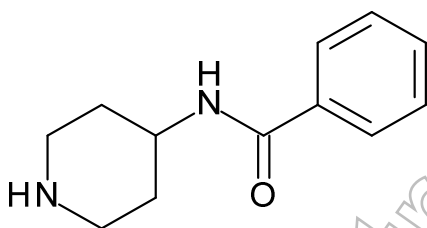




# Certificate of Analysis

## Reference Standard

N-(4-Piperidyl)benzamide



Molecular Formula:  $C_{12}H_{16}N_2O$   
Molecular Weight: 204.27  
CAS Number: 33953-37-6

Catalogue Number: MM0802.04  
Lot Number: 3110  
Long-term Storage: 2 to 8 °C, dark  
Appearance: white solid  
hygroscopic  
Melting Point: 144 °C  
Assay 'as is': 95.8 %

Date of shipment: **2015-July-05**

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

LGC Quality | ISO 9001:2008  
DQS 102448 QM08

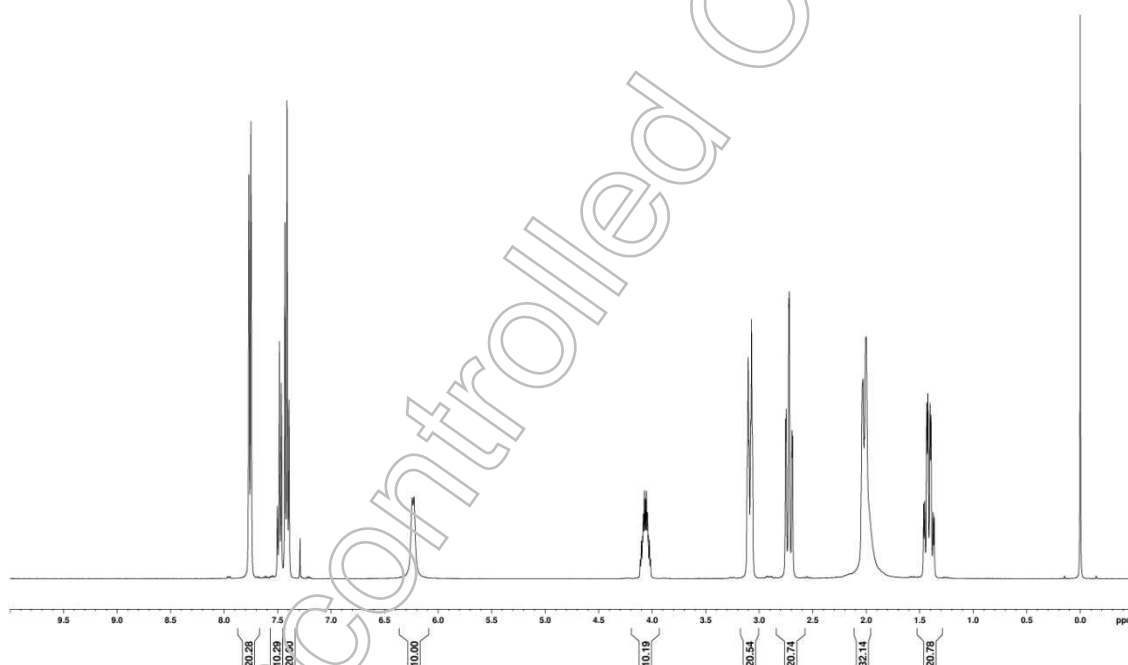


## I. Identity

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

### 1a. $^1\text{H-NMR}$ Spectrum

Conditions: 400 MHz,  $\text{CDCl}_3$

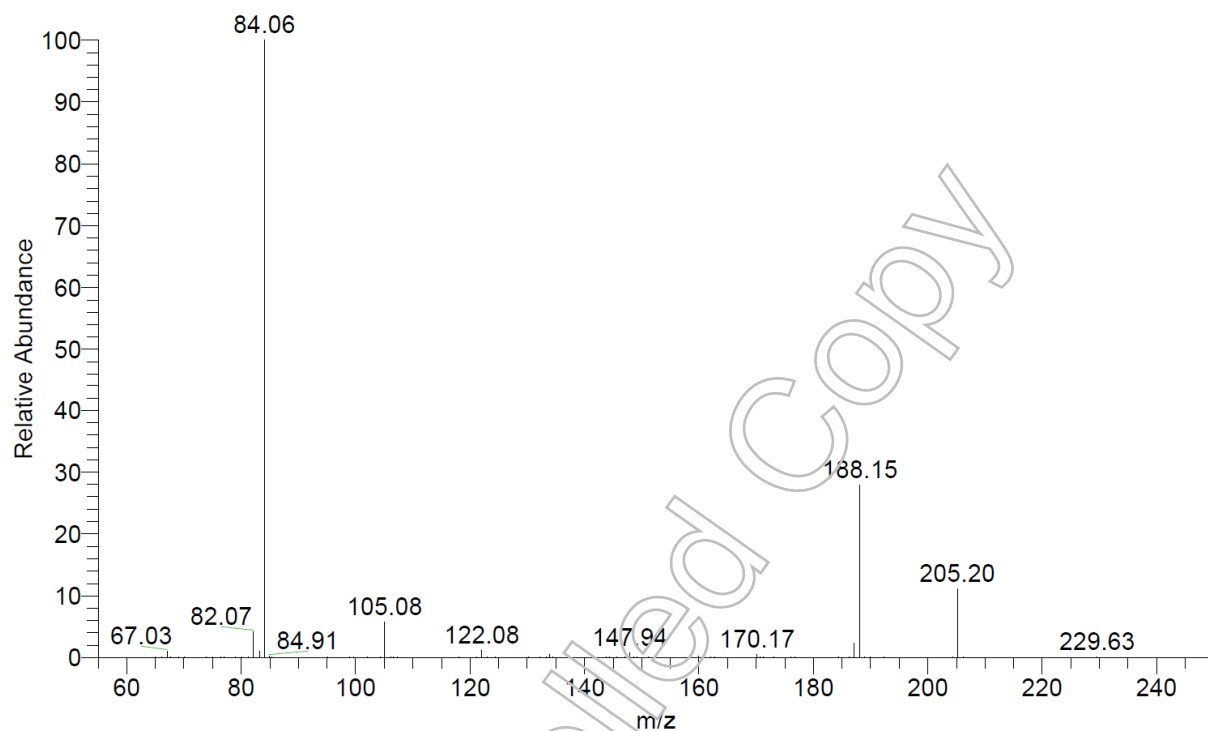


The structure is confirmed by the signals of the spectrum and their interpretation.



## Ib. Mass Spectrum

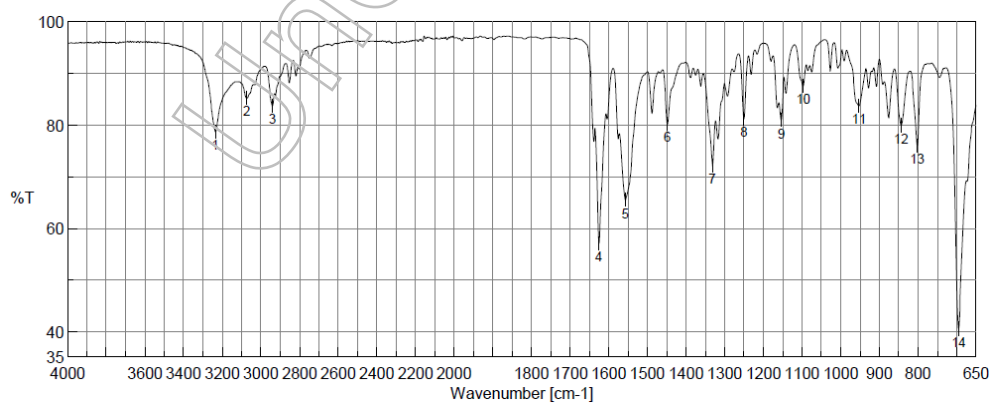
Method: 4.5 kV ESI+; vaporization temperature: 200 °C



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.



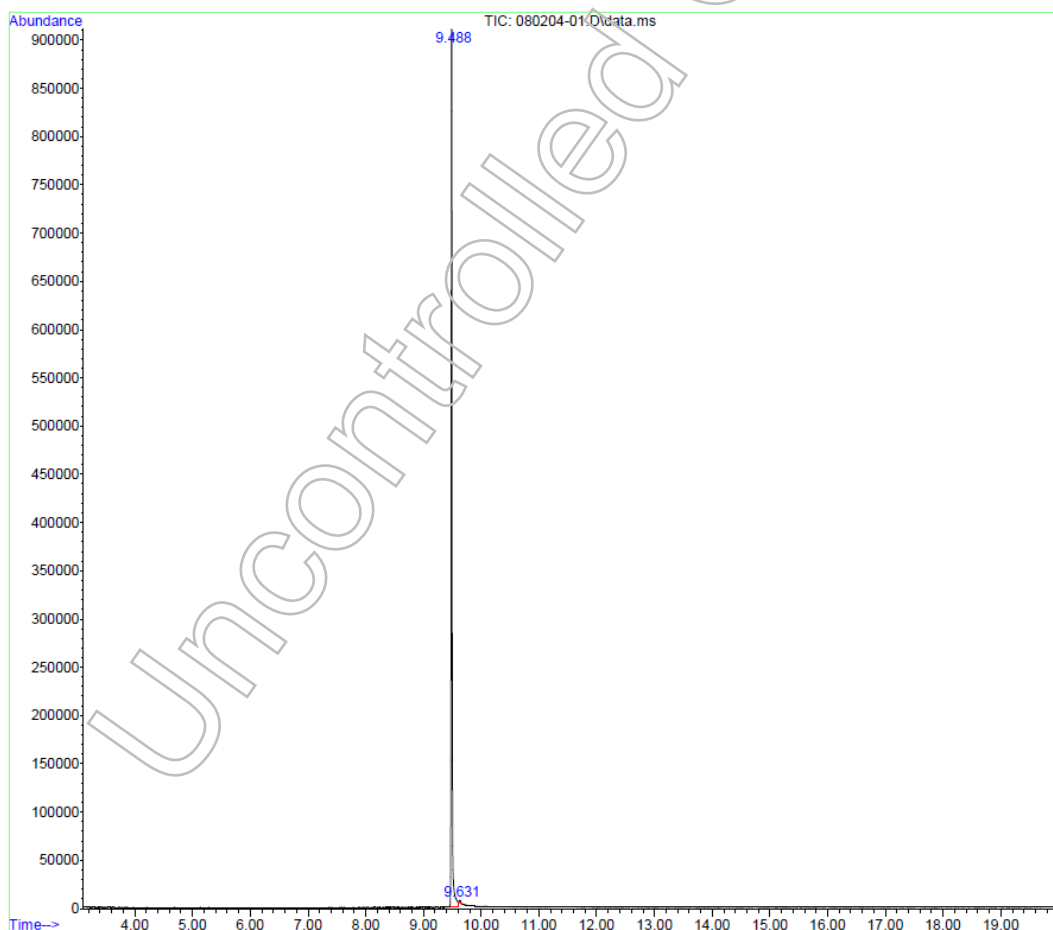
## II. Purity

### IIa. Gas Chromatography (GC)

The purity of the reference substance was analysed by gas chromatography (GC).

#### GC Conditions:

Column:	Injector and Flow:	Oven Program:	Detector:
HP-5MS	Split 20:1, 220 °C	Initial Temp.: 70 °C for 3 min	EI, 70 eV
30 m x 0.25 mm x 0.25 µm	Helium 1.50 ml/min	Heating Rate: 30 °C/min	35 to 550 amu
		Final Temp.: 250 °C for 11 min	280 °C





### Area Percent Report - Sorted by Signal

Pk #	Retention Time	Area	Area %
1	9.488	10348384	99.75
2	9.631	26116	0.25
Totals		10374500	100.00

For the calculation the air 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 99.74 %  
Number of results n=3  
Standard deviation 0.01 %

#### IIb. Water Content

Method: Karl Fischer titration

#### Results:

Average 3.99 %  
Number of results n=3  
Standard deviation 0.05 %

#### IIc. Residual Solvents

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

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



### III. Final Result

<b>Chromatographic purity (GC)</b>	99.74 %
<b>Water content</b>	3.99 %
<b>Residual solvents</b>	No significant amounts of residual solvents were detected (< 0.05 %).
<b>Assay (100 % method)<sup>1</sup></b>	95.76 %

The assay is assessed to be 95.8 % 'as is'

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

Release Date:

Luckenwalde, 2015-02-16

Dr. Sabine Schröder  
Product Release

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

$$\text{Assay (\%)} = (100 \% - \text{volatile contents}) * \frac{\text{Purity (\%)}}{100 \%}$$

Volatile contents are considered as absolute contributions, purity is considered as relative contribution.