test Type: Bacterial reverse mutation assay (AMES)
Method: OECD Test Guideline 471
Result: negative

Genotoxicity in vivo :  Test Type: In vivo micronucleus test
Species: Mouse
Method: OECD Test Guideline 474
Result: negative

Carcinogenicity
Not classified based on available information.

Components:

Benzodecinium bromide:
Species :  Rat
Application Route :  Ingestion
Exposure time :  104 weeks
Method :  OECD Test Guideline 453
Result: negative
Remarks: Based on data from similar materials

Benzododecinium chloride:
Species: Rat
Application Route: Ingestion
Exposure time: 104 weeks
Method: OECD Test Guideline 453
Result: negative
Remarks: Based on data from similar materials

Mirstalkonium chloride:
Species: Rat
Application Route: Ingestion
Exposure time: 2 y
Method: OECD Test Guideline 453
Result: negative
Remarks: Based on data from similar materials

(S)-3-[3-(tert-butylamino)-2-hydroxypropoxy]-4-morpholino-1,2,5-thiadiazole monomaleate:
Species: Rat
Application Route: Oral
Exposure time: 2 Years
LOAEL: 300 mg/kg body weight
Result: negative
Target Organs: Adrenal gland
Remarks: The significance of these findings for humans is not certain.

Species: Mouse, female
Application Route: Oral
Exposure time: 18 Months
LOAEL: 500 mg/kg body weight
Result: negative
Target Organs: Lungs, Mammary gland, Uterus (including cervix)
Remarks: The significance of these findings for humans is not certain.

Carcinogenicity - Assessment
Weight of evidence does not support classification as a carcinogen

Reproductive toxicity
Not classified based on available information.

Components:

Benzodecinium bromide:
Effects on fertility: Test Type: Two-generation reproduction toxicity study
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 416
Result: negative
Remarks: Based on data from similar materials
Effects on foetal development:

- Test Type: Fertility/early embryonic development
  - Species: Rabbit
  - Application Route: Ingestion
  - Method: OECD Test Guideline 414
  - Result: negative
  - Remarks: Based on data from similar materials

**Benzododecinium chloride:**

Effects on fertility:

- Test Type: Two-generation reproduction toxicity study
  - Species: Rat
  - Application Route: Ingestion
  - Method: OECD Test Guideline 416
  - Result: negative
  - Remarks: Based on data from similar materials

Effects on foetal development:

- Test Type: Embryo-foetal development
  - Species: Rabbit
  - Application Route: Ingestion
  - Method: OECD Test Guideline 414
  - Result: negative
  - Remarks: Based on data from similar materials

**Miristalkonium chloride:**

Effects on fertility:

- Test Type: Two-generation study
  - Species: Rat
  - Application Route: Ingestion
  - Method: OECD Test Guideline 416
  - Result: negative
  - Remarks: Based on data from similar materials

Effects on foetal development:

- Test Type: Embryo-foetal development
  - Species: Rabbit
  - Application Route: Ingestion
  - Method: OECD Test Guideline 414
  - Result: negative
  - Remarks: Based on data from similar materials

**(S)-3-[3-(tert-butylamino)-2-hydroxypropoxy]-4-morpholino-1,2,5-thiadiazole monomaleate:**

Effects on fertility:

- Test Type: Fertility/early embryonic development
  - Species: Rat
  - Application Route: Oral
  - Fertility: NOAEL Mating/Fertility: 150 mg/kg body weight
  - Early Embryonic Development: NOAEL F1: 150 mg/kg body weight

Effects on foetal development:

- Test Type: Embryo-foetal development
  - Species: Rabbit
  - Developmental Toxicity: LOAEL F1: 50 mg/kg body weight
  - Result: Some evidence of adverse effects on development, based on animal experiments.

Reproductive toxicity - Assessment:

- Some evidence of adverse effects on development, based on animal experiments.
STOT - single exposure
Not classified based on available information.

STOT - repeated exposure
Causes damage to organs (Cardio-vascular system, Lungs) through prolonged or repeated exposure.

**Product:**
Target Organs : Cardio-vascular system, Lungs
Assessment : Causes damage to organs through prolonged or repeated exposure.

**Components:**

**Benzodecinium bromide:**
Exposure routes : Ingestion
Assessment : No significant health effects observed in animals at concentrations of 1 mg/l/6h/d or less.

**(S)-3-[3-(tert-butylamino)-2-hydroxypropoxy]-4-morpholino-1,2,5-thiadiazole monomaleate:**
Target Organs : Lungs, Cardio-vascular system
Assessment : Causes damage to organs through prolonged or repeated exposure.

**Repeated dose toxicity**

**Components:**

**Benzodecinium bromide:**
Species : Dog, female
NOAEL : 45 mg/kg
Application Route : Ingestion
Exposure time : 90 Days
Method : OECD Test Guideline 409
Remarks : Based on data from similar materials

Species : Rat, male
NOAEL : 31 mg/kg
Application Route : Ingestion
Exposure time : 90 Days
Method : OECD Test Guideline 408
Remarks : Based on data from similar materials

Species : Rat, male
NOAEL : 56 mg/kg
Application Route : Ingestion
Exposure time : 52 - 104 Weeks
Remarks : Based on data from similar materials

**Benzododecinium chloride:**
Species : Rat
SAFETY DATA SHEET

Timolol Formulation

Version 4.3  Revision Date: 09/13/2019  SDS Number: 1598367-00008  Date of last issue: 2019/04/24  Date of first issue: 2017/05/01

NOAEL: > 25 mg/kg  Application Route: Ingestion  Exposure time: 52 Weeks  Method: OECD Test Guideline 453  Remarks: Based on data from similar materials

Miristalkonium chloride:
Species: Rat  NOAEL: 56 - 65 mg/kg  LOAEL: 109 - 133 mg/kg  Application Route: Ingestion  Exposure time: 52 Weeks  Remarks: Based on data from similar materials

(S)-3-[3-(tert-butylamino)-2-hydroxypropoxy]-4-morpholino-1,2,5-thiadiazole monomaleate:
Species: Rat  NOAEL: 25 mg/kg  Application Route: Oral  Exposure time: 67 Weeks
Species: Dog  NOAEL: 10 mg/kg  Application Route: Oral  Exposure time: 54 Weeks  Target Organs: Kidney

Aspiration toxicity
Not classified based on available information.

Experience with human exposure

Product:
General Information: May cause Stomach/intestinal disorders  Respiratory disorders  Symptoms: Irregular cardiac activity, central nervous system effects
Eye contact: Symptoms: burning or stinging of the eye

Components:
(S)-3-[3-(tert-butylamino)-2-hydroxypropoxy]-4-morpholino-1,2,5-thiadiazole monomaleate:
Eye contact: Symptoms: burning or stinging of the eye, dryness of the eyes, Headache, Nausea, Dizziness, dry mouth, changes in libido, hair loss, Allergic reactions
Ingestion: Symptoms: Headache, Fatigue, Respiratory disorders, Gastrointestinal discomfort, Allergic reactions, Rash, hair loss, altered mental status, Dizziness, changes in libido
12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

Benzododecinium bromide:
Toxicity to fish : LC50 (Lepomis macrochirus (Bluegill sunfish)): 0.515 mg/l
Exposure time: 96 h
Remarks: Based on data from similar materials

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 0.016 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202
Remarks: Based on data from similar materials

Toxicity to algae/aquatic plants : ErC50 (Selenastrum capricornutum (green algae)): 0.049 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201
Remarks: Based on data from similar materials

M-Factor (Acute aquatic toxicity) : 10
Toxicity to fish (Chronic toxicity) : NOEC (Pimephales promelas (fathead minnow)): 0.032 mg/l
Exposure time: 28 d
Remarks: Based on data from similar materials

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): 0.0125 mg/l
Exposure time: 21 d
Remarks: Based on data from similar materials

M-Factor (Chronic aquatic toxicity) : 1
Toxicity to microorganisms : EC10: 4 mg/l
Exposure time: 30 min
Method: OECD Test Guideline 209
Remarks: Based on data from similar materials

Benzododecinium chloride:
Toxicity to fish : LC50: > 0.1 - 1 mg/l
Exposure time: 96 h
Remarks: Based on data from similar materials

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): > 0.01 - 0.1 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202
Remarks: Based on data from similar materials

Toxicity to algae/aquatic : ErC50: > 0.01 - 0.1 mg/l
plants

Exposure time: 72 h
Remarks: Based on data from similar materials

EC10: > 0.001 - 0.01 mg/l
Exposure time: 72 h
Remarks: Based on data from similar materials

M-Factor (Acute aquatic toxicity) : 10
Toxicity to fish (Chronic toxicity) : NOEC (Pimephales promelas (fathead minnow)): > 0.01 - 0.1 mg/l
Exposure time: 28 d
Remarks: Based on data from similar materials

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): > 0.001 - 0.01 mg/l
Exposure time: 21 d
Method: OECD Test Guideline 211
Remarks: Based on data from similar materials

M-Factor (Chronic aquatic toxicity) : 1
Toxicity to microorganisms : EC50: > 10 - 100 mg/l
Exposure time: 30 min
Method: OECD Test Guideline 209
Remarks: Based on data from similar materials

Miristalkonium chloride:

Toxicity to fish : LC50 (Oncorhynchus mykiss (rainbow trout)): 0.85 mg/l
Exposure time: 96 h
Method: OECD Test Guideline 203
Remarks: Based on data from similar materials

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 0.016 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202
Remarks: Based on data from similar materials

Toxicity to algae/aquatic plants : ErC50 (Pseudokirchneriella subcapitata (green algae)): 0.049 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201
Remarks: Based on data from similar materials

NOEC (Pseudokirchneriella subcapitata (green algae)): 0.0012 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201
Remarks: Based on data from similar materials

M-Factor (Acute aquatic toxicity) : 10
M-Factor (Chronic aquatic toxicity) : 1
Toxicity to microorganisms : EC10: 4 mg/l
Exposure time: 30 min
Method: OECD Test Guideline 209
Remarks: Based on data from similar materials

(S)-3-[3-(tert-butylamino)-2-hydroxypropoxy]-4-morpholino-1,2,5-thiadiazole monomaleate:

Toxicity to fish: LC50 (Pimephales promelas (fathead minnow)): 411 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 161 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202

Toxicity to microorganisms: EC50: > 1,000 mg/l
Exposure time: 3 h
Test Type: Respiration inhibition
EC50 (Photobacterium phosphoreum): > 1,800 mg/l

Persistence and degradability

Components:

Benzodecinium bromide:
Biodegradability: Result: Readily biodegradable.
Biodegradation: 63 %
Exposure time: 28 d
Method: OECD Test Guideline 301D
Remarks: Based on data from similar materials

Benzododecinium chloride:
Biodegradability: Result: Readily biodegradable.
Remarks: Based on data from similar materials

Miristalkonium chloride:
Biodegradability: Result: Readily biodegradable.
Biodegradation: 95.5 %
Exposure time: 28 d
Method: OECD Test Guideline 301B
Remarks: Based on data from similar materials

(S)-3-[3-(tert-butylamino)-2-hydroxypropoxy]-4-morpholino-1,2,5-thiadiazole monomaleate:
Biodegradability: Result: Not readily biodegradable.
Biodegradation: 0 %
Exposure time: 30 d

Stability in water: Hydrolysis: 0 % (61 d)
Method: FDA 3.09
Bioaccumulative potential

Components:

Benzodecinium bromide:
- Bioaccumulation: Species: Lepomis macrochirus (Bluegill sunfish)
  Bioconcentration factor (BCF): 79
  Exposure time: 35 d
  Remarks: Based on data from similar materials

Benzododecinium chloride:
- Bioaccumulation: Species: Lepomis macrochirus (Bluegill sunfish)
  Bioconcentration factor (BCF): < 500
  Remarks: Based on data from similar materials

Partition coefficient: n-octanol/water: log Pow: < 4
  Remarks: Expert judgement

Miristalkonium chloride:
- Bioaccumulation: Species: Lepomis macrochirus (Bluegill sunfish)
  Bioconcentration factor (BCF): 79
  Remarks: Based on data from similar materials

(S)-3-[3-(tert-butylamino)-2-hydroxypropoxy]-4-morpholino-1,2,5-thiadiazole monomaleate:
- Partition coefficient: n-octanol/water: log Pow: 1.48

Mobility in soil
- No data available

Hazardous to the ozone layer
- Not applicable

Other adverse effects
- No data available

13. DISPOSAL CONSIDERATIONS

Disposal methods
- Waste from residues: Dispose of in accordance with local regulations.
- Contaminated packaging: Empty containers should be taken to an approved waste handling site for recycling or disposal.
  If not otherwise specified: Dispose of as unused product.

14. TRANSPORT INFORMATION

International Regulations

UNRTDG
- Not regulated as a dangerous good

IATA-DGR
- Not regulated as a dangerous good
IMDG-Code
Not regulated as a dangerous good

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable for product as supplied.

National Regulations
Refer to section 15 for specific national regulation.

15. REGULATORY INFORMATION

Related Regulations

Fire Service Law
Not applicable to dangerous materials / designated flammables.

Chemical Substance Control Law
Priority Assessment Chemical Substance

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt of alkyl(C=12-16)(benzyl)(dimethyl)ammonium</td>
<td>184</td>
</tr>
</tbody>
</table>

Industrial Safety and Health Law

Harmful Substances Prohibited from Manufacture
Not applicable

Harmful Substances Required Permission for Manufacture
Not applicable

Substances Prevented From Impairment of Health
Not applicable

Circular concerning Information on Chemicals having Mutagenicity - Annex 2: Information on Existing Chemicals having Mutagenicity
Not applicable

Circular concerning Information on Chemicals having Mutagenicity - Annex 1: Information on Notified Substances having Mutagenicity
Not applicable

Substances Subject to be Notified Names
Not applicable

Substances Subject to be Indicated Names
Not applicable

Ordinance on Prevention of Hazards Due to Specified Chemical Substances
Not applicable

Ordinance on Prevention of Lead Poisoning
Not applicable

Ordinance on Prevention of Tetraalkyl Lead Poisoning
Not applicable

Ordinance on Prevention of Organic Solvent Poisoning
Not applicable
Enforcement Order of the Industrial Safety and Health Law - Attached table 1 (Dangerous Substances)
Not applicable

Poisonous and Deleterious Substances Control Law
Not applicable

Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof
Not applicable

High Pressure Gas Safety Act
Not applicable

Explosive Control Law
Not applicable

Vessel Safety Law
Not regulated as a dangerous good

Aviation Law
Not regulated as a dangerous good

Marine Pollution and Sea Disaster Prevention etc Law
Bulk transportation: Not classified as noxious liquid substance
Pack transportation: Not classified as marine pollutant

Narcotics and Psychotropics Control Act
Narcotic or Psychotropic Raw Material (Export / Import Permission)
Not applicable
Specific Narcotic or Psychotropic Raw Material (Export / Import permission)
Not applicable

Waste Disposal and Public Cleansing Law
Industrial waste

The components of this product are reported in the following inventories:
AICS: not determined

DSL: not determined

IECSC: not determined

16. OTHER INFORMATION

Further information

Date format: yyyy/mm/dd
SAFETY DATA SHEET

Timolol Formulation

Version 4.3  Revision Date: 09/13/2019  SDS Number: 1598367-00008  Date of last issue: 2019/04/24  Date of first issue: 2017/05/01

Full text of other abbreviations

AICS - Australian Inventory of Chemical Substances; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user’s end product, if applicable.

JP / EN