Method 8.2 – Refined sugar: moisture by oven drying

1. Rationale

This method is applicable to refined sugar and speciality sugars with a moisture content of less than 0.5%. The method determines the moisture in the sugar by loss on drying.

2. Principle

The moisture in sugar is present in three forms:

- free moisture contained on the surface of the crystal leaving the centrifugals which is easily and quickly removed on drying,
- bound moisture contained in the glassy layer on the surface and in the re-entrant angles and which is released slowly as the glass crystallizes, and
- inherent moisture included within the crystal structure and released only, in general, by grinding.

The method uses oven drying at atmospheric pressure (105 ± 1°C) followed by standardised conditions for cooling. This method mainly estimates the amount of free moisture associated with the sample.

3. Apparatus

3.1 **Analytical balance** readable to 0.0001 g

3.2 **Moisture dish**: stainless steel with cover, 80 mm ϕ and 10-20 mm depth

3.3 **Desiccator** containing self-indicating silica gel

3.4 **Oven** operating at atmospheric pressure and maintained at 105 ± 1°C

4. Procedure

Heat the dish and cover for approximately 30 minutes in the oven (105 ± 1°C). Remove the dish and cover from the oven and allow to cool in a desiccator for approximately 1 hour before weighing accurately to 0.0001 g. Add approximately 10 g of sample to the dish immediately replacing the cover and weigh the dish and contents again accurately to 0.0001 g. Place the cover underneath the dish, transfer to the oven at 105 ± 1°C and dry for 3 hours ± 5 minutes. Replace the cover and transfer the dish to a desiccator for cooling to room temperature before re-weighing. The analysis should be done in duplicate.

5. Calculations

Express the loss of mass due to drying as a percentage of the original mass of the sample. Average the duplicate results and report to two decimal places.

$$\text{Moisture \% sugar} = \frac{(M_2 - M_3)}{(M_2 - M_1)} \times 100$$

where M_1 ≡ mass of dish and cover (g)
M_2 ≡ mass of dish, cover and sugar before drying (g)
M_3 ≡ mass of dish, cover and sugar after drying (g)

Reported as percentage to two decimal places.

6. Example

Mass of dish and lid	=	66.8497 g
Mass of sugar, dish and lid	=	76.3542 g
Mass of sugar before drying	=	9.5045 g
Mass of sugar, dish and lid after drying	=	76.3404 g

Moisture = 0.0138 g

$$\text{Moisture \% sugar} = \frac{0.0138\ g}{9.5045\ g} \times 100$$
$$= 0.15\%$$

Report as 0.15%

7. Precision

The tolerance associated with the analysis is ± 0.01 unit.

8. References

ICUMSA (1994). Sugar moisture by loss on drying. *ICUMSA Methods Book*, GS2/1/3-15.

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SMRI (1997). Determination of the moisture in white sugar by loss on drying. *SMRI Test Methods,* TM037.