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Lovibond® Colour Measurement

Tintometer® Group

AF 710-3 AOCS Tintometer

Colour Measurement of Oils & Fats
According to the AOCS-Tintometer Colour Scale

References: AOCS Official Method Cc 13b - 45, The Wesson Method

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Lovibond AOCS Tintometer AF 710-3

Summary

The AF 710-3 is a special version of the Lovibond Tintometer which is approved by the American Oil Chemists Society (AOCS) for colour measurement of oils and fats according to AOCS Official Method Cc 13b-45, the Wesson Method. Colour is determined by comparing light transmitted through a column of oil with that transmitted through a series of red and yellow glasses calibrated in accordance with the AOCS-Tintometer Colour Scale.

Description and measuring principle

The complete unit consists of:
- An integrated lighting cabinet fitted with two tungsten halogen lamps
- An adjustable viewing tube
- A set of AOCS-Tintometer colour glasses (5 racks)
- A sample tube holder mounted on the hinged door
- Two glass sample tubes
- A drip tray containing a separate opal reflecting plate

The Tintometer® AF 710-3 accommodates the special flat-bottomed glass sample tubes specified in the AOCS Official Method Cc 13b-45 which are marked to indicate an oil column of 1" and $5^1/_4$". The tube holder, which prevents light from entering the sides of the tubes, houses two tubes, one containing the sample and the other allowing an equal amount of light to reach the colour glasses. The holder is removable for cleaning purposes. The field of view comprises two circular fields, the sample and reference fields, which do not overlap as required by the AOCS Method.

The sample is placed in the black tube holder and then observed through the viewing tube. The viewing aperture is split into two circular fields of view with the product in the left hand sample field and the white reflective surface at the base of the sample chamber in the adjacent right hand comparison field. To ensure identical lighting conditions for both sample and comparison fields, light from the two lamps which are housed on either side of the cabinet, illuminates a central integrating chamber. The colour standards are introduced into the comparison field by a simple system of sliding racks, allowing the user to compare the colour of light which is transmitted through the sample with that transmitted through the standards. The racks are varied until a visual colour match is obtained for the light from the sample.

The Colour Standards

The AOCS-Tintometer Colour Scale is a special red and yellow version of the Lovibond® RYBN scale using the AOCS-Tintometer Red Scale (which is not the same as the Lovibond® standard Red scale and is only supplied for use with the Lovibond Tintometer AF710-3). These Red glasses are graded against the Tintometer® Master Scale which was agreed with the National Bureau of Standards, Washington. The Yellow glasses supplied are identical to the Lovibond® standard Yellow scale.

The AF 710-2 is supplied with the following standard set of glasses in 5 racks:		
Rack	Series	Colour Standards
1	Yellow	1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0
2	Yellow	10.0, 15.0, 20.0, 35.0, 50.0, 70.0
3	Red	0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9
4	Red	1.0, 2.0, 2.5, 3.0, 3.5, 4.0, 5.0, 6.0, 7.0

Assembly

When the instrument is first unpacked for setting up, the following points should be noted.

Remove the casing screws and unwrap the racks containing the colour standards, which are packed separately. By convention, Red racks are placed furthest from the eye and it is recommended that they are inserted in the following order from the viewing tube:

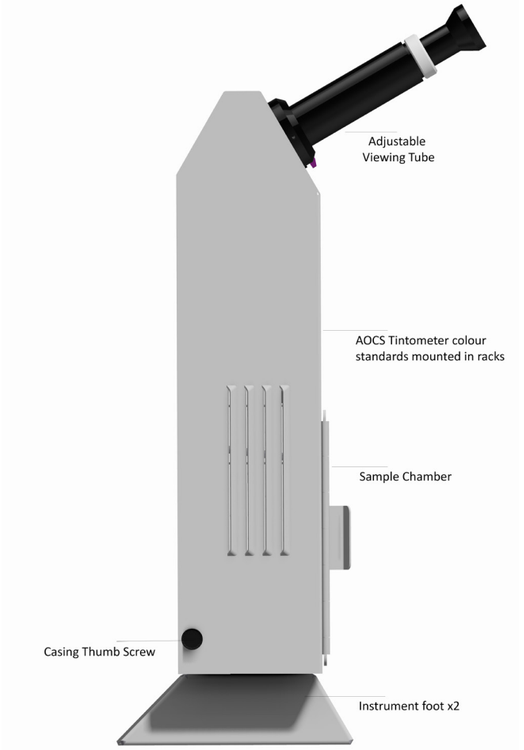
1.0	-	9.0	Yellow
10.0	-	70.0	Yellow
0.1	-	0.9	Red
1.0	-	7.0	Red
7.6	-	20.0	Red

Altering the spacing between the racks should have no impact on sample measurement. Move all racks to the right to clear the comparison field of view.

Screw the instrument feet to the base of the unit as shown below.

Note that the feet should be assembled so that they protrude further at the rear of the instrument for greater operational stability.

Place the drip tray directly beneath the viewing system at the base of the sample chamber. Unwrap the white porcelain reference plate and place matt side upwards within the drip tray.



Accessories

Order Code	Description
122340	Lamp 12V 20W
357110	A pair of glass sample tubes to AOCS requirements for the AF 710-3
115600	Spare opal white reflecting plate
114199	Drip tray AF 710-3
Amber Glass Conformance Filters	
106950	Value 0.5 Red 1.0 Yellow
106960	Value 3.7 Red 13.0 Yellow
109670	Value 6.6 Red 38.0 Yellow
109720	Complete set of 3 conformance filters - values as above Special values are available on request

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Technical Specification

Measuring principle	Visual, in terms of AOCS-Tintometer Red and Yellow units
Modes	Transmittance
Range	1.0 - 70 Yellow; 0.1 - 20 Red
Resolution	0.1 units
Optical system	5 glass-filled nylon racks containing a graduated range of AOCS-Tintometer colour standards
Viewing system	Fully adjustable with integral daylight correction blue filter for light standardisation
Light source	2 x 20 Watt Tungsten Halogen lamps
Illuminant	Simulates northern daylight
Path length	$5^1/_4$" max
Supply voltage	110 - 120 V or 230 - 240 V Autoranging (12V)
Input frequency	50 - 60 Hz
Power consumption	52 Watts max
Temperature range (operating)	-10°C to +70°C
Approvals	CE
Instrument housing	Fabricated sheet steel with a tough, textured paint finish
Dimensions	Width 450 mm, depth 285 mm, height 380 mm
Weight	7.9 kg

Operation

Pull open the hinged access door to the sample chamber at the front of the instrument. Ensure that the bulbs are firmly in place. Inspect the drip-tray and white opal plate and locate it behind the lip at the bottom of the sample chamber. The white opal plate should be checked periodically during the life of the instrument. If dirty, it should be cleaned with warm water and scouring powder. Rinse well and replace in drip-tray with the matt side uppermost.

Taking a Measurement

Two tubes are supplied with the instrument. Fill one of these with the sample to the $5^1/_4$" mark and place in the black tube holder nearest to the operator as shown in the photograph opposite.

AOCS rules do not state whether a blank tube is to be used in the other holder and practice differs from company to company on this point.

1 Close the sample chamber door allowing the sample tube to self-align beneath the viewing tube aperture and glass standards.

2 Illuminate the sample by depressing the ON/OFF switch.

3 Adjust the focus of the telescopic viewing tube for comfort.

4 Slide the racks into the comparison field to match the sample colour. Both Red and Yellow will be needed in most cases to match an oil.

5 Obtain the value of the sample colour from the numbers displayed in the appropriate rack window.

Note*Always start matching with the highest values and then use successively lower values to achieve the best visual match. Should the sample be too deep in colour to match with the standards at a depth of $5^1/_4$", pour out the sample until it reaches the 1" calibration mark and match again.

Conformance Filters

For users requiring permanent reference standards, The Tintometer Limited can offer a range of amber glass filters in special aluminium holders for use with this instrument. These can be used for training new personnel, as a check on instrument cleanliness and for inter-laboratory checks on operator agreement (see Accessories).

Care of Instrument

To maintain the performance of the AOCS-Tintometer AF710-3, spillages on the instrument or in the sample chamber should be cleaned immediately.

Care of Filters

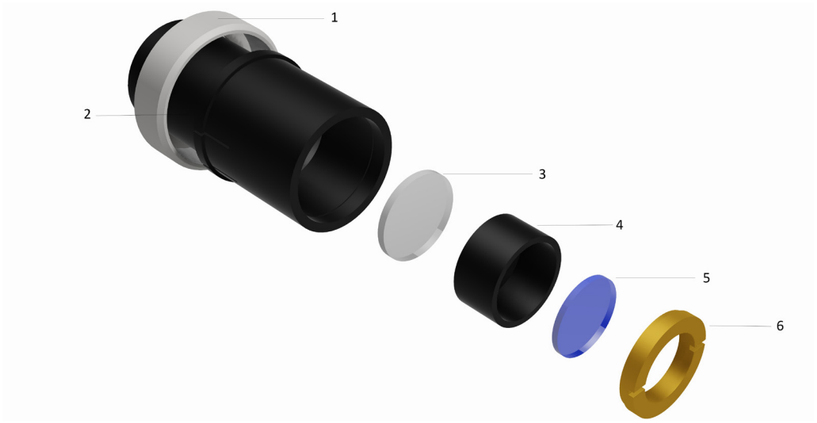
Coloured glass filters should be kept as clean as possible or errors may be introduced into measurements. The glass may be cleaned using a soft, lint-free cloth or cotton bud. Glass filters are retained in the plastics rack by a stainless steel circlip; care should be taken not to remove the glass from the rack. If glasses are accidentally removed from the rack they must be returned to their original position or readings will be invalidated.

Care of the Viewing Tube

The viewing tube can be dismantled for cleaning as shown in the diagram below.

- Carefully unscrew the locking bezel (1) and remove the draw tube (2) from the main base tube.
- Unscrew the slotted locking nut (3) from the bottom of the draw tube which will releasethe blue correction filter (4), the black spacer (5) and finally the focusing lens (6).
- Clean the lens (6) and replace it, followed by the spacer (5), ensuring the rebated end is facing the bottom of the draw tube.
- Clean the blue correction filter (4) and locate it back into the rebate on the spacer.
- Finally screw in the slotted locking nut to secure all the internal optical components. Check the draw tube for optical clarity and retighten the locking bezel.

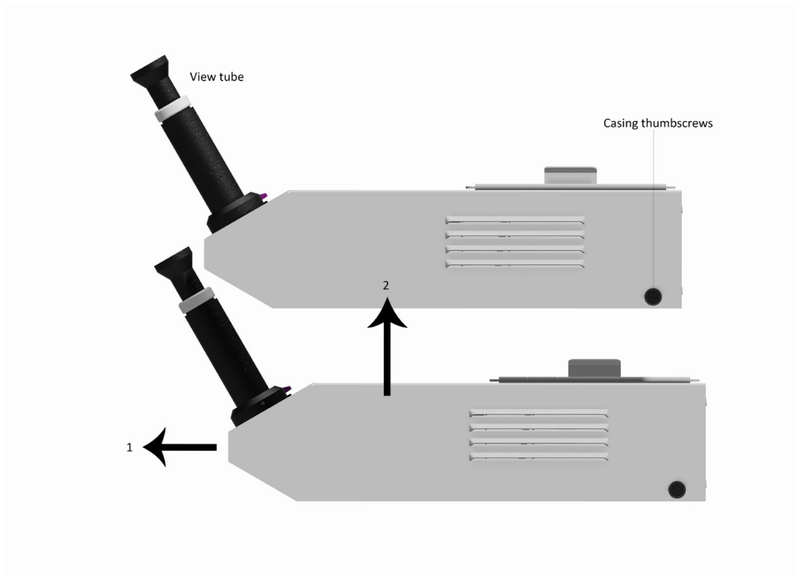
Note: Always use a suitable soft lens cloth for cleaning optical components.



Replacing the Lamps

Always disconnect the instrument from the power supply before opening to replace lamps or clean/replace sample chamber.

- Unscrew and remove the two casing thumbscrews on the sides of the instrument and place in a safe place.
- Next, slide the instrument top cover forward (1) and then lift upwards (2) as shown in the diagram below, using the viewing tube as a gripping point.



- Lift the cover clear of the base of the instrument and turn upside down to give easy access to the lamps located on the underside of the lid.
- Remove the old lamps (always replace in pairs) and dispose of carefully. Carefully replace with the new lamps using the protective plastic sleeving.

  Avoid touching the lamps directly with fingers as this will significantly reduce the life of the lamps.
- Return the top cover to its original position ensuring that it has located properly on the front overhang. This will allow all the optics to align and will lock the top cover securely in position once the thumbscrews have been replaced.