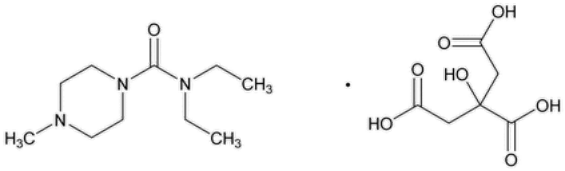
Status: Currently Official on 14-Feb-2025
Official Date: Official as of 01-Nov-2020
Document Type: USP Monographs
DocId: GUID-6B708DC4-BED5-45C3-89E3-026EBF95F2C9_4_en-US
DOI: https://doi.org/10.31003/USPNF_M25390_04_01
DOI Ref: zzv53

Diethylcarbamazine Citrate



$C_{10}H_{21}N_3O \cdot C_6H_8O_7$ 391.42

1-Piperazinecarboxamide, *N*,*N*-diethyl-4-methyl-, 2-hydroxy-1,2,3-propanetricarboxylate;

N,*N*-Diethyl-4-methyl-1-piperazinecarboxamide citrate (1:1) CAS RN®: 1642-54-2; UNII: OS1Z389K8S.

DEFINITION

Diethylcarbamazine Citrate contains NLT 98.0% and NMT 102.0% of diethylcarbamazine citrate ($C_{10}H_{21}N_3O \cdot C_6H_8O_7$), calculated on the anhydrous basis.

IDENTIFICATION

Add the following:

▲• **A.** The retention time of the major peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.▲ (USP 1-Aug-2020)

Change to read:

• ▲**B.**▲ (USP 1-Aug-2020) **Identification—Organic Nitrogenous Bases ⟨181⟩:** Meets the requirements

Change to read:

• ▲**C.**▲ (USP 1-Aug-2020) **Identification Tests—General ⟨191⟩**, *Chemical Identification Tests, Citrate*: Meets the requirements

ASSAY

Change to read:

• **Procedure**

Solution A: 10 mg/mL of monobasic potassium phosphate in water

Solution B: 31.24 mg/mL of monobasic potassium phosphate in water

Mobile phase: Methanol and *Solution A* (10:90)

Standard solution: 0.1 mg/mL of USP Diethylcarbamazine Citrate RS in *Solution B*

Sample solution: 0.1 mg/mL of Diethylcarbamazine Citrate in *Solution B*

Chromatographic system

(See *Chromatography ⟨621⟩, System Suitability*.)

Mode: LC

Detector: UV 220 nm

Column: 3.9-mm × 15-cm; 5-µm packing L1

Flow rate: 0.8 mL/min

Injection volume: 20 µL

System suitability

Sample: *Standard solution*

Suitability requirements

Relative standard deviation: NMT 2.0% ▲▲ (USP 1-Aug-2020)

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of diethylcarbamazine citrate ($C_{10}H_{21}N_3O \cdot C_6H_8O_7$) in the portion of Diethylcarbamazine Citrate taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times 100$$

r_U = peak response from the *Sample solution*

r_S = peak response from the *Standard solution*

C_S = concentration of USP Diethylcarbamazine Citrate RS in the *Standard solution* (mg/mL)

C_U = concentration of Diethylcarbamazine Citrate in the *Sample solution* (mg/mL)

Acceptance criteria: 98.0%–102.0% on the anhydrous basis

IMPURITIES

• **Residue on Ignition ⟨281⟩:** NMT 0.1%

Delete the following:

▲• **Ordinary Impurities ⟨466⟩**

Standard solution: Methanol

Sample solution: Methanol

Eluant: Methanol and ammonium hydroxide (100:1.5)

Visualization: 16 ▲ (USP 1-Aug-2020)

Add the following:

▲• **Organic Impurities, Procedure 1**

Impurity solution A: 0.1 mg/mL of 1-methylpiperazine in methanol

Impurity solution B: 0.1 mg/mL of 1,4-dimethylpiperazine in methanol

Standard solution: 50 mg/mL of USP Diethylcarbamazine Citrate RS in methanol

Sample solution: 50 mg/mL of Diethylcarbamazine Citrate in methanol

Chromatographic system

(See *Chromatography ⟨621⟩, General Procedures, Thin-Layer Chromatography*.)

Mode: TLC

Adsorbent: 0.25-mm layer of chromatographic silica gel mixture

Application volume: 10 µL

Developing solvent system: Ammonia solution, methyl ethyl ketone, and methanol (5:30:65)

Analysis

Samples: *Impurity solution A*, *Impurity solution B*, *Standard solution*, and *Sample solution*

Apply the *Samples* to a suitable thin-layer chromatographic plate. Develop the chromatograms in the *Developing solvent system* until the solvent front has moved two-thirds of the length of the plate. Remove the plate from the developing chamber, mark the solvent front, and allow the solvent to evaporate at about 100°–105°. Expose the plate to iodine vapor for about 30 min.

Determine the percentages of each impurity by comparing the intensity of the impurity spots within the *Sample solution* to those of the main spots from *Impurity solution A* and *Impurity solution B*, ignoring any impurity peak less intense than the main spots found in the *Impurity solution A* and *Impurity solution B* lanes.

Acceptance criteria: See *Table 1*.

Table 1

Name	Relative Retardation Factor	Acceptance Criteria, NMT (%)
1-Methylpiperazine	0.2	0.2
1,4-Dimethylpiperazine	0.5	0.2
Diethylcarbamazine citrate	1.0	—▲ (USP 1-Aug-2020)

Change to read:

• **Organic Impurities, Procedure 2**

Solution A, Solution B, Mobile phase, and **Chromatographic system:** Proceed as directed in the *Assay*.

▲**Citric acid solution:** 1 mg/mL of citric acid in *Solution B*▲ (USP 1-Aug-2020)

Standard solution: 0.003 mg/mL of USP Diethylcarbamazine Citrate RS in *Solution B*

Sample solution: 3 mg/mL of Diethylcarbamazine Citrate in *Solution B*. Filter or centrifuge, and use the clear filtrate or supernatant.

Analysis

Samples: ▲*Citric acid solution*,▲ (USP 1-Aug-2020) *Standard solution*, and *Sample solution*

Calculate the percentage of each individual impurity in the portion of Diethylcarbamazine Citrate taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times 100$$

r_U = peak response of each individual impurity from the *Sample solution*

r_S = peak response of diethylcarbamazine citrate from the *Standard solution*

C_S = concentration of USP Diethylcarbamazine Citrate RS in the *Standard solution* (mg/mL)

C_U = concentration of Diethylcarbamazine Citrate in the *Sample solution* (mg/mL)

Acceptance criteria: ▲See *Table 2*. Disregard any peak having a retention time corresponding to that of the main peak from the *Citric acid solution* and any peak below 0.05%.

Table 2

Name	Acceptance Criteria, NMT (%)
Diethylcarbamazine citrate	—
Any individual unspecified impurity	0.10
Total impurities	0.5

▲ (USP 1-Aug-2020)

SPECIFIC TESTS

• **Water Determination** ⟨921⟩, *Method I*: NMT 0.5%

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in tight containers.

• **USP Reference Standards** ⟨11⟩

USP Diethylcarbamazine Citrate RS

Auxiliary Information - Please check for your question in the FAQs before contacting USP.

Topic/Question	Contact	Expert Committee
DIETHYLCARBAMAZINE CITRATE	Documentary Standards Support	SM12020 Small Molecules 1

Chromatographic Database Information: Chromatographic Database

Most Recently Appeared In:
Pharmacopeial Forum: Volume No. PF 44(6)

Current DocID: GUID-6B708DC4-BED5-45C3-89E3-026EBF95F2C9_4_en-US

DOI: https://doi.org/10.31003/USPNF_M25390_04_01

DOI ref: zzv53