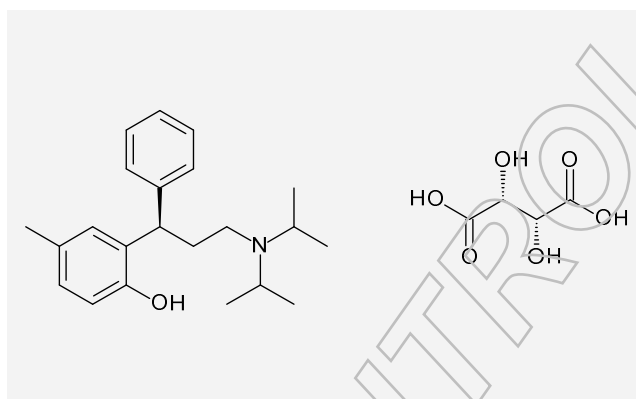


## Certificate of Analysis

### Reference Substance

#### Tolterodine Tartrate

Catalogue Number:	LGCFOR0900.00	Long-term Storage:	2 to 8 °C, dark
Lot Number:	41312	Appearance:	white solid
Molecular Formula:	C <sub>22</sub> H <sub>31</sub> NO C <sub>4</sub> H <sub>6</sub> O <sub>6</sub>	Melting Point:	205 °C
Molecular Weight:	475.57	Assay 'as is':	99.8 %
CAS Number:	[ 124937-52-6 ]		



Date of shipment: **2016-May-20**

This certificate is valid for two years from the date of shipment provided the substance is stored under the recommended conditions.

Release Date: 2013-11-08

LGC GmbH

Dr. Sabine Schröder  
Product Release

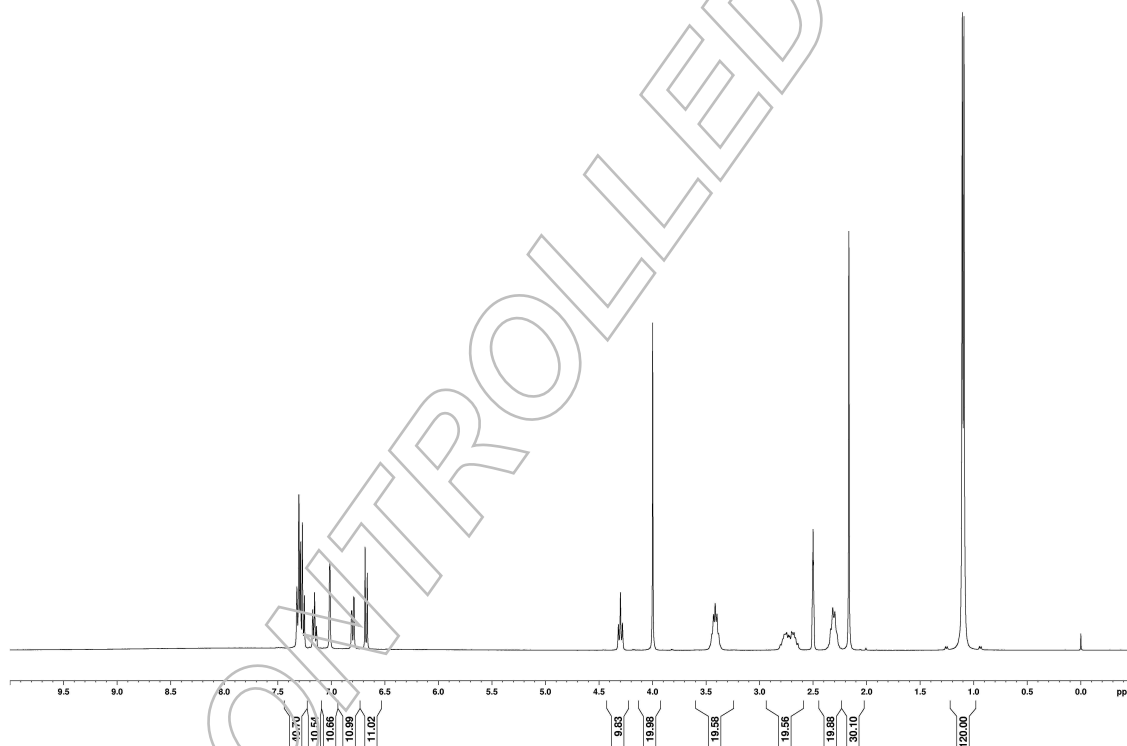
## I. Identity

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

### Ia. <sup>1</sup>H-NMR Spectrum

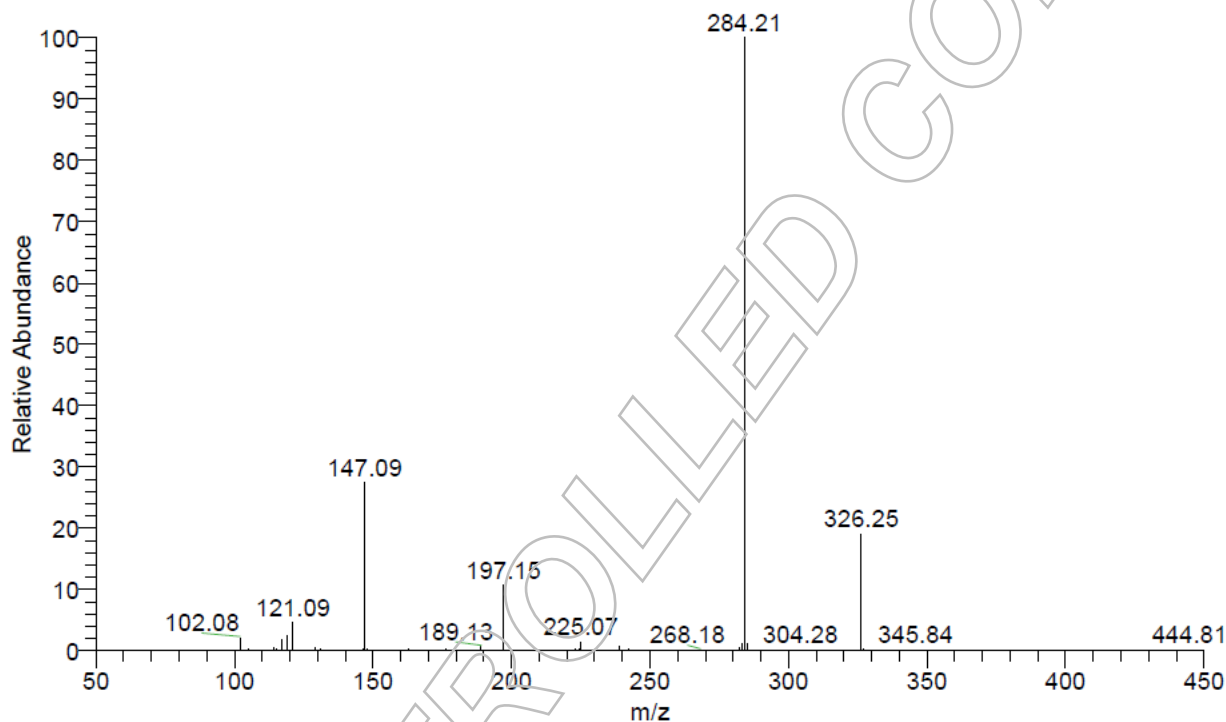
Conditions: 400 MHz, DMSO-d<sub>6</sub>

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



## 1b. Mass Spectrum

Method: 4.5 kV ESI; vaporization temperature: 200 °C, direct inlet

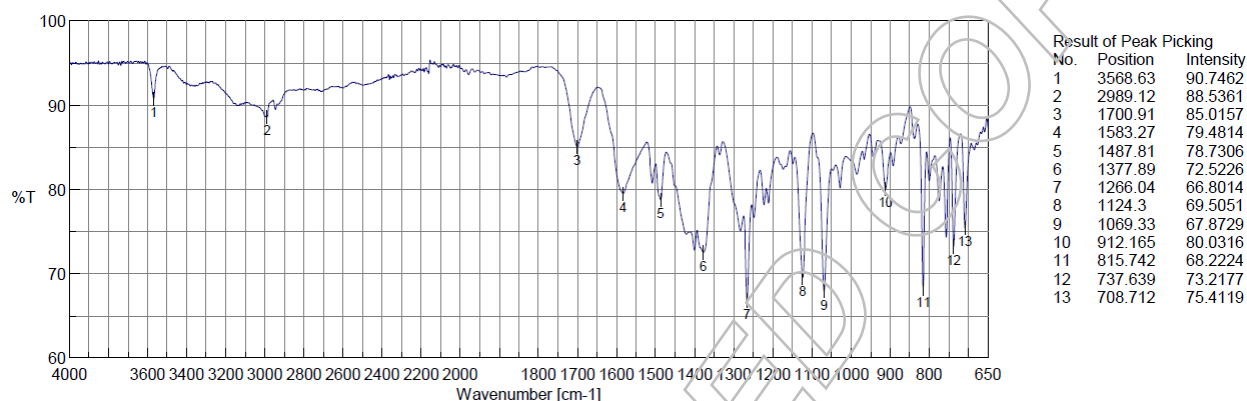


m/z	fragments (M = free base)
326	[ MH ]
197	[ C <sub>14</sub> H <sub>13</sub> O ]

The signals of the mass spectrum and their interpretation are 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 the structural formula.

## II. Purity

The purity of the reference substance was analysed by high performance liquid chromatography (HPLC).

### HPLC Conditions:

#### Column:

Hypersil Gold (C18)  
5 µm, 150 x 4.6 mm

#### Conditions:

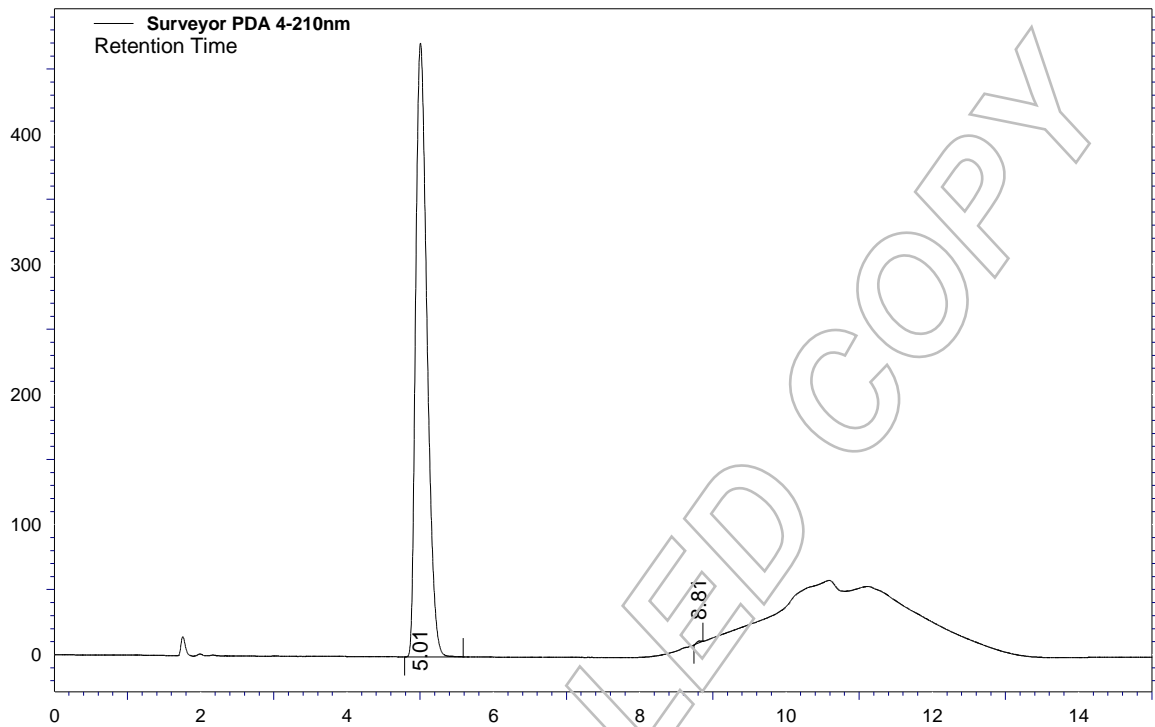
1.0 ml/min, 40 °C  
0 – 5 min Water/Acetonitrile 68/32  
5 – 8 min Water/Acetonitrile to 10/90  
8 – 10 min Water/Acetonitrile to 68/32  
10 – 15 min Water/Acetonitrile 68/32 (v/v);  
0.1 % H<sub>3</sub>PO<sub>4</sub>

#### Detector:

DAD  
210 nm

#### Injector:

Auto  
5 µl; 0.1018 mg/ml in  
Water/Acetonitrile 50/50 (v/v)



**Area Percent Report - Sorted by Signal**

Pk #	Retention Time	Area	Area %
-	1.76	Tartrate Peak	-
1	5.01	5072716	99.88
2	8.81	6007	0.12
Totals		5078723	100.00

For the calculation the tartrate peak and the system peaks were ignored. The content of the analyte was determined as ratio of the peak area of the analyte and the cumulative areas of the purities, added up to 100 %.

**Results:**

**Average**                    99.88 %  
**Number of results**        n=3  
**Standard deviation**       < 0.01 %

### III. Water Content

Method: Karl Fischer titration

#### Results:

<b>Average</b>	0.11 %
<b>Number of results</b>	n=3
<b>Standard deviation</b>	< 0.01 %

### IV. Residual Solvents

Method: <sup>1</sup>H-NMR

No significant amounts of residual solvents were detected (< 0.05 %).

### V. Final Result

<b>Total impurities (HPLC)</b>	0.12 %
<b>Water content</b>	0.11 %
<b>Residual solvents</b>	n. d. (not detected)
<b>Assay (100 % method) <sup>1</sup></b>	99.77 %

The assay is assessed to be 99.8 % 'as is'

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

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<sup>1</sup> The calculation of the 100 % method follows the formula:

$$\text{Assay (\%)} = (100 \% - \text{KF} - \text{RES}) * \frac{\text{Purity HPLC (\%)}}{100 \%}$$

Water (KF) and Residual solvents (RES) are considered as absolute contributions, HPLC purity is considered as relative contribution.

LGCFOR0900.00 Lot Number 41312

LGC GmbH, Im Biotechnologiepark, TGZ II, D-14943 Luckenwalde, Germany