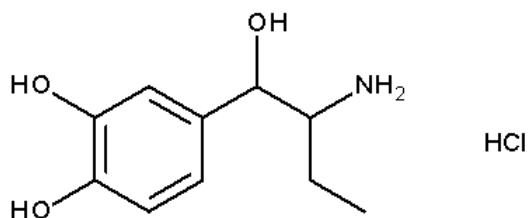




Certificate of Analysis

Reference Standard

Ethylnoradrenaline Hydrochloride



Molecular Formula: C₁₀H₁₅NO₃ · HCl
Molecular Weight: 233.69
CAS Number: 3198-07-0

Catalogue Number: MM3080.00
Lot Number: 61071
Long-term Storage: 2 to 8 °C, dark
Appearance: brown solid
Melting Point: 185 °C (dec.)
Assay 'as is': 99.7 %

Date of shipment: **2018-July-02**

This certificate is valid one year from the date of shipment provided the substance is stored under the recommended conditions unopened in the original container.

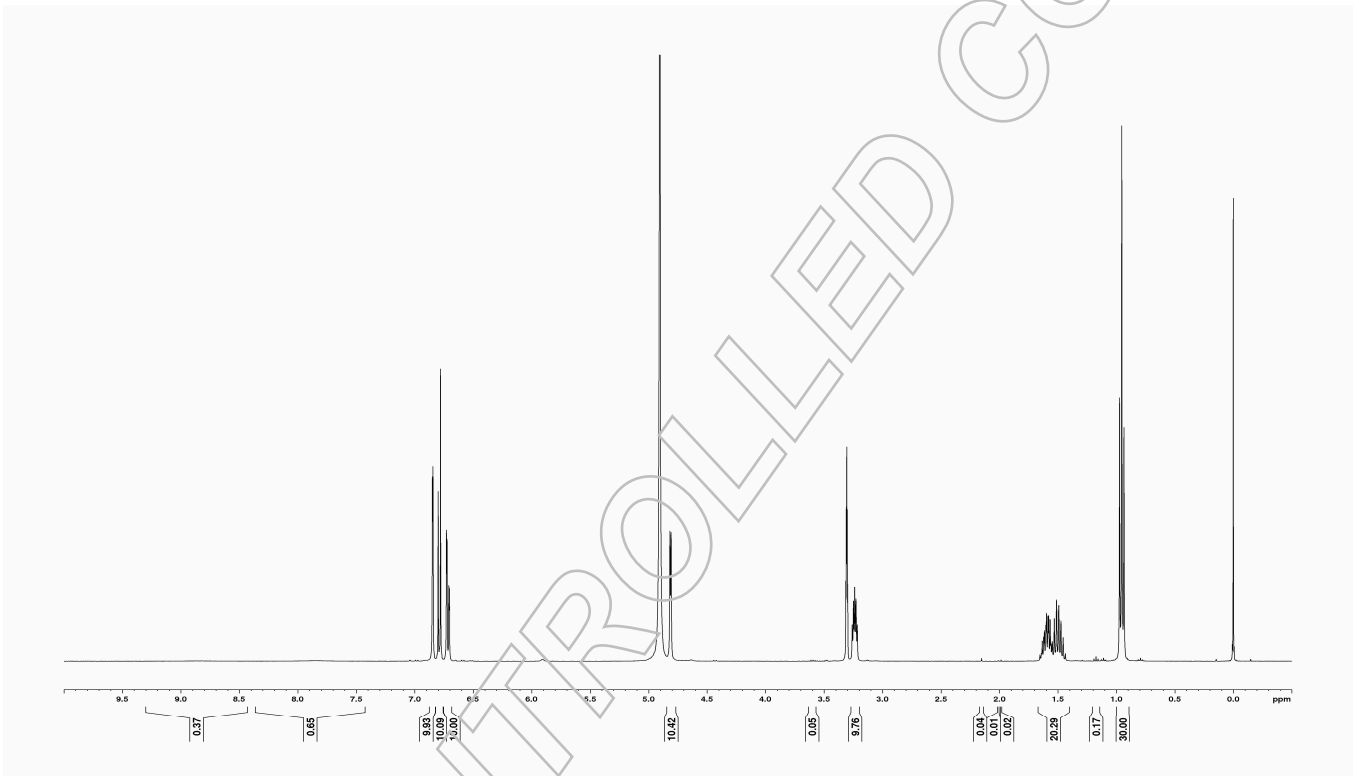


I. Identity

The identity of the reference substance was established by following analyses.

Ia. ¹H-NMR Spectrum

Conditions: 400 MHz, CD₃OD



The structure is confirmed by the signals of the spectrum and their interpretation.



Ib. Mass Spectrum

Method: HRMS; 3.5 kV ESI+; capillary temperature: 269 °C



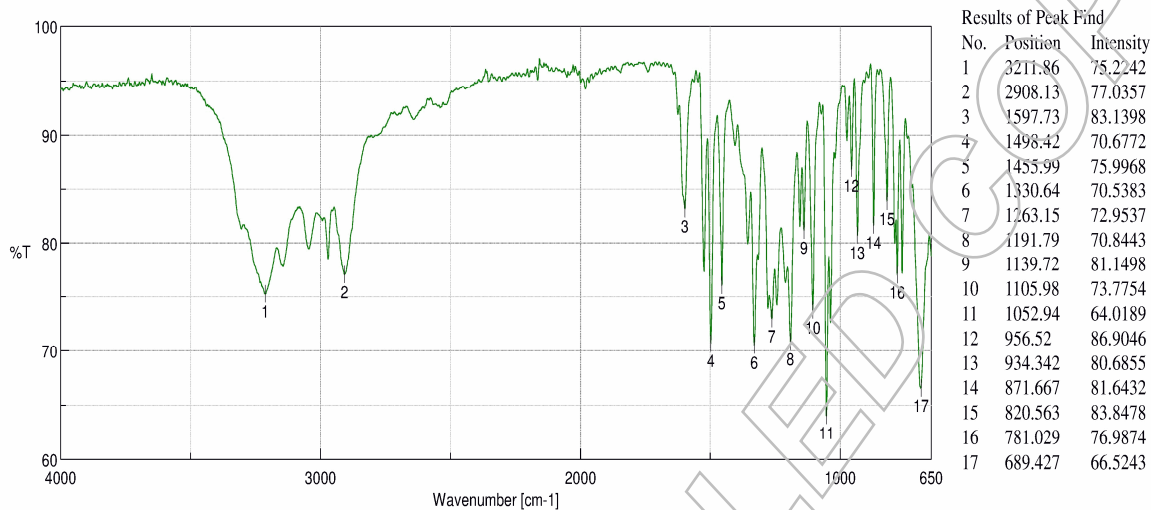
Theoretical value: 198.11246

The signal of the MS spectrum is consistent with the theoretical value and its interpretation is consistent with the structural formula.



Ic. IR Spectrum

Method: Attenuated Total Reflection Fourier Transform Infrared (ATR-FTIR) Spectroscopy



The signals of the IR spectrum and their interpretation are consistent with structural formula.

II. Purity

IIa. Water Content

Method: Karl Fischer titration

Results:

Average 0.20 %

Number of results n=3

Standard deviation 0.01 %

IIb. Residual Solvents

Residual Solvent	Average	Method
Acetic acid	0.02 %	¹ H-NMR
Acetone	0.02 %	¹ H-NMR
Ethanol	0.11 %	¹ H-NMR
Ethyl acetate	0.01 %	¹ H-NMR



III. Assay by Elementary Analysis (Carbon Titration)

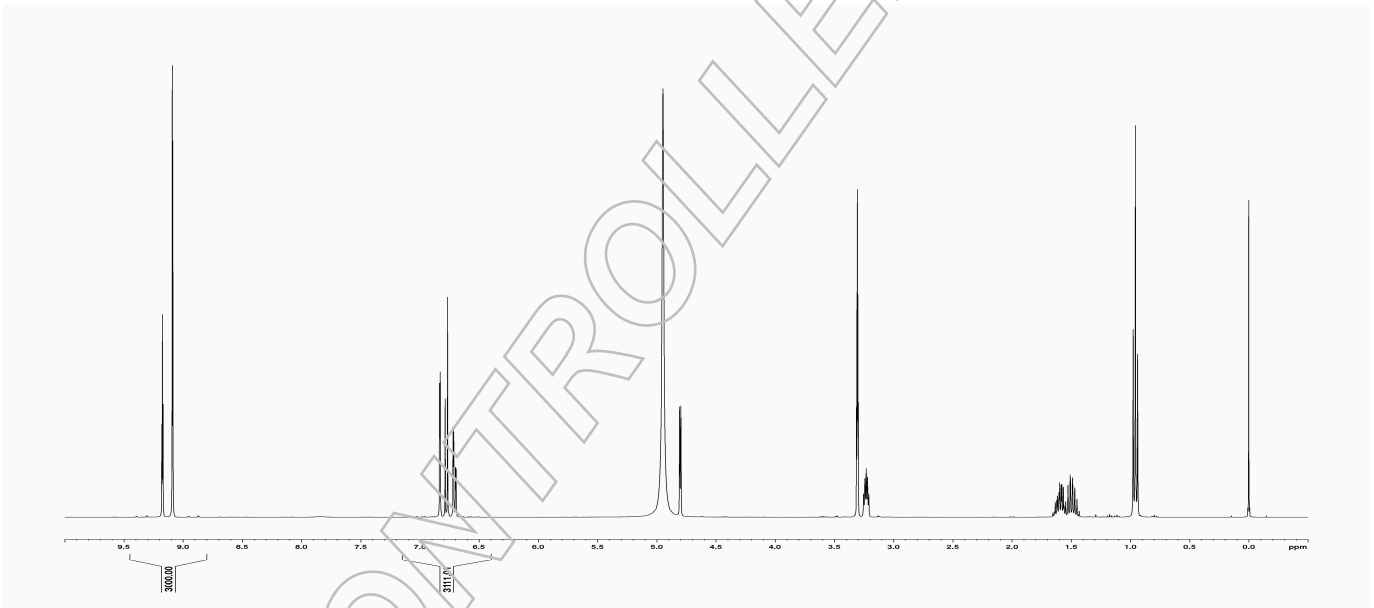
Method: percentage carbon found in relation to percentage carbon as calculated for molecular formula

Results:

Arithmetic mean (n=3) 99.88 % (mass fraction)

IV. Assay by quantitative NMR spectroscopy

The assay of the reference substance was established by quantitative NMR spectroscopy using CD₃OD as solvent and with 3,5-Dinitrobenzoic acid (certified reference material, signal 8.8 - 9.5 ppm, 3 H) as internal standard.



Results:

Average 99.71 %
Number of results n=6
Standard deviation 0.14 %



V. Final Result

Water content	0.20 %
Residual solvents	0.16 %
Assay	
Quantitative NMR spectroscopy	99.71 %

The assay is assessed to be 99.7 % 'as is'

The assay 'as is' is equivalent to the assay based on the not anhydrous and not dried substance respectively.

Release Date:

Luckenwalde, 2015-March-17

Signed:

Dr. Sabine Schröder
Product Release