Edition: BP 2025 (Ph. Eur. 11.6 update)

Liothyronine for Injection

General Notices

Action and use

Thyroid hormone replacement.

DEFINITION

Liothyronine for Injection is a sterile material consisting of Liothyronine Sodium with or without excipients. It is supplied in a sealed container.

The contents of the sealed container comply with the requirements for Powders for Injections or Infusions stated under Parenteral Preparations and with the following requirements.

Content of liothyronine sodium, $C_{15}H_{11}I_3NNaO_4$

90.0 to 105.0% of the stated amount.

IDENTIFICATION

In the Assay, record the UV spectrum of the principal peak in the chromatograms obtained with solutions (1) and (2) with a diode array detector in the range of 210 to 400 nm.

The UV spectrum of the principal peak in the chromatogram obtained with solution (1) is concordant with that of the peak in the chromatogram obtained with solution (2);

the retention time of the principal peak in the chromatogram obtained with solution (1) is similar to that of the peak in the chromatogram obtained with solution (2).

TESTS

Clarity and colour of solution

Dissolve the contents of a sealed container in *water for injections* and dilute to produce a final solution containing 0.002% w/v of Liothyronine Sodium. The solution is *clear*, Appendix IV A, and *colourless*, Appendix IV B.

Related substances

Carry out the method for *liquid chromatography*, Appendix III D, using the following solutions prepared in the mobile phase. Carry out the test protected from light.

(1) Dissolve the mixed contents of sealed containers containing 0.025 mg of Liothyronine Sodium with 4 mL and dilute to produce 5 mL.
(2) Dilute 1 volume of solution (1) to 100 volumes.
(3) 0.00025% w/v of *liothyronine sodium EPCRS* and 0.00005% w/v of *levothyroxine sodium EPCRS* (impurity A).

(4) Dilute 1 volume of solution (2) to 10 volumes.

CHROMATOGRAPHIC CONDITIONS

(a) Use a stainless steel column (15 cm × 4.6 mm) packed with *end-capped extra-dense bonded cyanosilyl silica gel for chromatography* (5 µm) (Zorbax Eclipse XDB-CN is suitable).
(b) Use isocratic elution and the mobile phase described below.
(c) Use a flow rate of 1 mL per minute.
(d) Use a column temperature of 60°.
(e) Use a detection wavelength of 225 nm.
(f) Inject 50 µL of each solution.
(g) For solution (1), allow the chromatography to proceed for 10 times the retention time of liothyronine.

MOBILE PHASE

5 volumes of *orthophosphoric acid*, 300 volumes of *acetonitrile* and 700 volumes of *water*.

SYSTEM SUITABILITY

The test is not valid unless, in the chromatogram obtained with solution (3), the *resolution* between the peaks due to liothyronine and impurity A is at least 4.0.

CALCULATION OF IMPURITIES

For impurity A, use the concentration of impurity A in solution (3).

For each unspecified impurity, use the concentration of liothyronine in solution (2).

For the reporting threshold, use the concentration of liothyronine in solution (4).

For peak identification, use solution (3).

Liothyronine retention time: about 4 minutes.

Relative retention: impurity B, about 0.5; impurity E, about 0.7; impurity A, about 1.4; impurity C, about 5.0 and impurity D, about 5.7.

LIMITS

— impurity A, not more than 1.0%;

— unspecified impurities: for each impurity, not more than 1.0%;

— total impurities: not more than 3.0%;

— reporting threshold: 0.1%.

Uniformity of content

Sealed containers containing the equivalent of 2 mg or less of Liothyronine Sodium comply with the requirements stated under *Parenteral Preparations*, *Powders for Injections or Infusions*. Use the individual results obtained in the Assay.

ASSAY

Carry out the method for *liquid chromatography*, Appendix III D, using the following solutions, prepared in the mobile phase. Carry out the test protected from light.

(1) Dissolve the contents of a sealed container to produce a solution containing 0.0005% w/v of Liothyronine Sodium.
(2) 0.0005% w/v of *liothyronine sodium EPCRS*.
(3) 0.0005% w/v of *liothyronine sodium EPCRS* and 0.0005% w/v of *levothyroxine sodium EPCRS*.

CHROMATOGRAPHIC CONDITIONS

The chromatographic procedure described under Related substances may be used.

SYSTEM SUITABILITY

The test is not valid unless, in the chromatogram obtained with solution (3), the *resolution* between the peaks due to liothyronine and impurity A is at least 4.0.

DETERMINATION OF CONTENT

Calculate the content of $C_{15}H_{11}I_3NNaO_4$ in the sealed containers using the chromatograms obtained and the declared content of $C_{15}H_{11}I_3NNaO_4$ in *liothyronine sodium EPCRS*.

STORAGE

Liothyronine for Injection should be protected from light.

IMPURITIES

The impurities limited by the requirements of this monograph include those listed under Liothyronine Sodium.