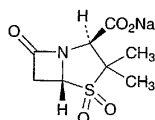


tive standard deviation of the peak area of sucrose octasulfate ester is not more than 2.0%.

Containers and storage Containers—Tight containers.

Sulbactam Sodium

スルバクタムナトリウム



$C_8H_{10}NNaO_5S$: 255.22

Monosodium (2*S*,5*R*)-3,3-dimethyl-7-oxo-4-thia-1-azabicyclo[3.2.0]heptane-2-carboxylate 4,4-dioxide [69388-84-7]

Sulbactam Sodium contains not less than 875 μ g (potency) per mg, calculated on the anhydrous basis. The potency of Sulbactam Sodium is expressed as mass (potency) of sulbactam ($C_8H_{11}NO_5S$: 233.24).

Description Sulbactam Sodium occurs as a white to yellowish white crystalline powder.

It is freely soluble in water, sparingly soluble in methanol, very slightly soluble in ethanol (99.5), and practically insoluble in acetonitrile.

Identification (1) Determine the infrared absorption spectrum of Sulbactam Sodium 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.

(2) Sulbactam Sodium responds to the Qualitative Test (1) for sodium salt.

Optical rotation $[\alpha]_D^{20}$: +219 – +233° (1.0 g, water, 100 mL, 100 mm).

pH Dissolve 1.0 g of Sulbactam Sodium in 20 mL of water: the pH of the solution is between 5.2 and 7.2.

Purity (1) Clarity and color of solution—Dissolve 1.0 g of Sulbactam Sodium in 20 mL of water: the solution is clear, and colorless to pale yellow.

(2) Heavy metals—Proceed with 1.0 g of Sulbactam Sodium according to Method 2, and perform the test. Prepare the control solution with 2.0 mL of Standard Lead Solution (not more than 20 ppm).

(3) Arsenic—Prepare the test solution with 1.0 g of Sulbactam Sodium as directed in Method 3, and perform the test using Apparatus B (not more than 2 ppm).

(4) Sulbactam penicillamine—Weigh accurately about 0.2 g of Sulbactam Sodium, dissolve in the mobile phase to make exactly 50 mL, and use this solution as the sample solution. Separately, weigh accurately about 0.04 g of sulbactam sodium for sulbactam penicillamine, dissolve in 2 mL of water, add 0.5 mL of sodium hydroxide TS, allow to stand for 10 minutes at a room temperature, and add 0.5 mL of 1 mol/L hydrochloric acid TS, then add the mobile

phase to make exactly 100 mL. Pipet 5 mL of this solution, add the mobile phase to make exactly 50 mL, and use this solution as the standard solution. Perform the test with 10 μ L each of the sample solution and the standard solution as directed under the Liquid Chromatography according to the following conditions, and determine the peak areas, A_T and A_S , of sulbactam penicillamine by the automatic integration method: the amount of sulbactam penicillamine is not more than 1.0%.

$$\begin{aligned} &\text{Amount (\% of sulbactam penicillamine} \\ &= \frac{\text{amount (mg) of sulbactam sodium} \\ &\quad \text{for sulbactam penicillamine}}{\text{amount (mg) of the sample}} \times \frac{A_T}{A_S} \times 5 \end{aligned}$$

Operating conditions—

Column, column temperature, mobile phase, and flow rate: Proceed as directed in the operating conditions in the Assay.

Detector: An ultraviolet absorption photometer (wavelength: 230 nm).

System suitability—

System performance: Proceed as directed in the system suitability in the Assay.

System repeatability: When the test is repeated 6 times with 10 μ L of the standard solution under the above operating conditions, the relative standard deviation of the peak areas of sulbactam penicillamine is not more than 2.0%.

Water Not more than 1.0% (0.5 g, volumetric titration, direct titration).

Assay Weigh accurately an amount of Sulbactam Sodium and Sulbactam Reference Standard, equivalent to about 0.1 g (potency), dissolve each in a suitable amount of the mobile phase, add exactly 10 mL of the internal standard solution, then add the mobile phase to make 100 mL, and use these solutions as the sample solution and the standard solution. Perform the test with 10 μ L each of the sample solution and the standard solution as directed under the Liquid Chromatography according to the following conditions, and calculate the ratios, Q_T and Q_S , of the peak area of sulbactam to that of the internal standard.

$$\begin{aligned} &\text{Amount } [\mu\text{g (potency)}] \text{ of } C_8H_{11}NO_5S \\ &= \text{amount [mg (potency)] of Sulbactam Reference} \\ &\quad \text{Standard} \\ &\quad \times \frac{Q_T}{Q_S} \times 1000 \end{aligned}$$

Internal standard solution—A solution of ethyl parahydroxybenzoate in the mobile phase (7 in 1000).

Operating conditions—

Detector: An ultraviolet absorption photometer (wavelength: 220 nm).

Column: A stainless steel column 3.9 mm in inside diameter and 30 cm in length, packed with octadecylsilanized silica gel for liquid chromatography (10 μ m in particle diameter).

Column temperature: A constant temperature of about 35°C.

Mobile phase: To 750 mL of 0.005 mol/L tetrabutylammonium hydroxide TS add 250 mL of acetonitrile for liquid chromatography.

Flow rate: Adjust the flow rate so that the retention time of sulbactam is about 6 minutes.

System suitability—

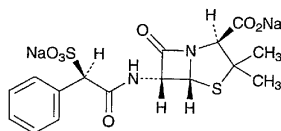
System performance: When the procedure is run with 10 μL of the standard solution under the above operating conditions, sulbactam and the internal standard are eluted in this order with the resolution between these peaks being not less than 1.5.

System repeatability: When the test is repeated 6 times with 10 μL of the standard solution under the above operating conditions, the relative standard deviation of the peak areas of sulbactam is not more than 2.0%.

Containers and storage Containers—Tight containers.

Sulbenicillin Sodium

スルベニシリンナトリウム



$\text{C}_{16}\text{H}_{16}\text{N}_2\text{Na}_2\text{O}_7\text{S}_2$: 458.42

Disodium (2*S*,5*R*,6*R*)-3,3-dimethyl-7-oxo-6-[(2*R*)-2-phenyl-2-sulfonatoacetyl-amino]-4-thia-1-azabicyclo[3.2.0]heptane-2-carboxylate [28002-18-8]

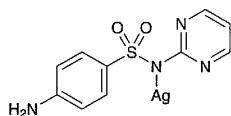
Sulbenicillin Sodium conforms to the requirements of Sulbenicillin Sodium in the Requirements for Antibiotic Products of Japan.

Description Sulbenicillin Sodium occurs as a white to light yellowish white powder.

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

Sulfadiazine Silver

スルファジアジン銀



$\text{C}_{10}\text{H}_9\text{AgN}_4\text{O}_2\text{S}$: 357.14

Monosilver 4-amino-*N*-(pyrimidin-2-yl)-benzenesulfonamide [22199-08-2]

Sulfadiazine Silver, when dried, contains not less than 99.0% and not more than 102.0% of $\text{C}_{10}\text{H}_9\text{AgN}_4\text{O}_2\text{S}$.

Description Sulfadiazine Silver occurs as a white to pale yellow, crystalline powder. It is odorless.

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

It dissolves in ammonia TS.

It is gradually colored by light.

Melting point: about 275°C (with decomposition).

Identification Determine the infrared absorption spectrum of Sulfadiazine Silver, previously dried, as directed in the paste method under the Infrared Spectrophotometry, and compare the spectrum with the Reference Spectrum or the spectrum of previously dried Sulfadiazine Silver Reference Standard: both spectra exhibit similar intensities of absorption at the same wave numbers.

Purity (1) Nitrate—To 250 mL of water add 1.0 g of Sulfadiazine Silver, shake well for 50 minutes, filter, and use this filtrate as the sample solution. Separately, weigh accurately 0.25 g of potassium nitrate, and dissolve in water to make exactly 2000 mL. Pipet 5 mL of this solution and add water to make exactly 200 mL, and use this solution as the standard solution. Pipet 2.0 mL each of the sample solution and the standard solution, and add 5 mL of a solution of chromotropic acid in sulfuric acid (1 in 10,000) and sulfuric acid to make exactly 10 mL. Determine the absorbances, A_T and A_S , of the sample solution and the standard solution at 408 nm as directed under the Ultraviolet-visible Spectrophotometry, using a solution, prepared with exactly 2.0 mL of water in the same manner, as the blank: A_T is not larger than A_S (not more than 0.05%).

(2) Related substances—Dissolve 0.050 g of Sulfadiazine Silver in 5 mL of a mixture of ethanol (95) and ammonia solution (28) (3:2), and use this solution as the sample solution. Pipet 2 mL of the sample solution, and add a mixture of ethanol (95) and ammonia solution (28) (3:2) to make exactly 20 mL. Pipet 2 mL of this solution, add a mixture of ethanol (95) and ammonia solution (28) (3:2) to make exactly 20 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 with fluorescent indicator for thin-layer chromatography. Develop the plate with a mixture of chloroform, methanol and ammonia solution (28) (10:5:2) to a distance of about 15 cm, and air-dry the plate. Examine under ultraviolet light (main wavelength: 254 nm): the spots other than the principal spot and spot of the starting point from the sample solution are not more intense than the spot from the standard solution.

Loss on drying Not more than 0.5% (1 g, in vacuum, phosphorus (V) oxide, 80%, 4 hours).

Residue on ignition 41.0 – 45.0% (1 g).

Silver content Weigh accurately about 0.05 g of Sulfadiazine Silver, previously dried, dissolve in 2 mL of nitric acid, and add water to make exactly 100 mL. Pipet 1 mL of this solution, add water to make exactly 100 mL, and use this solution as the sample solution. Measure accurately a suitable quantity of Standard Silver Solution for Atomic Absorption Spectrophotometry, dilute with water to make a solution containing 1.0 to 2.0 μg of silver (Ag:107.87) per ml, and use this solution as the standard solution. Perform the test with the sample solution and the standard solution as directed under the Atomic Absorption Spectrophotometry according to the following conditions, and calculate the silver content of the sample solution from the calibration curve obtained from the absorbance of the standard solution: it contains not less than 28.7% and not more than 30.8% of sil-