



**Certified Reference
Materials
for
UV, Visible, NIR and IR
Molecular Spectroscopy**

RM-TX

Set Serial No: 48947

Customer Details:

Total Laboratory Services Ltd
Unit 14C Sunrise Business Park
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The customer information stated on this page
number 1, applies to all certificates.

Original Starna references are manufactured under ISO 17034:2016 accreditation

All calibration measurements are performed under ISO/IEC 17025:2017 accreditation.





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Reference Material Certificate of Calibration and Traceability

Toluene in hexane and hexane blank sealed in a quartz cell for use as a spectral resolution reference in the ultraviolet spectrum

Certificate Number: 136507
Certificate Date: 28 October 2025
Expiration Date: 28 October 2027
Analysis Number: 13465
Set Serial Number: 48947
Cell Serial Number: 150282
Blank Serial Number: 150215



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Description of Reference Material:

This reference consists of two far UV quartz cells, both of which have been permanently sealed. One cell is filled with a 0.020 % v/v solution of toluene in hexane. The other cell is a blank, filled with hexane only. The reference material is designed for the verification of spectral resolution.

Certified Values of Reference Material:

The toluene in hexane filled cell is measured against the hexane blank at the maximum absorbance closest to 268.7 nm and the minimum absorbance closest 267.0 nm. Using the results from the analysis, a ratio of absorbance maximum divided by absorbance minimum is calculated for each bandwidth. The combined analytical and instrument uncertainties at a coverage probability of 95 % is 0.0049 A.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Nominal Concentration 0.02 % v/v	Wavelength	Absorbance	SBW
Peak	268.76	0.2220	1.50
Trough	266.73	0.1333	
	Ratio	1.67	

The chart below, for cells with a ratio of 1.65, shows the estimated variation of ratio values, based on the slit width and the temperature of measurement.

PLEASE NOTE: THE CHART IS PROVIDED FOR INFORMATION PURPOSES ONLY

Spectral Resolution: Temperature of Measurement	Spectral slit width				
	0.5 nm +/- 0.1 nm	1.0 nm +/- 0.1 nm	1.5 nm +/- 0.2 nm	2.0 nm +/- 0.2 nm	3.0 nm +/- 0.2 nm
20 +/- 1 °C	2.4 - 2.5	2.0 - 2.1	1.6 - 1.7	1.3 - 1.4	1.0 - 1.1
25 +/- 1 °C	2.3 - 2.4	1.9 - 2.0	1.6 - 1.7	1.3 - 1.4	1.0 - 1.1
30 +/- 1 °C	2.1 - 2.2	1.8 - 1.9	1.5 - 1.6	1.3 - 1.4	1.0 - 1.1

FOR FURTHER CLARIFICATION:

USP Chapter <857> states: 'The ratio of the absorbance at the maximum to the absorbance at the minimum will typically fall in the 1.0 - 2.6 range'.

'For most compendial quantitative purposes a SBW of 2nm or less is sufficient, and the Acceptance criteria for the ratio is NO LESS THAN 1.3'.

Certifying Instrument Qualification:

All calibration is performed on one of a series of high performance reference spectrophotometers. The instruments are tested and qualified to the manufacturer's published specification over the analytical range used for the reference material certification.

The following primary references and fundamental procedures are used in the qualification of the reference spectrophotometers:

Absorbance: NIST SRM 2031, 1930 & 930e, Double aperture method
Wavelength: NIST SRM 2034, Emission lines of Hg & deuterium
Stray Light: NIST SRM 2032, KCl, KI & lithium carbonate
Resolution: Benzene vapor, half width of D2 656.1 nm line

Validation Method:

The conditions of analysis used to establish the range values on this certificate are as listed in the chart below:

Cell Pathlength: 10 +/- 0.01mm
Cell Material: Spectrosil Quartz
Reference: Hexane
Scale: Absorbance
Range: 265.0 to 270.0 nm
Band width: 0.5 to 3.0 nm
Temperature: 23.5° C +/- 1 °C

Instructions for Use:

Carefully insert the toluene in hexane filled cell and hexane blank into the cell holder of your instrument touching only the frosted sides or by holding the top of the cell. Cells are fragile and should always be handled with care. Determine the absorbance of the toluene in hexane cell against the hexane blank at each of the wavelengths. Calculate the ratio as on page two of this certificate.

Instrument Dependencies:

The instrument to be tested should have a spectral bandwidth not exceeding 2 nm. Consult your instrument owner's manual for this information.

Duration of Certificate:

This certificate is valid for a maximum period of two years from the date of issue or sooner if specified by the user's own protocols. Although the references are covered by a lifetime guarantee this is subject to certain conditions, see guidance notes.

Re-certification Procedure:

All reference materials are certified and supplied in a useable condition. There is no warranty for fitness beyond receipt by the customer. When references need to be re-certified or inspected for any reason, customers should return them to the Starna ISO/IEC 17025 & ISO 17034 accredited calibration laboratory, where all original data is collated.

On receipt by Starna Scientific the references are measured "As received", before cleaning under the re-certification procedure. "As received" data is available on request.

Storage and Care:

References should always be stored in the box provided and handled with extreme care. Quartz cells are fragile and should be inserted and removed from the instrument by holding the cell cap, taking care not to twist or apply leverage against the cell holder, as this may crack the cells. Damage in the form of scratches may alter the certified values significantly such that they need re-certifying and may, as with cracks, require complete replacement. For cleaning see guidance notes.

Validation performed by:

Peter Wakelin

Calibration Technician - P. Wakelin RSci MRSC MIScT

Approved Signatory:

Alan Wakelin

Calibration Manager - A. Wakelin CSci CChem MRSC