

JJG

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Verification Regulation of Ultraviolet, Visible, Near-Infrared Spectrophotometers (English Translation)

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1 Scope

This regulation is applicable to the initial verification, subsequent verification and in-use inspection of visible, ultraviolet-visible, ultraviolet-visible-near-infrared spectrophotometers with wavelengths ranging from 190nm to 2600nm and with continuously adjustable wavelengths.

2 Normative References

This Regulation quoted the following references.

International Recommendation OIML R135 Edition 2004 Spectrophotometers for Medical Laboratories

JJF 1001-1998 General Terms in Metrology and their Definitions

JJF 1059-1999 Evaluation and Expression of Uncertainty in Measurement

When using this Regulation, pay attention to use the effective edition of the above quoted references.

3 Overview

Ultraviolet-visible-near-infrared spectrophotometer (hereinafter referred to as the instrument) is an instrument for the quantitative analysis and qualitative identification of the substance based on the selective absorption of radiation (light) in the ultraviolet, visible and near-infrared regions by the molecules against the substance, and the Lambert-Beer law.

The mathematical expression of the Lambert-Beer law is.

4 Requirements for Metrology Performance

In order to facilitate to describe the requirements for metrology performance, the working wavelength of the instrument is divided into three sections, namely Section-A (190nm~340nm),

Section-B (340nm~900nm), Section-C (900nm~2600nm). According to the level of metrology performance, the instrument is divided into four levels. I, II, III, and IV.

4.1 Maximum allowable error of wavelength

The maximum allowable error of the wavelength of the instrument shall meet the requirements of Table 1.

4.2 Wavelength repeatability

The wavelength repeatability of the instrument shall meet the requirements of Table 2.

Level Section-A Section-B Section-C

4.6 Transmittance repeatability

The transmittance repeatability of the instrument shall meet the requirements of Table 5.

4.7 Baseline flatness

The baseline flatness of the instrument is expressed by absorbance, which shall meet the requirements of Table 6.

4.8 Adaptability of power supply voltage

When the fluctuation of power supply voltage is (220 ± 22) V, the change of the transmittance indication value of the instrument shall meet the requirements of Table 7.

5.1 Safety performance

The insulation resistance of the instrument shall be no lower than 20Mohm.

5.2 Marking

The instrument should have the following markings. name, model, serial number, manufacturer's name, date of manufacture, working power supply voltage, and frequency.

Domestic instruments shall have a manufacturing license mark and serial number.

5.4 Absorption tank

There shall be no cracks in the absorption tank; and the light-transmitting surface shall be clean without scratches and spots.

6 Control of Metrological Instrument

The control of metrological instrument shall include initial verification, subsequent verification and in-use inspection.

6.1.2 Transmittance standard substance

6.1.2.1 0.001mol/L perchloric acid standard solution with a mass fraction of 0.06000/1000 potassium dichromate;

6.1.2.2

Ultraviolet region transmittance filter;

6.1.2.3

Spectral neutral filter, its transmittance is nominally 10%, 20%, 30%.

6.1.5 Equipment for verification

6.1.5.1

Voltage regulating transformer. the output power is no less than 500W; and the output voltage is (0~250) V;

6.1.5.2

Megohmmeter. test voltage 500V, Class-10;

6.1.5.3

Multimeter. no lower than Class-2.5;

6.1.5.4

Stopwatch. the division value is no more than 0.1s.

6.2 Verification Items

See Table 10 for the initial verification, subsequent verification and in-use inspection items of the instrument.

6.3.5.2 Calculation of the result

Calculate the transmittance indication error according to Formula (3).

6.3.8 Stray light

Select the stray light measurement standard substance specified in 6.1.3; measure the transmittance of the standard substance at the corresponding wavelength; and the transmittance value is the stray light of the instrument at the wavelength.

6.3.9 Compatibility of the absorption tank

In the same optical path absorption tank attached to the instrument, put distilled water at 220nm (quartz absorption tank) and 440nm (glass absorption tank); adjust the transmittance of one absorption tank to 100%; and measure the transmittance value of other tanks. The difference is the compatibility of the absorption tank.

For instruments whose transmittance range is only 0~100%, 95% can be used instead of 100%.

6.4 Processing of verification results

6.4.1

The newly-manufactured instruments shall be fully verified according to the first verification items in Table 10 of 6.2. Subsequent verification and in-use inspection shall, in principle, be carried out according to the content of the subsequent verification and in-use inspection specified in Table 10; and shall be carried out according to the requirements of the first