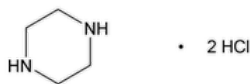


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Piperazine Dihydrochloride



$C_4H_{10}N_2 \cdot 2HCl \cdot xH_2O$ 159.06 (anhydrous)

Piperazine dihydrochloride hydrate CAS RN®: 142-64-3; UNII: 17VU4Z4W88.

» Piperazine Dihydrochloride contains not less than 98.5 percent and not more than 100.5 percent of $C_4H_{10}N_2 \cdot 2HCl$, calculated on the anhydrous basis.

Packaging and storage—Preserve in well-closed containers, and store at room temperature.

Labeling—Label it to indicate that it is for veterinary use only.

USP REFERENCE STANDARDS (11)—

[USP Piperazine Dihydrochloride RS](#).

Identification—

Change to read:

A: ▲ [Spectroscopic Identification Tests \(197\)](#), [Infrared Spectroscopy: 197K](#) ▲ (CN 1-May-2020) —

Test specimen: previously dried at 105° for 3 hours.

B: In the test for *Chromatographic purity*, the principal spot in the chromatogram obtained from *Test solution 2*, observed after spraying with the ninhydrin solutions, corresponds in R_f value, color, and size to that in the chromatogram obtained from *Standard solution 1*.

C: It meets the requirements of the test for [Chloride \(191\)](#).

pH (791): between 3.0 and 3.4, in a solution (1 in 20).

Water Determination, Method I (921): not more than 10.0%.

RESIDUE ON IGNITION (281): not more than 0.1%.

Chromatographic purity—

Solvent—Prepare a mixture of 13.5 N ammonium hydroxide and dehydrated alcohol (3:2).

Test solution 1—Prepare a solution of Piperazine Dihydrochloride in *Solvent* containing 100 mg per mL.

Test solution 2—Mix 1 mL of *Test solution 1* and 9 mL of *Solvent*.

Standard solution 1—Prepare a solution of [USP Piperazine Dihydrochloride RS](#) in *Solvent* containing 10 mg per mL.

Standard solution 2—Prepare a solution of ethylenediamine in *Solvent* containing 0.25 mg per mL.

Standard solution 3—Prepare a solution of triethylenediamine in *Solvent* containing 0.25 mg per mL.

Resolution solution—Prepare a solution in *Solvent* containing 0.25 mg of triethylenediamine and 10 mg of Piperazine Dihydrochloride per mL.

Procedure—Separately apply 5-μL portions of *Test solution 1*, *Test solution 2*, *Standard solution 1*, *Standard solution 2*, *Standard solution 3*, and the *Resolution solution* to a suitable thin-layer chromatographic plate (see [Chromatography \(621\)](#)), coated with a 0.25-mm layer of chromatographic silica gel. Allow the spots to dry, and develop the chromatograms in a solvent system consisting of a freshly prepared mixture of acetone and 13.5 N ammonium hydroxide (80:20) until the solvent front has moved about three-fourths of the length of the plate. Remove the plates from the developing chamber, mark the solvent front, and dry the plate at 105°. Spray the plate with a 0.3% solution of ninhydrin in a mixture of butyl alcohol and glacial acetic acid (100:3). Spray the plate again with a 0.15% solution of ninhydrin in dehydrated alcohol, dry the plate at 105° for 10 minutes, and examine the plate: any secondary spot in the chromatogram obtained from *Test solution 1* is not more intense than the principal spot in the chromatogram obtained from *Standard solution 2* (0.25%). Spray the plate with 0.1 N iodine TS, allow to stand for 10 minutes, and examine the plate: any spot corresponding to triethylenediamine in the chromatogram obtained from *Test solution 1* is not more intense than the principal spot in the chromatogram obtained from *Standard solution 3* (0.25%). In a valid test, the chromatogram obtained from the *Resolution solution* shows a spot due to triethylenediamine clearly separated from the principal spot. Disregard any spot at the origin of any chromatogram.

Assay—Dissolve about 140 mg of Piperazine Dihydrochloride in 4 mL of ethylene glycol using a 150-mL beaker. Add 25 mL of glacial acetic acid containing 1.2 g of mercuric acetate, rinsing the walls of the beaker with a small amount of the glacial acetic acid. Add 0.25 mL of *p*-naphtholbenzein TS, and titrate with 0.1 N perchloric acid VS. Perform a blank determination, and make any necessary correction. Each mL of 0.1 N perchloric acid is equivalent to 7.953 mg of $C_4H_{10}N_2 \cdot 2HCl$.

Auxiliary Information - Please [check for your question in the FAQs](#) before contacting USP.

Topic/Question	Contact	Expert Committee
PIPERAZINE DIHYDROCHLORIDE	Documentary Standards Support	SM32020 Small Molecules 3
REFERENCE STANDARD SUPPORT	RS Technical Services RSTECH@usp.org	SM32020 Small Molecules 3

Chromatographic Database Information: [Chromatographic Database](#)

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