Technical Report

UV No. 180002 Spectrophotometer

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Stray light application (USP 40 chapter <857> compliance)

The USP (United States Pharmacopeia, the National Formulary. Supplement) is the pharmacopeia of the United States. Stray light levels for ultraviolet-visible spectrophotometers (Model U-3900H, Model UH5300, and Model U-2900) were evaluated using various samples to verify compliance with USP 40 chapter <857>.*1 All samples passed acceptance criteria of stray light in USP.

*1) USP 40 Physical Tests / <857> Ultraviolet-Visible Spectroscopy
Limit of Stray Light (Stray Radiant Energy)

Model U-3900H / UH5300 / U-2900 spectrophotometers

Stray light measurement using an ultraviolet-visible spectrophotometer

- ✓ Stray light was measured for various samples (Table 1) using the Model U-3900H, Model UH5300, and Model U-2900 spectrophotometers.
- ✓ A solution is placed in a quartz cell having a 5 mm optical path length on the reference side and a quartz cell having a 10 mm optical path length on the sample side (Figure 1). Accept or reject decisions are made based on the acceptance criteria shown in Figure 2.
- ✓ Evaluation of the measurement results (Figure 3) showed that the Model U-3900H, Model UH5300, and Model U-2900 spectrophotometers passed acceptance criteria of USP. (Tables 2, 3, and 4).

■ Measurement samples

Table 1 - Samples for stray light measurement and wavelength range used

Liquid or solution	Wavelength (nm)
KCl (12 g/L)	190–205
NaI (10 g/L)	210–259
Acetone	250–320
$NaNO_2$ (50 g/L)	300–385

■ Measurement method

After measuring a baseline with nothing placed in the sample chamber, a spectrum was obtained by placing a solution in a quartz cell having a 5 mm optical path length on the reference side and a quartz cell having a 10 mm optical path length on the sample side.

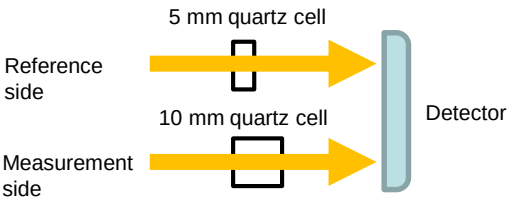

Figure 1 - Image of measurement method

$$S_\lambda = 0.25 \times 10^{-2A\lambda}$$

A_λ = Observed maximum absorbance
Acceptance criteria: $S_\lambda \leq 0.01$, $A_\lambda \geq 0.7A$

Figure 2 - Acceptance criteria of stray light

■ Measurement results

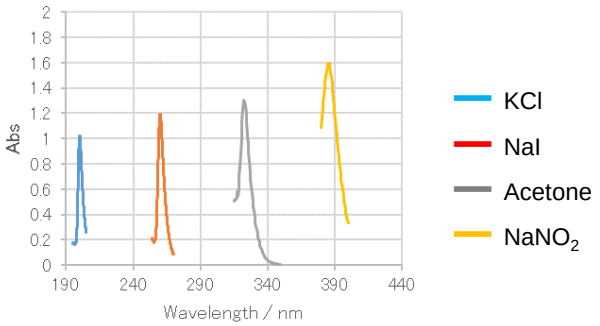

Figure 3 - Example of sample absorption spectra (Model U-2900)

Table 2 - Results of stray light measurements using Model U-3900H

	A_λ	S_λ	Acceptance criteria
KCl	1.064	0.002	OK
NaI	1.133	0.001	OK
Acetone	1.308	0.001	OK
$NaNO_2$	1.596	0.000	OK

Table 3 - Results of stray light measurements using Model UH-5300

	A_λ	S_λ	Acceptance criteria
KCl	0.745	0.008	OK
NaI	1.097	0.002	OK
Acetone	1.137	0.001	OK
$NaNO_2$	1.060	0.002	OK

Table 4 - Results of stray light measurements using Model U-2900

	A_λ	S_λ	Acceptance criteria
KCl	1.087	0.002	OK
NaI	1.155	0.001	OK
Acetone	1.024	0.002	OK
$NaNO_2$	0.976	0.003	OK

Note: External appearance and specifications of the products appearing in this technical report are subject to change for improvement.
Note: The data published in this document present measurement examples and are not a guarantee of performance.

[KEYWORDS]

spectrophotometer, U-3900H, UH5300, U-2900, USP 40, stray light, KCl, NaI, acetone, $NaNO_2$

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