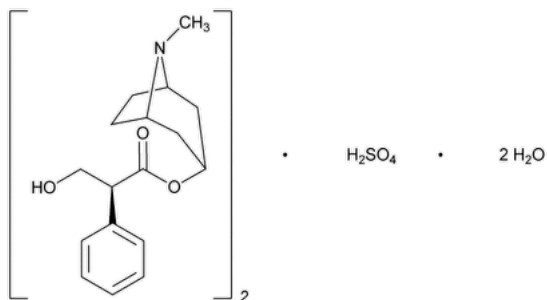


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Hyoscyamine Sulfate



$(C_{17}H_{23}NO_3)_2 \cdot H_2SO_4 \cdot 2H_2O$ 712.85

$(C_{17}H_{23}NO_3)_2 \cdot H_2SO_4$ 676.83

Benzeneacetic acid, α -(hydroxymethyl)-, 8-methyl-8-azabicyclo[3.2.1]oct-3-yl ester, [3(S)-endo]-, sulfate (2:1), dihydrate;

1 α H,5 α H-Tropan-3 α -ol (-)-tropate (ester) sulfate (2:1) (salt) dihydrate;

(1R,3r,5S)-8-Methyl-8-azabicyclo[3.2.1]octan-3-yl (S)-3-hydroxy-2-phenylpropanoate sulfate dihydrate CAS RN®: 6835-16-1; UNII: F2R8V82B84 (dihydrate).

DEFINITION

Hyoscyamine Sulfate contains NLT 98.0% and NMT 102.0% of hyoscyamine sulfate $[(C_{17}H_{23}NO_3)_2 \cdot H_2SO_4]$, calculated on the anhydrous basis.

[CAUTION]—Handle hyoscyamine sulfate with exceptional care because it is highly potent.]

IDENTIFICATION

Change to read:

- **A.** **SPECTROSCOPIC IDENTIFICATION TESTS** (197), *Infrared Spectroscopy*, 197A or 197K: (CN 1-MAY-2020) Meets the requirements.
- **B.** The retention time of the major peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the Assay.
- **C.** **IDENTIFICATION TESTS—GENERAL** (191), *Chemical Identification Tests, Sulfate*

Sample solution: 50 mg/mL

Acceptance criteria: Meets the requirements

ASSAY

PROCEDURE

Buffer: 7.0 g/L of [monobasic potassium phosphate](#), adjusted with 0.05 M [phosphoric acid](#) to a pH of 3.3

Solution A: Dissolve 3.5 g of [sodium dodecyl sulfate](#) in 606 mL of *Buffer*, add 320 mL of acetonitrile, and mix.

Solution B: Acetonitrile

Mobile phase: See [Table 1](#). Return to original conditions and re-equilibrate the system.

Table 1

Time (min)	Solution A (%)	Solution B (%)
0	95	5
2	95	5
20	70	30

Standard solution: 0.24 mg/mL of [USP Hyoscyamine Sulfate RS](#) in *Solution A*

Sample solution: 0.24 mg/mL of Hyoscyamine Sulfate in *Solution A*

Chromatographic system

(See [Chromatography \(621\), System Suitability](#).)

Mode: LC

Detector: UV 210 nm**Column:** 4.6-mm × 10-cm; 3-μm packing L1**Flow rate:** 1.0 mL/min**Injection volume:** 10 μL**System suitability****Sample:** *Standard solution***Suitability requirements****Tailing factor:** NMT 2.0**Relative standard deviation:** NMT 0.73%**Analysis****Samples:** *Standard solution* and *Sample solution*Calculate the percentage of hyoscyamine sulfate $[(C_{17}H_{23}NO_3)_2 \cdot H_2SO_4]$ in the portion of Hyoscyamine Sulfate 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 Hyoscyamine Sulfate RS](#) in the *Standard solution* (mg/mL) C_U = concentration of Hyoscyamine Sulfate in the *Sample solution* (mg/mL)**Acceptance criteria:** 98.0%–102.0% on the anhydrous basis**IMPURITIES**• **RESIDUE ON IGNITION (281):** NMT 0.1%• **ORGANIC IMPURITIES****Buffer, Solution A, Solution B, Mobile phase, Sample solution, and Chromatographic system:** Proceed as directed in the Assay.**Standard stock solution:** 1.2 mg/mL of [USP Hyoscyamine Sulfate RS](#) in *Solution A***Standard solution:** 0.24 μg/mL of [USP Hyoscyamine Sulfate RS](#) from the *Standard stock solution* in *Solution A***System suitability stock solution:** 2.4 μg/mL of [USP Hyoscyamine Related Compound A RS](#) in *Solution A***System suitability solution:** Transfer 5.0 mL of *System suitability stock solution* to a 50-mL volumetric flask, add 10 mL of the *Standard stock solution*, and dilute with *Solution A* to volume.**System suitability****Samples:** *Standard solution* and *System suitability solution***Suitability requirements****Resolution:** NLT 2.0 between hyoscyamine related compound A and hyoscyamine, *System suitability solution***Relative standard deviation:** NMT 10.0%, *Standard solution***Analysis****Samples:** *Sample solution* and *Standard solution*

Calculate the percentage of each impurity in the portion of Hyoscyamine Sulfate taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times (1/F) \times 100$$

 r_U = peak response of each impurity from the *Sample solution* r_S = peak response of hyoscyamine from the *Standard solution* C_S = concentration of [USP Hyoscyamine Sulfate RS](#) in the *Standard solution* (μg/mL) C_U = concentration of Hyoscyamine Sulfate in the *Sample solution* (μg/mL) F = relative response factor (see [Table 2](#))**Acceptance criteria:** See [Table 2](#).**Table 2**

Name	Relative Retention Time	Relative Response Factor	Acceptance Criteria, NMT (%)
DL-Tropic acid	0.2	2.1	0.2
7-Hydroxyhyoscyamine	0.67	1.0	0.2