Status: Currently Official on 14-Feb-2025
Official Date: Official as of 01-May-2016
Document Type: USP Monographs
DocId: GUID-4A290B3C-D12E-4A48-AEEF-79B9269DC606_1_en-US
DOI: https://doi.org/10.31003/USPNF_M24970_01_01
DOI Ref: h3dif

Diclofenac Sodium Delayed-Release Tablets

DEFINITION

Diclofenac Sodium Delayed-Release Tablets contain NLT 90.0% and NMT 110.0% of the labeled amount of diclofenac sodium ($C_{14}H_{10}Cl_2NNaO_2$).

IDENTIFICATION

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

• **B.** The UV (190–400 nm) spectrum of the diclofenac peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.

ASSAY

• **Procedure**

Solution A: 0.7708 g/L of ammonium acetate in water. Adjust with acetic acid to a pH of 5.3. Pass through a suitable filter of 0.2-µm pore size.

Solution B: Acetonitrile

Mobile phase: See *Table 1*.

Table 1

Time (min)	Solution A (%)	Solution B (%)
0.00	70	30
0.50	70	30
8.50	5	95
10.00	5	95
10.01	70	30
14.00	70	30

Diluent: Acetonitrile and water (50:50)

Standard solution: 0.2 mg/mL of USP Diclofenac Sodium RS in *Diluent*

Sample solution: Nominally 0.2 mg/mL of diclofenac sodium in *Diluent* prepared as follows. Transfer a suitable portion of diclofenac sodium to a suitable volumetric flask from NLT 20 finely powdered Tablets. Add *Diluent* equivalent to 50% of the flask volume. Dissolve with sonication for 20 min at 40° and fill with *Diluent* to volume. Pass the solution through a suitable filter of 0.22-µm pore size. [Note—Protect the *Standard solution* and *Sample solution* from light.]

Chromatographic system

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

Mode: LC

Detector: UV 280 nm. For *Identification* test *B*, use a photo-diode array detector.

Column: 10-cm × 2.0-mm; 1.9-µm packing L1

Column temperature: 35°

Flow rate: 0.3 mL/min

Injection volume: 1 µL

System suitability

Sample: *Standard solution*

[NOTE—See *Table 2* for relative retention times.]

Suitability requirements

Tailing factor: NMT 1.2

Relative standard deviation: NMT 1.0%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of diclofenac sodium ($C_{14}H_{10}Cl_2NNaO_2$) in the portion of Tablets taken:

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

r_U = peak response of diclofenac from the *Sample solution*

r_S = peak response of diclofenac from the *Standard solution*

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

C_U = nominal concentration of diclofenac sodium in the *Sample solution* (mg/mL)

Acceptance criteria: 90.0%–110.0%

PERFORMANCE TESTS

• **DISSOLUTION ⟨711⟩**

Proceed as directed in *Procedure*, *Apparatus 1 and Apparatus 2*, *Delayed-Release Dosage Forms*, *Method B* to determine the amount of diclofenac sodium ($C_{14}H_{10}Cl_2NNaO_2$) dissolved.

Acid stage

Medium: 0.1 N hydrochloric acid; 900 mL

Apparatus 2: 50 rpm, paddles constructed of (or coated with) polytef being used

Time: 2 h

Detector: UV, maxima at about 276 nm

Standard solution: Transfer 68 mg of USP Diclofenac Sodium RS to a 100-mL volumetric flask, add 10.0 mL of 0.1 N sodium hydroxide, and dilute with water to volume. Transfer 2.0 mL of this solution to a second 100-mL volumetric flask, dilute with a mixture of 0.1 N hydrochloric acid and 5 N sodium hydroxide (900:20) to volume, and mix. This *Standard solution* contains 13.6 µg/mL of USP Diclofenac Sodium RS.

Sample solution: At the end of 2 h, remove each Tablet, or the major portion thereof if the Tablet is not intact, from the individual vessels, and subject them to the test under *Buffer stage*. To the 0.1 N hydrochloric acid remaining in each vessel, add 20.0 mL of 5 N sodium hydroxide, and stir for 5 min.

Buffer stage

Medium: pH 6.8 phosphate buffer; 900 mL

Apparatus 2: 50 rpm

Time: 45 min

Detector: UV, maxima at about 276 nm

Solution A: 76 mg/mL of tribasic sodium phosphate

pH 6.8 phosphate buffer: *Solution A* and 0.1 N hydrochloric acid (1:3), adjusted with 2 N hydrochloric acid or 2 N sodium hydroxide to a pH of 6.8 ± 0.05, if necessary

Standard solution: Transfer 68 mg of USP Diclofenac Sodium RS to a 100-mL volumetric flask. Add 10.0 mL of 0.1 N sodium hydroxide, dilute with water to volume, and mix. Transfer 3.0 mL of this solution to a 100-mL volumetric flask, dilute with *Buffer stage Medium* to volume, and mix. The final concentration is about 0.0204 mg/mL of diclofenac sodium.

Sample solution: Sample per *Dissolution ⟨711⟩*. Dilute with *Medium* to a concentration similar to that of the *Standard solution*.

Tolerances: NLT 75% (*Q*) of the labeled amount of diclofenac sodium ($C_{14}H_{10}Cl_2NNaO_2$) is dissolved.

• **UNIFORMITY OF DOSAGE UNITS ⟨905⟩:** Meet the requirements

IMPURITIES

• **ORGANIC IMPURITIES**

Mobile phase and **Diluent:** Proceed as directed in the *Assay*.

Standard solution: 0.001 mg/mL each of USP Diclofenac Sodium RS and USP Diclofenac Related Compound A RS in *Diluent*

Sample solution: Nominally 1.0 mg/mL of diclofenac sodium in *Diluent* prepared as follows. Transfer a suitable portion of diclofenac sodium to a suitable volumetric flask from NLT 20 finely powdered Tablets. Add *Diluent* equivalent to 50% of the flask volume. Dissolve with sonication for 20 min at 40° and fill with *Diluent* to volume. Pass the solution through a suitable filter of 0.22-µm pore size.

Chromatographic system: Proceed as directed in the *Assay*, except for the *Detector*.

Detector: UV 254 nm

System suitability

Sample: *Standard solution*

Suitability requirements

Relative standard deviation: NMT 5%

Signal-to-noise ratio: NLT 10

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of diclofenac related compound A in the portion of Tablets taken:

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

r_U = peak response of diclofenac related compound A from the *Sample solution*

r_S = peak response of diclofenac related compound A from the *Standard solution*

C_S = concentration of USP Diclofenac Related Compound A RS in the *Standard solution* (mg/mL)

C_U = nominal concentration of diclofenac sodium in the *Sample solution* (mg/mL)

Calculate the percentage of any other impurity in the portion of Tablets 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 diclofenac from the *Standard solution*

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

C_U = nominal concentration of diclofenac sodium in the *Sample solution* (mg/mL)

Acceptance criteria: See *Table 2*. Disregard any impurity peak less than 0.05%.

Table 2

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Oxindole[a,b]	0.4	—
Diclofenac	1.0	—
Diclofenac related compound D (diclofenac bromo analog)[c,b]	1.04	—
Diclofenac related compound A	1.48	0.5
Diclofenac alcohol analog[d,b]	1.55	—
Diclofenac benzaldehyde analog[e,b]	1.81	—
Any individual unspecified impurity	—	0.5

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Total impurities[b]	—	1.5

[a] 1,3-Dihydro-2*H*-indol-2-one.

[b] Process-related impurities, not to be counted in total impurities.

[c] 2-{2-[(2-Bromo-6-chlorophenyl)amino]phenyl}acetic acid.

[d] {2-[(2,6-Dichlorophenyl)amino]phenyl}methanol.

[e] 2-[(2,6-Dichlorophenyl)amino]benzaldehyde.

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in tight, light-resistant containers. Store at controlled room temperature. Protect from moisture.

• **USP Reference Standards** ⟨11⟩

USP Diclofenac Sodium RS

USP Diclofenac Related Compound A RS

1-(2,6-Dichlorophenyl)indolin-2-one.

$C_{14}H_9Cl_2NO$ 278.13

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

Topic/Question	Contact	Expert Committee
DICLOFENAC SODIUM DELAYED-RELEASE TABLETS	Documentary Standards Support	SM22020 Small Molecules 2

Chromatographic Database Information: Chromatographic Database

Most Recently Appeared In:
Pharmacopeial Forum: Volume No. PF 40(6)

Current DocID: GUID-4A290B3C-D12E-4A48-AEEF-79B9269DC606_1_en-US

DOI: https://doi.org/10.31003/USPNF_M24970_01_01

DOI ref: h3dif