

Application Note

UV VIS

Fields of Application / Industry:

- Chemistry / Polymer Industry
- Clinical Chemistry / Medicine / Hygiene / Health Care
- Cosmetics
- Electronics
- Energy
- Environment / Water / Waste
- Food / Agriculture
- Geology / Mining
- **Material Analysis**
- Metallurgy / Galvanization
- Pharmacy
- Refineries / Petrochemistry
- Semi-Conductor Technology
- Others

紫外可见光谱法测定玻璃管的色度

玻璃管也作为瓦片式进行了分析。因为它的耐化学性，中立性，耐热性和温度稳定性，这种玻璃主要用于生物和医药产品的包装。此外，管的形状更能耐内部的高压，因此它主要用于制造成容器用于容纳和保护药物的质量。

本文利用德国耶拿公司的 SPECORD® 200 PLUS 紫外可见分光光度计和固体样品池架附件，测定三种FIOLAX®玻璃管样品（第一种是管状，第二种是扁平的碎片，第三种是管板）的色度坐标，研究其测试仪器的适用性，当样品直接放置于检测器前面时，是否可以忽略样品的弯曲。测量结果表明，色度坐标中各参数都会影响色度坐标的测定，从这方面而言，色度辨别是可以保证的。样品管的弯曲影响了色度坐标，因此，对于色度测定，尽管将样品直接放置于检测器前面还是不能忽略弯曲这个影响因素。

对于色度坐标的测定，可以将可见光进行透射扫描，并通过 WinASPECT PLUS 软件色度测量的特殊工具进行评价测定。该模块提供了不同入射光的角度和光学模型，计算不同色度索引的可能性。

Color location determination of glass tube samples

General

Three glass tube samples of sort FIOLAX® (1x tube, 1x flattened tube segment and 1x tube plate) have been analyzed concerning their color. The glass tube was additionally analyzed as half shell.

Because of their chemical resistance, neutrality, temperature resistance and stability this sort of glass is mainly used for package for products of biotechnology and pharmacy. Furthermore the tube shape is resistant against high inner pressure, so it is mainly used for ampullae and tubes for pills and accommodates protection concerning quality assurance of drugs.

For determination of color location the SPECORD® 200 PLUS with solid sample holder was used.

The aim was to test the applicability of the instrument and if the bend of the samples can be disregarded when sample is positioned directly in front of detector.

For the color location determination, VIS transmittance spectra were scanned and then evaluated by the color determination of WinASPECT PLUS software. This module offers the possibility of calculating different color indexes with consideration of different angles of incidence and light models.

The chromaticity coordinates x and y characterize the color in a two-dimensional Cartesian space; in this respect, the saturation must be specified and given separately. The CIE coordinates characterize the color in a three-dimensional Cartesian space, while taking the brightness into account. The brightness of a color tone is represented by the value "L" in the CIE lab system. In this respect, the value "a" stands for the red-green portion and the value "b" for the yellow-blue portion.

Solid sample holder

Figure 1 shows the holder for solid samples. This accessory is suitable for solid samples with a diameter from 20mm and a thickness up to 25mm and is placed on the mount for cells of SPECORD directly in front of detector.



Fig. 1 Solid sample holder for SPECORD®

The measurements were carried out with the following parameter settings:

| | | | |
|--------------------------|------------------------------|---------------------|-------------|
| Title: | Color location determination | Range: | 190 -1100nm |
| Correction: | Reference | Step width: | 1nm |
| Display: | Transmittance | Speed: | 50nm/s |
| Lamp changeover: | 320nm | Accessories: | none |
| Measurement mode: | Scan mode | | |

The reference measurement was conducted against air. For sample measurement the glasses were placed into the solid holder and fixed with the clip.

Results/Evaluation

The figure 2 shows the transmittance spectra of all glass samples. The accordant color values are given below. The calculated CIE L*a*b* coordinates base on an light model C (most corresponding to natural light) and an observation angle of 2°.

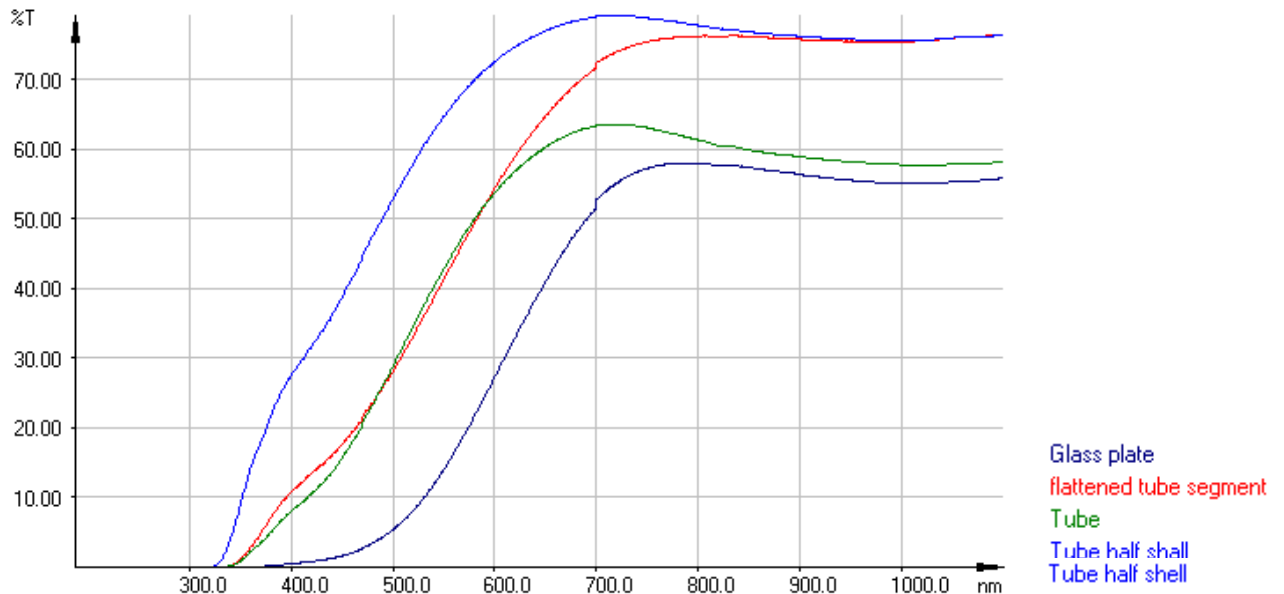


Fig. 2: Transmittance spectra of the glass samples

Color coordinates of glass samples:

Glass plate

X= 20.6493 Y= 17.0683 Z= 2.5527
 x= 0.5128 y= 0.4238
 L= 48.3459 a= 20.1055 b= 55.2485
 Cab= 58.7931 hab= 1.2218

Tube

X= 43.7184 Y= 43.5559 Z= 20.4771
 x= 0.4057 y= 0.4042
 L= 71.9307 a= 2.9439 b= 40.1180
 Cab= 40.2258 hab= 1.4975

flattened tube segment

X= 44.6442 Y= 43.1233 Z= 22.3619
 x= 0.4054 y= 0.3916
 L= 71.6386 a= 6.8803 b= 36.2937
 Cab= 36.9401 hab= 1.3834

Tube half shell

X= 63.3266 Y= 64.7305 Z= 47.6702
 x= 0.3604 y= 0.3684
 L= 84.3447 a= -0.3512 b= 25.2509
 Cab= 25.2533 hab= -1.5569

The described method with the SPECORD® 200 PLUS with solid sample holder and was ideally suited for determining the color location of such samples. Taken spectra of glass plate, tube and tube half shell are different distinctly. Transmittance spectra and color coordinates of the tube and the flattened tube segment are conditionally comparable. The basic color coordinates X; Y and Z as well as the chromaticity coordinates x and y with the brightness value L are in a good accordance. of a color tone is represented by the value "L" in the CIE lab system. There are only differences in the red-green portion as well as the yellow-blue portion and the chroma.

The characterization of the color location can be effected for all color coordinates specified. In this respect, the color discrimination is always guaranteed. The bend of the tube effects the color coordinates. Hence for color determination this effect can not be disregarded although the sample was positioned directly in front of detector.

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