

Status: Currently Official on 15-Feb-2025
 Official Date: Official as of 01-Jan-2019
 Document Type: USP Monographs
 DocId: GUID-5006FF1E-5A5F-42DC-AEA2-77F7D3B93CBC_5_en-US
 DOI: https://doi.org/10.31003/USPNF_M40613_05_01
 DOI Ref: s7ud9

© 2025 USPC
 Do not distribute

Insulin Lispro Injection

DEFINITION

Insulin Lispro Injection is an isotonic, sterile solution of Insulin Lispro in Water for Injection. It has a potency of NLT 95.0% and NMT 105.0% of the potency stated on the label, expressed in USP Insulin Lispro Units/mL.

IDENTIFICATION

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

ASSAY

PROCEDURE

Solution A: 28.4 g of [anhydrous sodium sulfate](#) in 1000 mL of [water](#). Adjust with [phosphoric acid](#) to a pH of 2.3.

Mobile phase: Acetonitrile and *Solution A* (51:149)

System suitability solution: 1 mg/mL of insulin lispro in 0.01 N [hydrochloric acid](#). Allow to stand at room temperature to obtain a solution containing 0.8%–11% of A-21 desamido insulin lispro.

Standard solution: 0.7 mg/mL of [USP Insulin Lispro RS](#) in 0.01 N [hydrochloric acid](#)

Sample solution: Acidify each milliliter of Injection with 3 µL of 9.6 N [hydrochloric acid](#). Quantitatively dilute a portion of the acidified solution with 0.01 N [hydrochloric acid](#) to obtain a solution containing 20 USP Insulin Lispro Units/mL.

Chromatographic system

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

Mode: LC

Detector: UV 214 nm

Column: 4.6-mm × 10-cm; packing [L1](#)

Column temperature: 40°

Flow rate: 0.8 mL/min

Injection volume: 20 µL

System suitability

Adjust the *Mobile phase* to obtain a retention time of about 24 min for the main insulin lispro peak.

Sample: *System suitability solution* (3 replicate injections)

Suitability requirements

Resolution: NLT 3.0 between insulin lispro and A-21 desamido insulin lispro

Tailing factor: NMT 1.5 for the insulin lispro peak

Relative standard deviation: NMT 1.1% for the insulin lispro peak

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the potency, in USP Insulin Lispro Units/mL, of Injection taken:

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

r_U = peak response of insulin lispro from the *Sample solution*

r_S = peak response of insulin lispro from the *Standard solution*

C_S = concentration of [USP Insulin Lispro RS](#) in the *Standard solution* (USP Insulin Lispro Units/mL)

D = dilution factor used to prepare the *Sample solution*

Acceptance criteria: 95.0%–105.0% of the potency stated on the label, expressed in USP Insulin Lispro Units/mL

OTHER COMPONENTS**Change to read:**

- ▲ **ZINC DETERMINATION** (591):▲ (IRA 1-JAN-2019) 14–35 µg for every 100 USP Insulin Lispro Units

PRODUCT-RELATED SUBSTANCES AND IMPURITIES**Change to read:**• **RELATED SUBSTANCES**

Solvent: 28.4 g of [anhydrous sodium sulfate](#) in 1000 mL of [water](#). Adjust with phosphoric acid to a pH of 2.3.

Solution A: Acetonitrile and *Solvent* (18:82)

Solution B: Acetonitrile and *Solvent* (50:50)

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

Table 1

Time (min)	Solution A (%)	Solution B (%)
0	81	19
60	81	19
83	51	49
84	81	19
94	81	19

System suitability solution: 3.5 mg/mL of insulin lispro in 0.01 N [hydrochloric acid](#). Allow to stand at room temperature to obtain a solution containing 0.8%–11% of A-21 desamido insulin lispro.

Sample solution: Acidify each milliliter of Injection with 3 µL of 9.6 N [hydrochloric acid](#).

Chromatographic system

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

Mode: LC

Detector: UV 214 nm

Column: 4.6-mm × 25-cm; packing [L1](#)

Column temperature: 40°

Flow rate: 1 mL/min

Injection volume: 20 µL

System suitability

Adjust the *Mobile phase* composition and the duration of the isocratic elution to obtain a retention time of about 41 min for the main insulin lispro peak, with A-21 desamido insulin lispro eluting just prior to the start of the gradient elution phase.

Sample: *System suitability solution*

Suitability requirements

Resolution: NLT 2.5 between insulin lispro and A-21 desamido insulin lispro

Tailing factor: NMT 2.0 for the insulin lispro peak

Analysis

Sample: *Sample solution*

Calculate the percentage of insulin lispro, A-21 desamido insulin lispro, and other impurities in the portion of ▲Injection▲ (ERR 1-Sep-2018) taken.

Calculate the percentage of insulin lispro (%I):

$$\text{Result} = (r_I/r_T) \times 100$$

r_I = peak response of insulin lispro from the *Sample solution*

r_T = sum of the responses of all the peaks from the *Sample solution*