

Doxorubicin Hydrochloride Injection

DEFINITION
Doxorubicin Hydrochloride Injection is a sterile solution of Doxorubicin Hydrochloride in Sterile Water for Injection made isoosmotic with Sodium Chloride, Dextrose, or other suitable added substances. It contains NLT 90.0% and NMT 115.0% of the labeled amount of doxorubicin hydrochloride ($C_{27}H_{29}NO_{11} \cdot HCl$).

- IDENTIFICATION**
- A.** The retention time of the doxorubicin peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the Assay.
 - B.** The UV spectrum of the doxorubicin peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the Assay.

ASSAY
Change to read:

- PROCEDURE**

[NOTE—Protect solutions containing doxorubicin from light.]

Solution A: [0.1% trifluoroacetic acid TS](#)

Solution B: [Acetonitrile](#), methanol, and [trifluoroacetic acid](#) (800:200:1)

Mobile phase: See [Table 1](#).

Table 1

Time (min)	Solution A (%)	Solution B (%)
0	90	10
15	25	75
16	25	75
16.1	90	10
18	90	10

Diluent: *Solution A* and *Solution B* (50:50)

System suitability solution: 0.1 mg/mL each of [USP Doxorubicin Hydrochloride RS](#) and [USP Epirubicin Hydrochloride RS](#) in *Diluent*

Standard solution: 0.1 mg/mL of [USP Doxorubicin Hydrochloride RS](#) in *Diluent*

Sample solution: Nominally 0.1 mg/mL of doxorubicin hydrochloride in *Diluent* from Injection

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

Mode: LC

Detector: UV 254 nm. For *Identification B*, use a diode array detector in the range of 190–400 nm.

Column: 2.1-mm × 10-cm; 1.7-μm packing [L1](#)

Temperatures

Autosampler: 4°

Column: 35°

Flow rate: 0.5 mL/min

Injection volume: 2 μL

System suitability

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

[NOTE—See [Table 2](#) for the relative retention times.]

Suitability requirements

Resolution: NLT 1.5 between doxorubicin and epirubicin, *System suitability solution*

Tailing factor: 0.8–1.5, *Standard solution*

Relative standard deviation: NMT 0.73%, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of doxorubicin hydrochloride ($C_{27}H_{29}NO_{11} \cdot HCl$) in the portion of Injection taken:

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

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

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

C_S = concentration of [USP Doxorubicin Hydrochloride RS](#) in the *Standard solution* (mg/mL)

C_U = nominal concentration of doxorubicin hydrochloride in the *Sample solution* (mg/mL)

P = potency of doxorubicin ▲hydrochloride▲ (ERR 1-Nov-2022) in [USP Doxorubicin Hydrochloride RS](#) (µg/mg)

F = conversion factor, 0.001 mg/µg

Acceptance criteria: 90.0%–115.0%

IMPURITIES

Change to read:

• ORGANIC IMPURITIES

[NOTE—Protect solutions containing doxorubicin from light.]

Mobile phase, Diluent, System suitability solution, and Chromatographic system: Proceed as directed in the Assay.

Standard solution: 0.008 mg/mL each of [USP Doxorubicin Hydrochloride RS](#) and 0.012 mg/mL of [USP Doxorubicinone RS](#) in *Diluent*. [NOTE—It may be necessary to first dissolve in [acetonitrile](#), using NMT 5% of the final volume, before diluting with *Diluent*.]

Sample solution: Nominally 0.4 mg/mL of doxorubicin hydrochloride in *Diluent* from Injection

System suitability

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

Suitability requirements

Resolution: NLT 1.5 between doxorubicin and epirubicin, *System suitability solution*

Relative standard deviation: NMT 5.0%, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of doxorubicinone in the portion of Injection taken:

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

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

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

C_S = concentration of [USP Doxorubicinone RS](#) in the *Standard solution* (mg/mL)

C_U = nominal concentration of doxorubicin hydrochloride in the *Sample solution* (mg/mL)

P = potency of doxorubicinone in [USP Doxorubicinone RS](#) (mg/mg)

Calculate the percentage of any individual unspecified degradation product in the portion of Injection taken:

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

r_U = peak response of each degradation product from the *Sample solution*

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

C_S = concentration of [USP Doxorubicin Hydrochloride RS](#) in the *Standard solution* (mg/mL)

C_U = nominal concentration of doxorubicin hydrochloride in the *Sample solution* (mg/mL)

P = potency of doxorubicin ▲hydrochloride▲ (ERR 1-Nov-2022) in [USP Doxorubicin Hydrochloride RS](#) (µg/mg)

F = conversion factor, 0.001 mg/µg

Acceptance criteria: See [Table 2](#).

Table 2