



# Validation of the Far UV Wavelength Scale of Spectrophotometers

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**Method and materials for the validation of the far UV wavelength scale of a spectrophotometer using a rare earth material permanently sealed in a quartz cuvette.**

Verification that a spectrophotometer's wavelength scale is accurate within the specification of the instrument's manufacturer is difficult when working in the Far UV. The use of a rare earth in dilute sulphuric acid provides five absorbance peaks which are clearly resolved and are reproducible. The range of these absorbance peaks is from 201 nm to 253 nm. Starna manufactures a reference set which consists of a single far UV quartz cell which has been filled with the rare earth in sulphuric acid solution. The cell is permanently heat sealed and analyzed on a reference grade spectrophotometer. The rare earth wavelength reference cell is supplied with a NIST traceable certificate which specifies the wavelengths of each of the five peaks based on seven different spectral bandwidths. The spectral bandwidths that are certified are 0.10, 0.25, 0.50, 1.00, 1.50, 2.00 and 3.00.

## Experimental Conditions

The UV spectrophotometer is setup to scan from 270 nm down to the lower limit of the instrument's UV scale. This is 190 nm in many instruments. Insert the rare earth UV wavelength reference in the sample holder of the instrument and leave the blank sample holder empty. The wavelength reference is measured against air. Perform the scan and determine the wavelength at which each of the five absorbance maxima is found. See Figure 1 for an example plot of the scan.



The location of each absorbance peak on the wavelength scale is related to the slit width (spectral bandwidth or SBW) that is used in the analysis. If your instrument has a variable slit width, then make a note of the slit width used in the analysis. Many instruments have a fixed slit width and this value can be found in the user manual supplied with the instrument.

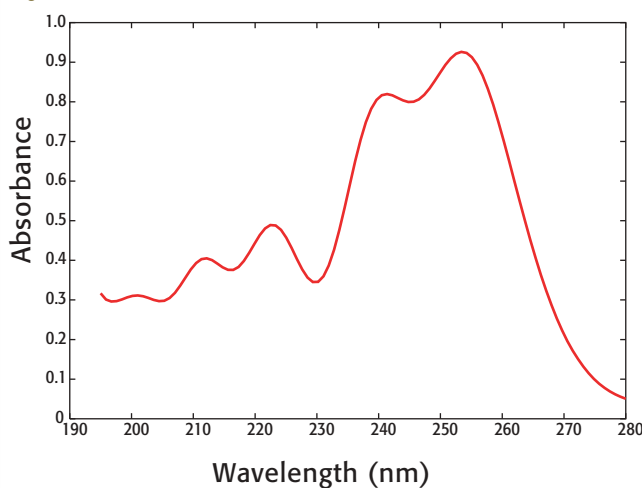
## Results

The results of the scan will be five wavelength values in nanometers. Compare the experimental values with the values supplied on the NIST Traceable certificate. The wavelength values for each peak should be within the expected range, as specified in the instrument handbook, based on the slit width that was used in the analysis. See the sample chart of wavelength values.

Table 1.

SBW	nm	nm	nm	nm	nm
0.10	201.14	211.14	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

Figure 1.



## Conclusions

Validation of the wavelength scale of a UV spectrophotometer using the Starna Rare Earth wavelength reference set, RM-RE, is a simple and reproducible procedure. As a Certified Reference Material it will assist in making your instrument validation procedures more comprehensive with less effort. The benefits of this reference set are:

- \* No chemical preparation
- \* Validation of certified results by Starna
- \* Stable rare earth material
- \* Made from quartz cuvette
- \* NIST traceable

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