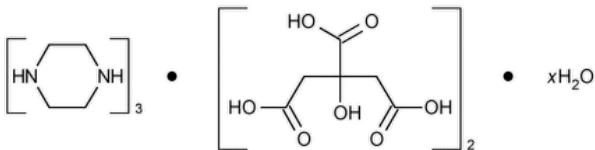


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Piperazine Citrate



$(C_4H_{10}N_2)_3 \cdot 2C_6H_8O_7 \cdot xH_2O$ (anhydrous) 642.65

Piperazine, 2-hydroxy-1,2,3-propanetricarboxylate (3:2), hydrate.

Piperazine citrate (3:2) hydrate CAS RN®: 41372-10-5; UNII: 63KP7FXF2I.

Anhydrous 642.66 CAS RN®: 144-29-6; UNII: RI85381D5G.

» Piperazine Citrate contains not less than 98.0 percent and not more than 100.5 percent of $(C_4H_{10}N_2)_3 \cdot 2C_6H_8O_7$, calculated on the anhydrous basis.

Packaging and storage—Preserve in well-closed containers.

USP REFERENCE STANDARDS (11)—

[USP Piperazine Citrate RS](#)

Identification—

Change to read:

A: ▲ [SPECTROSCOPIC IDENTIFICATION TESTS \(197\), Infrared Spectroscopy: 197K](#) ▲ (CN 1-May-2020).

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

C: It responds to the tests for [Citrate \(191\)](#).

WATER DETERMINATION, Method I (921): not more than 12.0%.

Chromatographic purity—

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

Standard solution 1—Prepare a solution of [USP Piperazine Citrate 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.

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

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

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

Procedure—Apply separate 5- μ L portions of **Standard solution 1**, **Standard solution 2**, **Standard solution 3**, **Resolution solution**, **Test solution 1**, and **Test solution 2** 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 plate from the developing chamber, mark the solvent front, and dry the plate at 105°. Spray the plate with a 0.3% (w/v) solution of ninhydrin in a mixture of butyl alcohol and glacial acetic acid (100:3). Spray the plate again with a 0.15% (w/v) 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 200 mg of Piperazine Citrate, accurately weighed, in 100 mL of glacial acetic acid, warming slightly if necessary to effect solution. Add crystal violet 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 10.71 mg of $(C_4H_{10}N_2)_3 \cdot 2C_6H_8O_7$.

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

Topic/Question	Contact	Expert Committee
PIPERAZINE CITRATE	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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