tion, add water to make exactly 25 mL, and use this solution as the standard solution. Perform the test with these solutions as directed under the Thin-layer Chromatography. Spot 5 μL each of the sample solution and the standard solution on a plate of silica gel for thin-layer chromatography. Develop the plate with a mixture of ethanol (99.5), water, 1-butanol and ammonia water (28) (2:1:1:1) to a distance of about 10 cm, and dry the plate at 100°C for 30 minutes. Spray evenly a solution of ninhydrin in acetone (1 in 50) on the plate, and heat at 80°C for 5 minutes: the spots other than the principal spot from the sample solution are not more intense than the spot from the standard solution.

**Loss on drying** Not more than 0.20% (1 g, 105°C, 3 hours).

**Residue on ignition** Not more than 0.10% (1 g).

**Assay** Weigh accurately about 0.1 g of L-Arginine Hydrochloride, previously dried, dissolve in 2 mL of formic acid, add exactly 15 mL of 0.1 mol/L perchloric acid VS, and heat on a water bath for 30 minutes. After cooling, add 45 mL of acetic acid (100), and titrate the excess perchloric acid with 0.1 mol/L sodium acetate VS (potentiometric titration). Perform a blank determination.

Each mL of 0.1 mol/L perchloric acid VS
= 10.533 mg of $C_6H_{14}N_4O_2.HCl$

**Containers and storage** Containers—Tight containers.

# L-Arginine Hydrochloride Injection

## Arginine Hydrochloride Injection

塩酸L-アルギニン注射液

L-Arginine Hydrochloride Injection is an aqueous solution for injection. It contains not less than 9.5 w/v% and not more than 10.5 w/v% of L-arginine hydrochloride ($C_6H_{14}N_4O_2.HCl$: 210.66).

**Method of preparation**

| | |
|---|---|
| L-Arginine Hydrochloride | 100 g |
| Water for Injection | a sufficient quantity |
| To make | 1000 mL |

Prepare as directed under Injections, with the above ingredients. No preservative is added.

**Description** L-Arginine Hydrochloride Injection is a clear, colorless liquid.

**Identification** (1) To 5 mL of a solution of L-Arginine Hydrochloride Injection (1 in 100) add 1 mL of ninhydrin TS, and heat for 3 minutes: a blue-purple color develops.

(2) To 5 mL of a solution of L-Arginine Hydrochloride Injection (1 in 10) add 2 mL of sodium hydroxide TS and 1 to 2 drops of a solution of 1-naphthol in ethanol (95) (1 in 1000), allow to stand for 5 minutes, and add 1 to 2 drops of sodium hypochlorite TS: a red-orange color develops.

**pH** 5.0 - 6.0

**Pyrogen** Perform the test with L-Arginine Hydrochloride Injection stored in a container in a volume exceeding 10 mL: it meets the requirements of the Pyrogen Test.

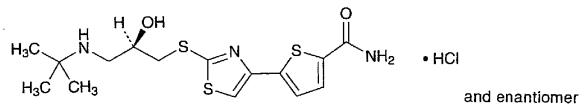
**Assay** Pipet 20 mL of L-Arginine Hydrochloride Injection, add 7.5 mol/L hydrochloric acid TS to make exactly 100 mL, and determine the optical rotation $\alpha_D$ as directed under the Optical Rotation Determination at 20 ± 1°C in a 100-mm cell.

Amount (mg) of L-arginine hydrochloride ($C_6H_{14}N_4O_2.HCl$)
= $\alpha_D \times 4444$

**Containers and storage** Containers—Hermetic containers.

# Arotinolol Hydrochloride

塩酸アロチノロール




$C_{15}H_{21}N_3O_2S_3.HCl$: 408.00
5-{2-[(*RS*)-3-*tert*-Butylamino-2-hydroxypropylsulfanyl]-thiazol-4-yl}thiophene-2-carboxamide monohydrochloride [*68377-91-3*]

Arotinolol Hydrochloride, when dried, contains not less than 99.0% of $C_{15}H_{21}N_3O_2S_3.HCl$.

**Description** Arotinolol Hydrochloride occurs as a white to light yellow crystalline powder.

It is freely soluble in dimethylsulfoxide, slightly soluble in methanol and in water, very slightly soluble in ethanol (99.5), and practically insoluble in diethyl ether.

A solution of Arotinolol Hydrochloride in methanol (1 in 125) does not show optical rotation.

**Identification** (1) Determine the absorption spectrum of a solution of Arotinolol Hydrochloride in methanol (1 in 75,000) as directed under the Ultraviolet-visible Spectrophotometry, and compare the spectrum with the Reference Spectrum: both spectra exhibit similar intensities of absorption at the same wavelengths.

(2) Determine the infrared absorption spectrum of Arotinolol Hydrochloride, previously dried, as directed in the potassium bromide disk method under the Infrared Spectrophotometry, and compare the spectrum with the Reference Spectrum: both spectra exhibit similar intensities of absorption at the same wave numbers.

(3) A solution of Arotinolol Hydrochloride (1 in 200) responds to the Qualitative Tests (2) for chloride.

**Purity** (1) Heavy metals—Proceed with 1.0 g of Arotinolol Hydrochloride according to Method 2, and perform the test. Prepare the control solution with 1.0 mL of Standard Lead Solution (not more than 10 ppm).

(2) Related substances—Dissolve 0.05 g of Arotinolol Hydrochloride in 10 mL of methanol, and use this solution as the sample solution. Pipet 1 mL of the sample solution, add methanol to make exactly 100 mL. Pipet 1 mL of this solution, add methanol to make exactly 10 mL, and use this so-

lution as the standard solution. Perform the test with these solutions as directed under the Thin-layer Chromatography. Spot 40 μL each of the sample solution and the standard solution on a plate of silica gel with fluorescent indicator for thin-layer chromatography. Develop the plate with a mixture of chloroform, methanol, acetone and ammonia solution (28) (30:10:10:1) to a distance of about 12 cm, and air-dry the plate. Examine under ultraviolet light (main wavelength: 254 nm): the spots other than the principal spot from the sample solution are not more intense than the spot from the standard solution.

**Loss on drying** Not more than 0.20% (1 g, in vacuum, 105°C, 4 hours).

**Residue on ignition** Not more than 0.10% (1 g).

**Assay** Weigh accurately about 1.5 g of Arotinolol Hydrochloride, previously dried, dissolve in dimethylsulfoxide to make exactly 25 mL. Pipet 5 mL of this solution, add 100 mL of water and 5 mL of sodium hydroxide TS, and extract with three 50-mL portions of dichloromethane. Filter each dichloromethane extract through a pledget of absorbent cotton with anhydrous sodium sulfate on it. Evaporate combined filtrate to dryness in vacuum. Dissolve the residue in 70 mL of acetic acid (100), and titrate with 0.05 mol/L perchloric acid VS (potentiometric titration). Perform a blank determination, and make any necessary correction.

Each mL of 0.05 mol/L perchloric acid VS
= 20.400 mg of $C_{15}H_{21}N_3O_2S_3.HCl$

**Containers and storage** Containers—Tight containers.
Storage—Light-resistant.

# Arsenic Trioxide

## Arsenous Acid

三酸化ヒ素

$As_2O_3$: 197.84

Arsenic Trioxide, when dried, contains not less than 99.5% of $As_2O_3$.

**Description** Arsenic Trioxide occurs as a white powder.

It is odorless. It is practically insoluble in water, in ethanol (95) and in diethyl ether.

It dissolves in sodium hydroxide TS.

**Identification** Dissolve 0.2 g of Arsenic Trioxide in 40 mL of water by heating on a water bath: the solution responds to the Qualitative Tests for arsenite.

**Purity** Clarity of solution—To 1.0 g of Arsenic Trioxide add 10 mL of ammonia TS, and heat gently: the solution is clear.

**Loss on drying** Not more than 0.5% (1 g, 105°C, 3 hours).

**Assay** Weigh accurately about 0.15 g of Arsenic Trioxide, previously dried, dissolve in 20 mL of a solution of sodium hydroxide (1 in 25), by warming, if necessary. Add 40 mL of water and 2 drops of methyl orange TS, then add dilute hydrochloric acid until the color of the solution becomes light red. Add 2 g of sodium hydrogen carbonate and 50 mL of water to this solution, and titrate with 0.05 mol/L iodine VS (indicator: 3 mL of starch TS).

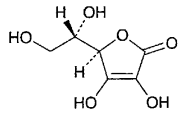
Each mL of 0.05 mol/L iodine VS = 4.946 mg of $As_2O_3$

**Containers and storage** Containers—Tight containers.

# Ascorbic Acid

## Vitamin C

アスコルビン酸



$C_6H_8O_6$: 176.12
2,3-Didehydro-L-*threo*-hexono-1,4-lactone [*50-81-7*]

Ascorbic Acid, when dried, contains not less than 99.0% of L-ascorbic acid ($C_6H_8O_6$).

**Description** Ascorbic Acid occurs as white crystals or a white, crystalline powder. It is odorless, and has an acid taste.

It is freely soluble in water, sparingly soluble in ethanol (95), and practically insoluble in diethyl ether.

Melting point: about 190°C (with decomposition).

**Identification** **(1)** To 5 mL each of a solution of Ascorbic Acid (1 in 50) add 1 drop of potassium permanganate TS or 1 to 2 drops of 2,6-dichloroindophenol sodium TS: the color of the solution is discharged immediately in each case.

**(2)** Dissolve 0.1 g of Ascorbic Acid in 100 mL of a solution of metaphosphoric acid (1 in 50). To 5 mL of the solution add iodine TS until the color of the solution becomes light yellow. Then add 1 drop of a solution of copper (II) sulfate pentahydrate (1 in 1000) and 1 drop of pyrrole, and warm the mixture at 50°C for 5 minutes: a blue color develops.

**Optical rotation** $[\alpha]_D^{20}$ : + 20.5 – + 21.5° (2.5 g, water, 25 mL, 100 mm).

**pH** Dissolve 1.0 g of Ascorbic Acid in 20 mL of water: the pH of this solution is between 2.2 and 2.5.

**Purity** **(1)** Clarity and color of solution—Dissolve 1.0 of Ascorbic Acid in 20 mL of water: the solution is clear and colorless.

**(2)** Heavy metals—Perform the test with 1.0 g of Ascorbic Acid according to Method 1. Prepare the control solution with 2.0 mL of Standard Lead Solution (not more than 20 ppm).

**Loss on drying** Not more than 0.20% (1 g, silica gel, 24 hours).

**Residue on ignition** Not more than 0.10% (1 g).

**Assay** Weigh accurately about 0.2 g of Ascorbic Acid, previously dried, dissolve in 50 mL of a solution of