

WSL—2 TINTOMETER

OPERATING INSTRUCTION

Please read through these operating instruction before using

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I. APPLICATION AND FEATURE

WSL-2 tintometer is a kind of visual color measuring instrument. It uses Rovibund color scale, which is a international acknowledged specific color code, as a standard to measure the colority of liquid, gelatin, solid and powder samples. This instrument has the features of simple structure and convenient operation and often used in the color measurements of different materials of grease, paint, plastics, jam, textile fabric, foodstuff, etc.

Rovibund color scale is a kind of unit of colority. It is a very simple and also quite perfect digital color language. Therefore, it can be mastered. Rovibund color tester has been accepted by numerous countries internationally and used extensively.

II. SPECIFICATIONS

Measurement rang: Red	0.1-79.9 Rovibund unit
Yellow	0.1-79.9 Rovibund unit
Blue	0.1-49.9 Rovibund unit
Neutral gray	0.1-3.9 Rovibund unit
Minimum shown value: 0.1 Rovibund unit	
The diffuse reflectivity of white plate: >80%	
The amplification of the magnifier: 1.9×	
The dimensions of colorimetric utensil (mm):	10×20×40
	25.4×20×40
	133.4×20×40
Power supply: 220V 50Hz	
Power consumption: 50W	
Dimension (mm):	Main body 500×320×130
	Observing ocular 215
	Accessories kit: 340×160×80
Net weight: 9 kg	

III. MEASURING PRINCIPLE

The method to regulate the visual color effect of two parts in a viewing field to same or equal is called the color match. That is just the principle applied by WSL-2 tintometer. The colors of the object to be measured and the combined color of the filters appear in the viewing field on the left and right of the ocular respectively through the light path. Adjusting the filters to make the color of two parts of the field fully consistent, the values in Rovibund color code indicated on the instrument is just the colority of the object to be measured.

IV. STRUCTURE

The tintometer consists of colorimetric chamber, Rovibund filter groups and an ocular. The colorimetric chamber is made of metallic plates and two standard white plate is on its rear wall. There are two milk lamps in it on left and right. They are kept $\pm 45^\circ$ angles with the white plate respectively. The diffuse reflecting light of the chamber ensure two visual fields of the ocular have same illuminant conditions. There is a rectangular cup base at the bottom of the chamber, which is used for resting a colorimetric utensil of length smaller than 180mm. There is a filter box in front of the colorimetric chamber, the supports of the filters can move freely in the grooves of top and bottom plates. A connection screw for observation ocular is on top groove plate. The power switch installed on the rear plate can control two lamps simultaneously. The optical system under the observation ocular reflect the light to turn far 90° and divided the visual field into two parts of left and right. The left part presents the color of sample, while the right one the color of the filters. A blue calibration filter on the top of connection screw used for calibration the color temperature of light source.

V. OPERATION

i. Installation

The instrument should avoid to be put in front of a window or in a place shown by sunshine directly. It would be facing to a windowless wall of white or neutral color. The height of the seat should be appropriate, so that the field can be observed directly on the ocular.

Open the accessories kit, there are an ocular, a set of colorimetric utensil, two spare lamps in the kit. Take the ocular out of the kit and turn it on the connection screw of the main body after turn away the cover of it.

ii. Preparation of sample

Due to there are two kinds of samples of transparent and opaque, the method of measurement divided into with transmission and reflection. When measuring the color of transparent liquid, it needs only to pour liquid into the colorimetric utensil and put it in the rectangular cup base in the colorimetric chamber. It is very important for repeatability that, the utensil must be closed to the filter box.

By the way, it is to be noted that, the double dilute can got the half color code of the liquid.

In the case of no concrete standard, care must be taken to make the sample color not exceed 20 Rovibund unit as far as possible when selecting the length of colorimetric utensil, because the range of best color resolution is between 3 to 10 Rovibund units and the resolution will drop down gradually if it out of this range.

When measuring the colors of opaque objects, such as ink, cloth materials,

powder, gelatin, plastics etc, it can select appropriate sample container respectively, such as colloidal box, powder box, solid sample rack, etc (to be another order for these). After sampling, put the sample object to be measured onto the lower hole at the rear plate to replace the standard white plate, then it can be tested by reflected light.

iii. Colorimetric method

Turn on power switch, observe the visual field, the left half part shows the sample color, while the right half part the color of standard filters.

Adjust yellow, red, blue filter groups respectively until the colors of two parts of left and right are completely consistent, when the values on the reading window is just the colority of measured sample (the sum of values of same kind of color). It would be best to predict the result beforehand, so that to reduce the measuring time.

When the color of one or two kinds of primary filter is adjusted to nearest sample color, if its color is darker than sample color, you can weaken the brightness of the sample with the neutral gray filters. This sum of the gray digits is just the brightness data of sample. Care must be taken here, when the filters of three primary colors are all used in color comparison, the neutral gray filters then can not be used, you can only achieve color match by method of adjusting color filters of minimum value.

When the colority of yellow liquid would be determinate, it is suggested that, the yellow Rovibund colority must be fixed first, and then match it with blue and red filters, that can determine the result faster. Otherwise, it is not suitable for eyes to stare too long during observing, the resolution of eyes will drop down with his tired, in other words, rather observe step by step than do it continuously for long time.

iv. The nomenclature of color

Now, it is more widespread to use the method of description one color with three primary colors. But some department takes it on six kinds of description for more convenience or some special necessities.

The six colors as follows:

1. Red-Rovibund red
2. Orange-the combination of red and yellow, it is yellowish orange, if it is mostly yellow, contrarily, it is reddish orange.
3. Yellow-Rovibund yellow
4. Green-the combination of yellow and blue, the yellowish green is mostly yellow, contrarily, it is bluish green.
5. Blue Rovibund blue
6. Purple-the combination of red and blue, it is reddish purple if it is mostly red, contrarily, it is bluish purple

There are the conception of brightness and darkness for various colors. When three primary colors are all used in comparison of color, the sample is called dark X color, of which the same weakest primary color value is the dark value. When the neutral gray filter must be used during

measurement, the sample is called bright X color, and the sum value of the gray filters shown on the window is brightness value.

For example:

The results measured after a comparison are: red 10.5; yellow 7.2; blue 3.1; all three primary colors are used, of which, the weakest value-blue 3.1 is darkness (red 3.1; yellow 3.1; blue 3.1). Due to the red 7.4, yellow 4.1 of the rest contain equal volume of 4.1, so the value of the orange is 4.1, the red is 3.3 and the sample is called “dark reddish orange”. By analogy, the table below recorded the results of several sample. Referring the format of this table the users can make up into testing manual for recording data.

VI. MAINTENANCE

i. Change lamps

In order to ensure optimal state of the color temperature of the light source, two lamps should be replaced simultaneously after using about for 200 hours. You can do it through the opening of colorimetric chamber.

ii. Keeping clean

It must be taken to avoid the contaminating of the white coating on the internal wall of the colorimetric chamber. In order to guarantee the accuracy and repeatability of the instrument, the room putting the instrument should be possibly dustless and the smoking is not allowed. The colorimetric utensil must be cleaned after each time using.

The color filters should be cleaned periodically with alcohol ether (50% each) if necessary.

VII. APPENDIX

No.	Measurement data				Expression of six color								Name of color
	R	Y	B	Bri	Bri	Dar	R	O	Y	G	B	P	
1	21.0			0.7	0.7		21.0						Bright red
2	15.5						15.5						Red
3	14.5	2.5	2.5			2.5	12.0						Dark red
4		35.0		0.8	0.8				35.0				Bright yellow
5		28.0							28.0				Yellow

6	2.3	20.3	2.3			2.3			18.0				Dark yellow
7			18.6	1.0	1.0						18.6		Bright blue
8			2.0								2.0		Blue
9	1.7	1.7	20.1			1.7					18.4		Dark blue
10	21.8	3.8		0.6	0.6		18.0	3.8					B-orangish red
11	6.0	5.6	1.6			1.6	0.4	4.0					D-reddish orange
12	2.3	12.4		0.1	0.1			2.3	10.1				B-orangish yellow
13	1.6	13.9	0.9			0.9		0.7	12.3				D-greenish blue
14		3.4	4.0	0.6	0.6					3.4	0.6		B-bluish green
15	1.0	4.6	13.0			1.0				3.6	8.4		D-greenish blue
16		16.0	3.0	1.0	1.0				13.0	3.0			B-greenish yellow
17	2.1	15.1	4.1			2.1				11.0	2.0		D-bluish green
18	34.0		23.0	0.7	0.7		11.0					23.0	B-reddish purple
19	21.1	0.1	0.7			0.1	20.4					0.6	D-purplish red
20	1.4		10.5	0.7	0.7						9.1	1.4	B-purplish blue
21	21.3	0.3	30.3			0.3					9.0	21.0	D-bluish purple