DRAFT TANZANIA STANDARD

Determination of White Sugar Colour

TANZANIA BUREAU OF STANDARDS

0. Foreword

This draft Tanzania standard prescribes the method for determination of White Sugar Colour.

In the preparation of this draft Tanzania standard assistance was derived from ICUMSA Method GS2/3-10 (2011) The Determination of White Sugar Solution Colour - Official

In reporting the result of a test or analysis made in accordance with this standard, if the final value observed or calculated, is to be rounded off, it shall be done in accordance with TZS 4.

1. Scope

This draft Tanzania standard prescribes the method for determination of White Sugar Colour.

2. Field of Application

The method can be applied to all crystalline or powdered white sugars and very pure syrups, provided that a filtered test solution can be prepared by the procedure specified in the method. The method is not suitable for those sugars which contain colouring matter, turbidity or additives to an extent that filtration is not practical.

NOTE - The method for determining white sugar solution turbidity, Method GS2/3-18 (2007), is actually based on this Method GS2/3-10 (2007).

If a choice is available to the user for the Determination of Colour of White Sugar, then ICUMSA recommends that Method GS9/1/2/3-8 is used preferentially. However, it should be noted that this method gives equivalent results to Method GS9/1/2/3-8 up to a maximum value of 50 IU.

3 Definitions

3.1 Transmittance of a solution. If I_1, represents the radiant energy incident upon the first surface of the solution and I_2, represents the radiant energy leaving the second surface of the solution. Then:

$T = \frac{I_2}{I_1}$ transmittance of the solution

(100 T = percentage transmittance)

3.2 Transmittancy. Let Tsoln, represent the transmittance and let Tsolv, represent the transmittance of the same or duplicate cell containing the pure solvent. Then:

$T_S = \frac{T_{soln}}{T_{solv}}$ = transmittancy of the solution

3.3 Absorbancy (extinction).

$A = -\log_{10} T_s$ = absorbancy of the solution

3.4. Absorbancy index (extinction index)

Let b represent the length(cm) of the absorbing path between the boundary layers of the solution and let c represent the concentration. (g/mL). of sugar solution. Then

Absorbancy index of the solution $(a_{s)} = \frac{A_s}{bc}$

3.5 ICUMSA Colour. The value of the absorbancy index multiplied by 1000 is reported as ICUMSA Colour. The resulting values are designated as ICUMSA Units (IU).

4. Principle

White sugar is dissolved in distilled water to give a 50% sugar solution.

The solution is filtered through a membrane filter to remove turbidity. The absorbancy of the filtered solution is measured at a wavelength of 420 nm and the solution colour is calculated.

5. Reagents

Use only distilled water or water of equivalent purity

6. Apparatus

6.1. Instrument. Spectrophotometer or colorimeter capable of light transmission measurements at a wavelength of 420 nm with the narrowest practical bandwidth, e.g. ± 10 nm. The instrument should be fitted with a grating, prism or interference filter monochromator.

NOTE- The suitability of the instrument for this special purpose should, be tested using standard sugar with known certified colour.

6.2. Associated optical cells. Use a cell of at least 4 cm in length. A cell length of 10 cm or more is to be preferred for low colour white sugars. A second or reference cell may be used, provided that a test with distilled water has shown that the two cells are within 0.2% of being identical.

6.3. Membrane filters - cellulose nitrate of pore size 0.45 µm, diameter 50 mm.

NOTE - Pore size as determined by 'bubble point' testing

6.4. Membrane filter holder - preferably fitted with a stainless-steel support

6.5. Vacuum oven, vacuum desiccator or ultrasonic bath - for de-aeration of the filtered sugar solution.

6.6. Refractometer preferable digital

6.7. Laboratory balance - readable to 0.1 g.

7. Procedure

7.1 Sample preparation.

Mix the sample of sugar thoroughly. Weigh 50.0 ± 0.1 g of the sample into a 250 mL conical flask, add 50.0 ± 0.1g of distilled water (5) and dissolve the sugar by swirling at room temperature.

Filter the sample solution under vacuum through a membrane filter (6.3) into a clean, dry conical flask.

De-aerate the filtered solution for 1hour at room temperature in a vacuum oven or an evacuated desiccator. Alternatively, de-aerate by immersing the conical flask, containing the sugar solution, in an ultrasonic bath for 3 min.

Measure the refractometric dry substance (RDS) of the solution, to an accuracy of ± 0.1 g/100 g, by the ICUMSA method as also described in Method GS4/3/8-13.

7.2 Colour measurement. Set up the colour measuring instrument (6.1) according to the manufacturer's instructions and adjust the wavelength to 420 nm. Rinse the measuring cell with sugar solution and then fill. Determine the absorbancy (AS or $\log_{10}T_S$) of the solution using filtered de-aerated distilled water as the reference standard for zero colour

8.Expression of Results

8.1. Calculation. Calculate the concentration of sample solids in solution, c, from the RDS measured in 7.1

use the RDS to obtain the ρ in kg/m3 of the test solution, from Table 1 by interpolation, the appropriate ICUMSA Table in SPS-4 or the relevant equation• Then the concentration of the test solution is given by:

$$c = \frac{RDS\ .\ \rho\ g/mL}{10^5}$$

Table 1

% RDS	Density (kg/m^3)
47	1213.3
48	1218.7
49	1224.2
50	1229.7
51	1235.2
52	1240.7
53	1246.3

From the definition given in 3.5:

$$\text{ICUMSA Colour} = \frac{1000\ .A_S}{bc}$$

$$= \frac{10^8.As\ \ (\ IU)}{b.\ RDS.\ \rho}$$

Express results to the nearest whole number

NOTE

. When using SPS-4 Tables, strictly speaking the data for mw/V should be taken, not data for ρ. An error of the order of only 0.1% however, is introduced by using data for. ρ

8.2 Precision.

For sugars with ICUMSA Colour values up to 50 IU, the absolute difference between two results, obtained under repeatability conditions, should not be greater than 3 IU. For sugars with ICUMSA Colour values up to 50 IU, the absolute difference between two results, obtained under reproducibility conditions, should not be greater than 7 IU.

DTZS