Starna®

Certified Reference Materials for UV and Visible Spectroscopy

Starna®

Wavelength

For the measurement of this fundamental parameter, Starna® offers you the choice of either sealed cell, or filter materials. Please note that your selection process should not only include the wavelength(s) required, but also the spectral bandwidth (SBW) of your spectrophotometer. Use of the reference materials outside the SBW range detailed is not excluded, but at higher spectral bandwidths some of the certified peaks may not be resolved from the overall background spectrum.

Holmium Oxide – UV and Visible Wavelength

Product Description:

The use of holmium oxide solvated in perchloric acid is an established and well recognised method for the validation of the wavelength scale of a spectrophotometer in the UV and visible regions. When prepared in perchloric acid, holmium oxide gives a spectral scan containing a series of characteristic peaks. However, these values are dependent and will vary with the spectral bandwidth of the measuring instrument (NIST Special Publication 260-120)

RM-HL:

Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.

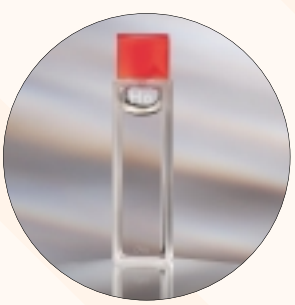
Holmium Oxide – UV and Visible Wavelength

Description: Holmium oxide (4% m/v) in 10% v/v perchloric acid.
Primary Usage: Assessment of wavelength scale accuracy in both UV and visible regions.
Useable range: 240 nm to 650 nm, instruments with spectral bandwidth of less than 3 nm.
Physical Configuration: Far UV quartz cells that have been permanently heat sealed.

Typical values obtained:

SBW	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
0.10	640.54	536.47	485.26	467.88	452.13	416.16	385.55	361.43	345.60	333.52	287.10	278.29	249.85	241.07
0.25	640.52	536.52	485.29	467.84	452.12	416.16	385.48	361.42	345.46	333.56	287.12	278.26	249.88	241.09
0.50	640.52	536.55	485.31	467.90	451.99	416.19	385.61	361.39	345.54	333.61	287.19	278.29	249.94	241.16
1.00	640.65	536.85	485.37	467.93	451.38	416.58	385.90	361.18	345.56	333.64	287.66	278.28	250.14	241.33
1.50	640.58	536.66	485.31	467.88	451.37	416.40	385.78	361.41	345.53	333.58	287.39	278.27	250.00	241.30
2.00	640.85	537.01	485.29	468.00	451.42	416.73	385.90	361.13	345.66	333.62	287.78	278.25	250.25	241.34
3.00	641.29	537.50	485.28	468.14	451.45	417.04	386.17	361.11	345.67	333.74	287.91	278.30	250.38	241.34

All Starna® holmium oxide cells are prepared in accordance with “Holmium Oxide Solution Wavelength Standard From 240 to 640 nm – SRM 2034” (NIST Special Publication 260-54). After filling under controlled conditions, the cells are then permanently sealed by heat fusion and the values certified by the procedure described below.



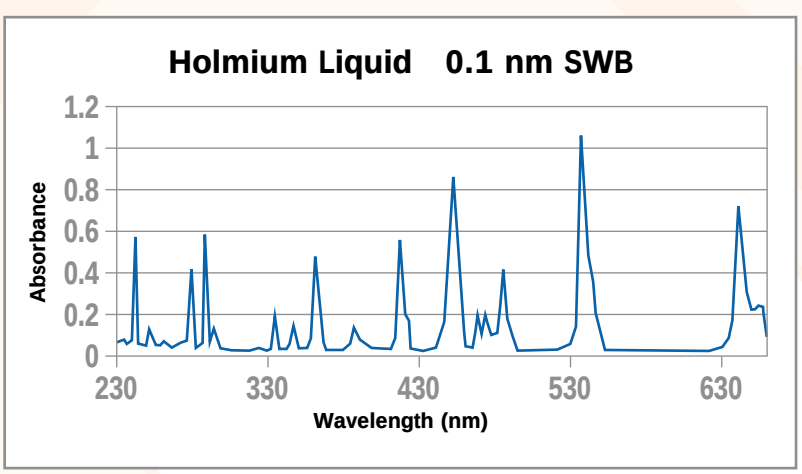
Calibration procedure:

Traceability:

- Primary instrumental wavelength calibration is established using the emission lines from mercury and deuterium sources.
- Additional traceability links to NIST primary materials are established using SRM 2034 holmium oxide (4% m/v) in perchloric acid (10% v/v).

Use:

- All appropriate fundamental parameters and procedures relating to measurement, handling and storage are fully documented on the certificate supplied with each Certified Reference Material.



Didymium – UV and Visible Wavelength

Description: Didymium (neodymium & praesodymium) in perchloric acid.
Primary Usage: Assessment of wavelength scale accuracy in both UV and visible regions.
Useable range: 290 nm to 870 nm, instruments with SBW of less than 5 nm.
Physical Configuration: Far UV quartz cells that have been permanently heat sealed.

Didymium – UV and Visible Wavelength

Product Description:

Didymium glass has been used for many years as a high wavelength visible reference material. When prepared in perchloric acid, didymium gives a spectral scan containing a series of sharp characteristic peaks that extend well above the useable range of the holmium into the near NIR (680-900 nm). Again, like holmium, these values are dependent and will vary with the spectral bandwidth of the measuring instrument.

RM-DL:

Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.

Typical values obtained:

SBW	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
0.10	864.35	799.18	794.13	740.06	731.57	575.19	521.82	511.81	481.65	468.78	444.05	353.83	328.92	298.24
0.25	864.32	799.63	794.16	740.08	731.57	575.14	521.81	511.83	481.64	468.80	444.06	353.82	328.99	298.25
0.50	864.32	799.63	794.12	740.02	731.56	575.12	521.76	511.85	481.63	468.76	444.04	353.81	328.74	298.24
1.00	864.40	798.99	794.08	740.04	731.63	575.04	521.56	511.87	481.67	468.66	444.01	353.80	328.78	298.29
1.50	864.34	799.83	794.09	740.02	731.74	574.87	521.38	511.90	481.70	468.61	443.96	353.82	328.79	298.51
2.00	864.37	799.63	794.09	740.17	731.92	574.87	521.38	511.90	481.70	468.48	443.88	353.83	328.82	298.52
3.00	864.37	799.63	794.09	740.34	732.48	574.98	521.38	511.57	481.64	468.25	443.73	353.53	328.84	298.79

All Starna® didymium Certified Reference Materials are manufactured using procedures similar to those used in the preparation of our Holmium Oxide Reference Material (RM-HL). After filling under controlled conditions, the cells are then permanently sealed by heat fusion and the values certified by the procedure described below.

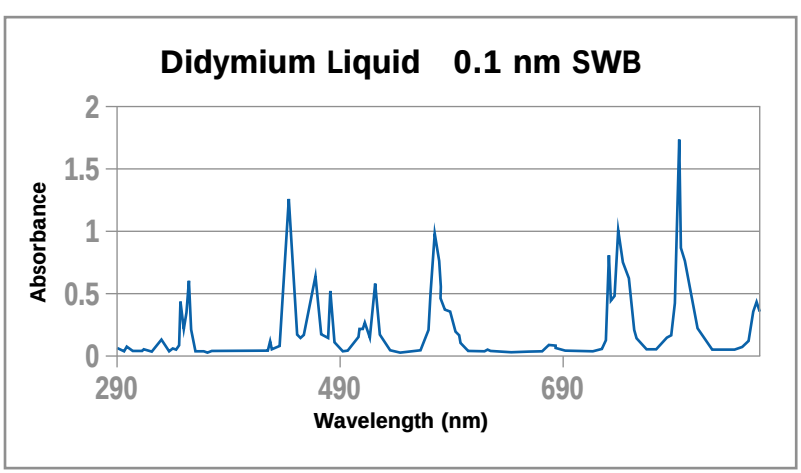
Calibration procedure:

Traceability:

- Primary instrumental wavelength calibration is established using the emission lines from mercury and deuterium sources.
- Additional traceability links to NIST primary materials are established using SRM 2034 holmium oxide (4% m/v) in perchloric acid (10% v/v).

Use:

- All appropriate fundamental parameters and procedures relating to measurement, handling and storage are fully documented on the certificate supplied with each Certified Reference Material.



Samarium – UV and Visible Wavelength

Samarium – UV and Visible Wavelength

Description: Samarium (III) oxide in perchloric acid.
Primary Usage: Assessment of wavelength scale accuracy in both UV and visible regions.
Useable range: 230 nm to 560 nm, instruments with SBW of less than 5 nm.
Physical Configuration: Far UV quartz cells that have been permanently heat sealed.

Product Description:

Samarium perchlorate is a particularly suitable reference material for checking the wavelength scale of a spectrophotometer over the most commonly used range of 200 to 500 nm, as it has peaks throughout this region. Many of the peaks are very narrow, providing very accurate location of the peak wavelengths. With a half bandwidth of as little as 5 nm, some peaks provide a very convenient way of checking instrument resolution also. Shown below is this effect observed on the peak couple at 233-235 nm.

RM-SL:

Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.

Typical values obtained:

SBW	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
0.10	479.18	463.49	415.20	401.45	390.60	374.27	362.36	346.96	332.09	317.59	305.28	290.24	278.99	235.27
0.25	479.17	463.48	415.33	401.41	390.68	374.24	362.55	344.61	331.94	317.71	305.30	290.29	279.07	235.18
0.50	479.12	463.44	415.32	401.40	390.51	374.32	362.42	344.61	331.94	317.60	305.38	290.19	278.96	235.16
1.00	478.99	463.53	415.44	401.36	390.61	374.31	362.46	344.51	332.05	317.58	305.23	290.22	279.10	235.21
1.50	479.07	463.60	415.65	401.28	390.55	374.31	362.53	344.48	332.14	317.49	305.32	290.20	279.10	235.21
2.00	478.86	463.71	415.99	401.27	390.54	374.22	362.32	344.57	332.09	317.52	305.56	290.20	279.10	235.03
3.00	478.57	463.77	415.99	401.18	390.65	374.08	362.11	344.50	332.00	317.50	305.43	290.50	279.07	234.60

All Starna® samarium Certified Reference Materials are manufactured using procedures similar to those used in the preparation of our Holmium Oxide Reference Material (RM-HL). After filling under controlled conditions, the cells are then permanently sealed by heat fusion and the values certified by the procedure described below.

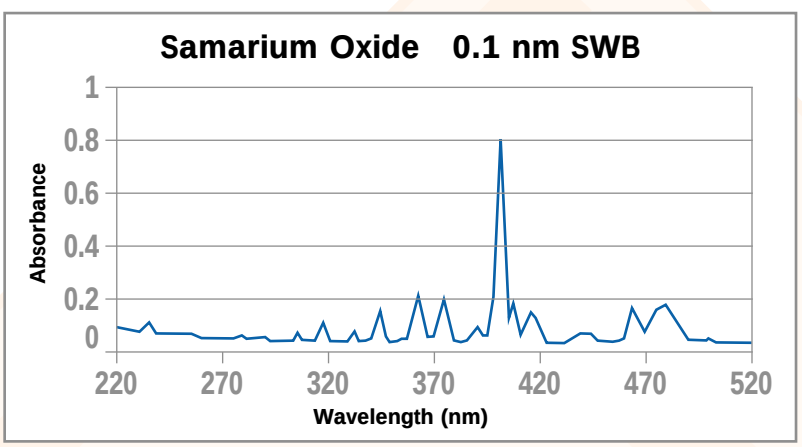
Calibration procedure:

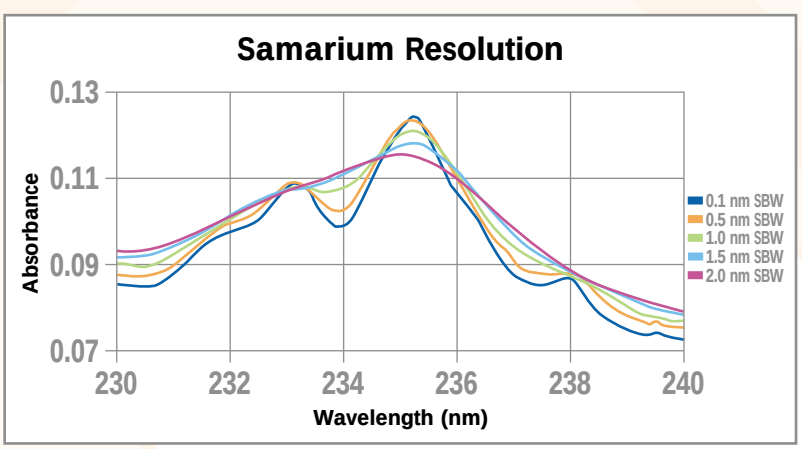
Traceability:

- Primary instrumental wavelength calibration is established using the emission lines from mercury and deuterium sources.
- Additional traceability links to NIST primary materials are established using SRM 2034 holmium oxide (4% m/v) in perchloric acid (10% v/v).

Use:

- All appropriate fundamental parameters and procedures relating to measurement, handling and storage are fully documented on the certificate supplied with each Certified Reference Material.





Holmium Glass – UV and Visible Wavelength

Description: Holmium glass filter.
Primary Usage: Assessment of wavelength scale accuracy in the UV and visible regions.
Useable range: 270 nm to 640 nm, instruments with SBW of less than 10 nm.
Physical Configuration: Glass filters 'stress free' mounted in anodised aluminium holder.

Holmium Glass – UV and Visible Wavelength

Product Description:

Like its liquid counterpart, the holmium glass filter produces characteristic peaks that make it suitable for use as a wavelength reference material. As a solid material it is physically more robust than the liquid cell, and can therefore be used in a more demanding environment, providing care is still taken to avoid scratching the surface of the filter. By individually certifying each Starna® filter, uncertainty caused by variations in peak positions (observed from melt to melt of the glass) is significantly reduced to acceptable levels (± 0.2 nm).

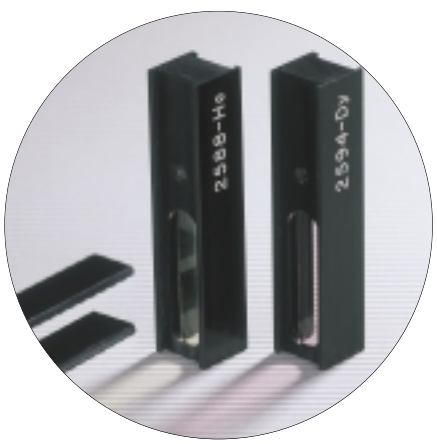
RM-HG:

Consists of one filter, 'stress free' mounted in a proprietary NIST design, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm, and 3.00 nm.

Typical values obtained:

SBW	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
0.10	637.53	536.43	460.33	453.69	445.71	418.93	360.98	333.87	287.62	279.40	241.66
0.25	637.58	536.36	460.30	453.68	445.70	418.66	360.98	333.86	287.62	279.40	241.69
0.50	637.68	536.37	460.28	453.70	445.71	418.73	360.97	333.90	287.60	279.40	241.70
1.00	637.54	536.64	460.23	453.69	445.73	418.73	360.90	333.90	287.65	279.45	241.65
1.50	637.60	536.59	460.21	453.65	445.82	418.73	360.94	333.91	287.72	279.33	241.58
2.00	637.55	536.63	460.22	453.69	445.97	418.71	360.92	333.92	287.74	279.28	xxx.xx
3.00	637.51	536.87	460.42	453.58	446.21	418.86	360.94	333.95	287.82	278.82	xxx.xx

Note: xxx.xx This peak cannot be resolved at this SBW.



All Starna® filter Certified Reference Materials are manufactured to the same optical tolerances required by the primary National Physical Reference Laboratories around the World. After assembly under controlled conditions, the filters are then certified by the procedure described below.

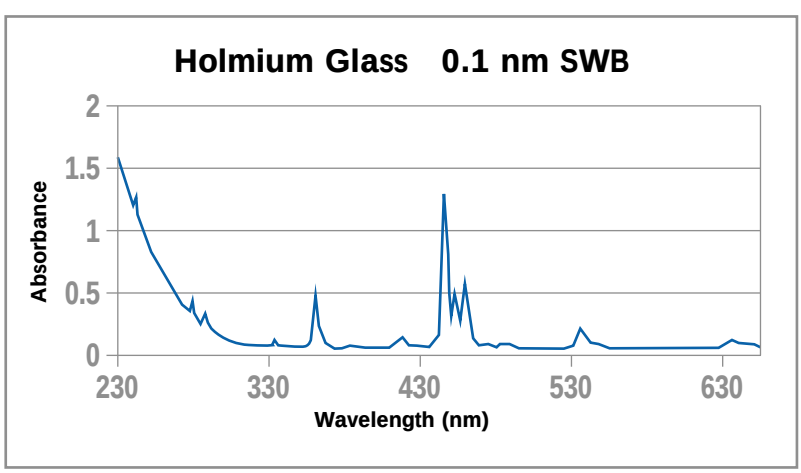
Calibration procedure:

Traceability:

- Primary instrumental wavelength calibration is established using the emission lines from mercury and deuterium sources.
- Additional traceability links to NIST primary materials are established using SRM 2034 holmium oxide (4% m/v) in perchloric acid (10% v/v).

Use:

- All appropriate fundamental parameters and procedures relating to measurement, handling and storage are fully documented on the certificate supplied with each Certified Reference Material.



Didymium Glass – UV and Visible Wavelength

Didymium Glass – UV and Visible Wavelength

Description: Didymium glass filter.
Primary Usage: Assessment of wavelength scale accuracy in the visible/near NIR region.
Useable range: 430 nm to 890 nm, instruments with SBW of less than 10 nm.
Physical Configuration: Glass filters 'stress free' mounted in anodised aluminium holder.

Product Description:

Like its liquid counterpart, the didymium glass filter produces characteristic peaks that make it suitable for use as a wavelength reference material in the high end visible/near NIR region. As a solid material it is physically more robust than the liquid cell, and can therefore be used in a more demanding environment, providing care is still taken to avoid scratching the surface of the filter. By individually certifying each Starna® filter, uncertainty caused by variations in peak positions (observed from melt to melt of the glass) is significantly reduced to acceptable levels (± 0.2 nm).

RM-DG:

Consists of one filter, "stress free" mounted in a proprietary NIST design, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm, and 3.00 nm.

Typical values obtained:

SBW	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
0.10	879.40	805.40	748.82	741.63	684.62	587.44	574.35	528.93	513.35	481.13	440.30
0.25	879.40	805.36	748.52	741.05	684.59	587.06	573.09	528.93	513.47	481.08	440.40
0.50	879.30	805.74	748.62	741.15	684.47	587.01	573.03	528.91	513.36	480.99	440.50
1.00	879.36	805.48	748.54	741.07	684.53	587.39	573.07	528.99	513.51	480.99	440.38
1.50	879.44	805.52	748.58	740.70	684.62	587.16	573.19	528.95	513.37	480.92	440.50
2.00	879.44	805.46	748.59	740.46	684.55	587.34	573.32	528.92	513.51	480.75	440.41
3.00	879.36	805.48	748.54	741.07	684.53	587.39	573.07	528.99	513.51	480.99	440.38

All Starna® filter Certified Reference Materials are manufactured to the same optical tolerances required by the primary National Physical Reference Laboratories around the World. After assembly under controlled conditions, the filters are then certified by the procedure described below.

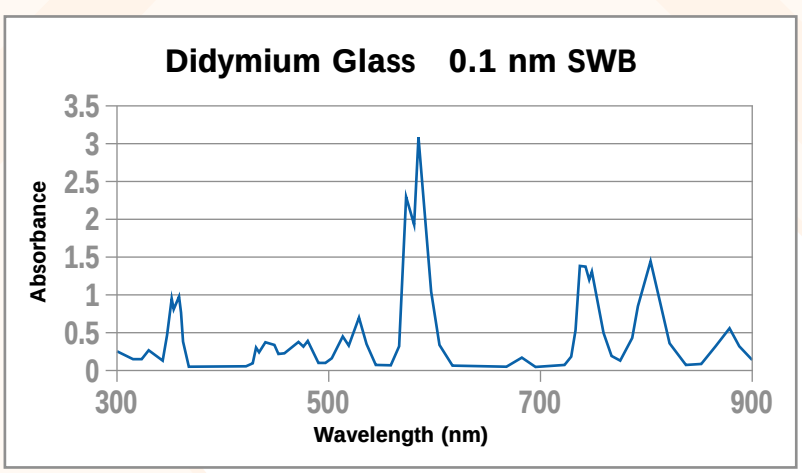
Calibration procedure:

Traceability:

- Primary instrumental wavelength calibration is established using the emission lines from mercury and deuterium sources.
- Additional traceability links to NIST primary materials are established using SRM 2034 holmium oxide (4% m/v) in perchloric acid (10% v/v).

Use:

- All appropriate fundamental parameters and procedures relating to measurement, handling and storage are fully documented on the certificate supplied with each Certified Reference Material.



Far UV Wavelength

For the measurement of this fundamental parameter, Starna® offers you sealed cell materials. Please note that your selection process should not only include the wavelength(s) required, but also the spectral bandwidth (SBW) of your spectrophotometer. Use of the reference materials outside the SBW range detailed is not excluded, but at higher spectral bandwidths some of the certified peaks may not be resolved from the overall background spectrum.

Rare Earth Oxide – UV Wavelength

Description: Rare earth oxide in dilute sulphuric acid.
Primary Usage: Assessment of wavelength scale accuracy in the UV region.
Useable range: 200nm to 300nm, instruments with spectral bandwidth of less than 5nm.
Physical Configuration: Far UV quartz cells that have been permanently heat sealed.

Rare Earth Oxide – UV Wavelength

Product Description:

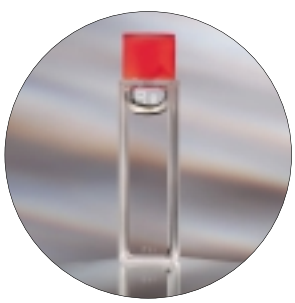
The use of rare earth oxides solvated in acid is an established and well recognised method for the validation of the wavelength scale of a spectrophotometer in the UV and visible regions. When prepared in sulphuric acid, this rare earth gives a spectral scan containing a series of characteristic peaks that extend into the Far UV region.

RM-RE:

Consists of one sealed cell, with certified peak at spectral bandpass values of 0.1nm, 0.2nm, 0.5nm, 1.0nm, 1.5nm, 2.0nm and 3.0nm.

Typical values obtained:

SBW	nm	nm	nm	nm	nm
0.10	201.14	211.76	222.92	240.00	253.56
0.25	201.16	211.96	222.82	240.44	253.80
0.50	200.98	212.00	222.86	240.26	253.58
1.00	201.44	211.72	223.02	240.48	253.74
1.50	201.34	211.96	222.86	240.38	253.58
2.00	201.34	212.00	223.02	240.72	253.52
3.00	201.34	211.96	222.86	240.72	253.64

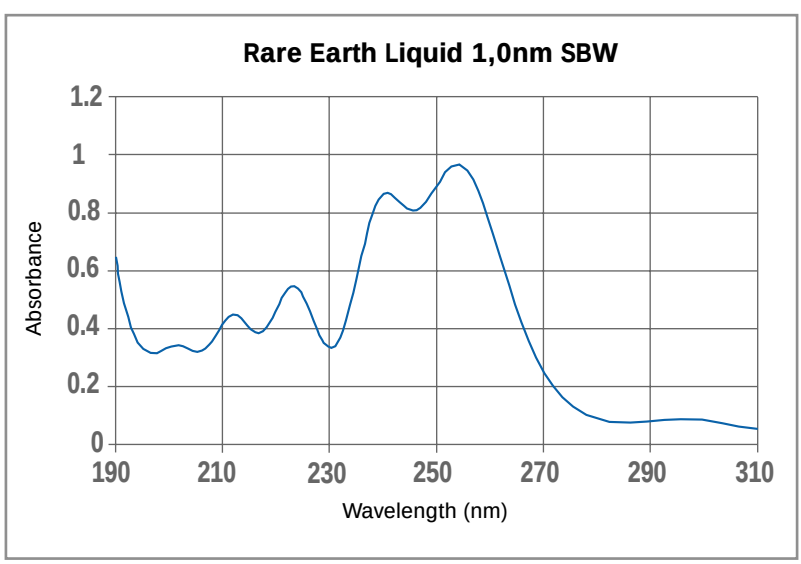


All Starna® Far UV cells are filled under controlled conditions, the cells are then permanently sealed by heat fusion and the values certified by the procedure described below.

Calibration procedure:

Traceability:

- Primary instrumental wavelength calibration is established using the emission lines from mercury and deuterium sources.
- Additional traceability links to NIST primary materials are established using SRM 2034 holmium oxide (4% m/v) in perchloric acid (10% v/v).



Use:

- All appropriate fundamental parameters and procedures relating to measurement, handling and storage are fully documented on the certificate supplied with each Certified Reference Material.

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