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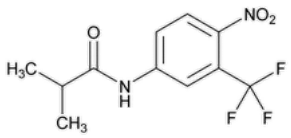
Flutamide



$C_{11}H_{11}F_3N_2O_3$ 276.21

Propanamide, 2-methyl-*N*-[4-nitro-3-trifluoromethyl)phenyl]-;

α,α,α-Trifluoro-2-methyl-4'-nitro-*m*-propionotoluidide CAS RN®: 13311-84-7; UNII: 76W6J0943E.

DEFINITION

Flutamide contains NLT 98.0% and NMT 101.0% of flutamide ($C_{11}H_{11}F_3N_2O_3$), calculated on the dried basis.

IDENTIFICATION

Change to read:

• **A.** ▲Spectroscopic Identification Tests ⟨197⟩, *Infrared Spectroscopy*: **197M**▲ (CN 1-May-2020)

• **B.** The retention time of the major peak from the *Sample solution* corresponds to that of the *Standard solution,* as obtained in the *Assay.*

ASSAY

• **Procedure**

Mobile phase: Acetonitrile and water (45:55)

Diluent: Acetonitrile and water (20:80)

System suitability stock solution: 1 mg/mL of USP *o*-Flutamide RS, prepared as follows. Dissolve the Standard in acetonitrile using 20% of the final volume. Sonicate to dissolve. Dilute with water to volume. Mix, and allow to warm to room temperature.

Standard solution: 0.2 mg/mL of USP Flutamide RS, prepared as follows. Dissolve the Standard in acetonitrile using 20% of the final volume. Sonicate to dissolve. Dilute with water to volume. Mix, and allow to warm to room temperature.

System suitability solution: 10 µg/mL each of USP *o*-Flutamide RS and USP Flutamide RS in *Diluent* prepared from the *System suitability stock solution* and the *Standard solution*

Sample solution: 0.2 mg/mL of Flutamide, prepared as follows. Dissolve a previously dried sample in acetonitrile using 20% of the final volume. Sonicate to dissolve. Dilute with water to volume. Mix, and allow to warm to room temperature.

Chromatographic system

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

Mode: LC

Detector: UV 240 nm

Column: 4.6-mm × 25-cm; 5-µm packing L1

Column temperature: 25 ± 5°

Flow rate: 1 mL/min

Injection volume: 20 µL

System suitability

Samples: *System suitability solution* and *Standard solution*

[Note—For the relative retention times, see *Table 1*.]

Suitability requirements

Resolution: NLT 6.0 between flutamide and *o*-flutamide, *System suitability solution*

Tailing factor: NMT 2.0, *Standard solution*

Relative standard deviation: NMT 1.5%, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of flutamide ($C_{11}H_{11}F_3N_2O_3$) in the portion of Flutamide taken:

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

r_U = peak area from the *Sample solution*

r_S = peak area from the *Standard solution*

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

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

Acceptance criteria: 98.0%–101.0% on the dried basis

IMPURITIES

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

• **Organic Impurities**

Mobile phase, Diluent, Standard solution, Sample solution, and **Chromatographic system:** Prepare as directed in the *Assay*.

System suitability stock solution: 1 mg/mL each of USP *o*-Flutamide RS, USP Flutamide Related Compound A RS, and USP Flutamide Related Compound B RS, prepared as follows. Dissolve the Standards in acetonitrile using 20% of the final volume. Sonicate to dissolve. Dilute with water to volume. Mix, and allow to warm to room temperature.

System suitability solution: 10 µg/mL each of USP *o*-Flutamide RS, USP Flutamide Related Compound A RS, USP Flutamide Related Compound B RS, and USP Flutamide RS in *Diluent*, prepared from the *System suitability stock solution* and *Standard solution*

Sensitivity solution: 0.1 µg/mL of USP Flutamide RS from the *Standard solution* in *Diluent*

System suitability

Samples: *System suitability solution* and *Sensitivity solution*

[Note—For the relative retention times, see *Table 1*.]

Suitability requirements

Resolution: NLT 6.0 between flutamide and *o*-flutamide; NLT 2.0 between flutamide related compound A and flutamide related compound B, *System suitability solution*

Relative standard deviation: NMT 10.0% for flutamide, *Sensitivity solution*

Analysis

Sample: *Sample solution*

Calculate the percentage of each impurity in the portion of Flutamide taken:

$$\text{Result} = (r_U/r_T) \times (1/F) \times 100$$

r_U = peak area for each impurity

r_T = sum of all the peak responses

F = relative response factor (see *Table 1*)

Acceptance criteria: See *Table 1*.

Table 1

Name	Relative Retention Time	Relative Response Factor	Acceptance Criteria, NMT (%)
Flutamide related compound B[a]	0.42	1.06	0.2
Flutamide related compound A[b]	0.45	1.10	0.15
3-(Trifluoromethyl) aniline	0.63	1.10	0.2
Propionyl analog[c]	0.66	1.02	0.3
Desnitroflutamide[d]	0.80	1.95	0.2
o-Flutamide[e]	1.40	1.78	0.2
Flutamide	1.0	—	—
Any unknown impurity	—	1.0	0.05

Name	Relative Retention Time	Relative Response Factor	Acceptance Criteria, NMT (%)
Total impurities	—	—	0.4

[a] *N*-[4-Nitro-3-(trifluoromethyl)phenyl]acetamide.

[b] 4-Nitro-3-(trifluoromethyl)aniline.

[c] *N*-[4-Nitro-3-(trifluoromethyl) phenyl]propionamide.

[d] *N*-[3-(Trifluoromethyl)phenyl]isobutyramide.

[e] *N*-[2-Nitro-3-(trifluoromethyl)phenyl]isobutyramide.

SPECIFIC TESTS

• **Loss on Drying** ⟨731⟩

Analysis: Dry a sample in vacuum at 60° for 3 h.

Acceptance criteria: NMT 0.5%

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in tight, light-resistant containers.

• **USP Reference Standards** ⟨11⟩

USP Flutamide RS

USP *o*-Flutamide RS

N-[2-Nitro-3-(trifluoromethyl)phenyl]isobutyramide.

$C_{11}H_{11}F_3N_2O_3$ 276.21

USP Flutamide Related Compound A RS

4-Nitro-3-(trifluoromethyl)aniline.

$C_7H_5F_3N_2O_2$ 206.12

USP Flutamide Related Compound B RS

N-[4-Nitro-3-(trifluoromethyl)phenyl]acetamide.

$C_9H_7F_3N_2O_3$ 248.16

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

Topic/Question	Contact	Expert Committee
FLUTAMIDE	Documentary Standards Support	SM52020 Small Molecules 5

Chromatographic Database Information: Chromatographic Database

Most Recently Appeared In:
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