



Method 2.1 – Prepared cane: Preparation Index (PI)

1. Rationale

This method is applicable to prepared cane. It is an empirical method which has been devised to compare cane preparation at different times on an index scale. The results of the test are only comparable if the procedure is carried out meticulously. Results cannot be directly compared to results from other similar methods.

2. Principle

A sample of shredded cane is divided into two portions and mixed with water. The first portion is tumbled in a plastic bottle for 30 minutes and the second is shredded in a cold digester for 20 minutes. The percentage ratio of the Brixes of the two resulting extracts is the preparation index (PI) of the cane.

3. Apparatus

- 3.1 **Tumbler**
- 3.2 **Heavy duty balance** readable to 1 g
- 3.3 **Weighing scoop**
- 3.4 **Plastic bottle** with screw lid: 4 litres
- 3.5 **Cold digester**
- 3.6 **Refractometer** operating at $20.0 \pm 0.1^\circ\text{C}$
- 3.7 **Stemless funnel**: 100 mm ϕ
- 3.8 **Watch glass**: 100 mm ϕ
- 3.9 **Beakers**: $2 \times 250 \text{ cm}^3$
- 3.10 **Sieve**: 1.2 mm, 200 mm ϕ
- 3.11 **Stainless steel funnel**: 200 mm ϕ
- 3.12 **Stoppered bottles**: 225, 500 cm^3
- 3.13 **Filter paper**: Whatman No. 6, Postslip medium white or equivalent, 150 mm ϕ

4. Reagents

4.1 **Celite 577**

Celite is an inert powder and should not be inhaled. Use a dust mask.

5. Procedure

5.1 Tumbling

Weigh 500 g of shredded cane into a plastic bottle. Add 3 000 g water and screw on the lid. Tumble the bottle in the tumbler for 30 minutes. Determine the Brix of the extract according to 5.3.

5.2 Digesting

Weigh 333 g of shredded cane into a weighing scoop and transfer to a cold digester. Add 2 000 g water and run the digester for 20 minutes. Determine the Brix of the extract according to 5.3.

5.3 Brix determination

Place the sieve over the mouth of the container (4 litre bottle or cold digester). Pouring the extract through the sieve, rinse the 500 cm³ bottle and lid with the first 100 cm³ of extract and collect the next 500 cm³ of the extract in the 500 cm³ bottle. Rinse the 250 cm³ bottle and lid with the collected extract and transfer 100 cm³ of the extract to the 250 cm³ bottle.

Add 2 g Celite 577 to the 100 cm³ extract, replace the lid and shake vigorously. Transfer the total contents of the bottle to a fluted filter paper in a funnel which rests directly on a 250 cm³ beaker. Do not overrun the rim of the filter paper. Do not allow the filtrate to touch the bottom of the funnel or filter paper. Do not replenish the solution in the filter funnel. Seal the funnel with a watch glass to minimise evaporation. Discard the first 10 cm³ of filtrate and collect about 25 cm³ of the filtrate in another clean, dry beaker.

Zero the refractometer using distilled water. If the reading is not 0.00°Bx at 20.0 ± 0.1°C, record this value as the water blank.

Pour the filtrate into the refractometer cell compartment using three portions to ensure complete displacement of the previous solution. Record the reading once it stabilizes at 20.0 ± 0.1°C.

6. Calculations

Correct the refractometer readings for the water blank.

$$\text{PI (\%)} = \frac{B_1}{B_2} \times 100$$

$$\begin{aligned} \text{where } B_1 &\equiv \text{Brix of the tumbled extract (°Bx)} \\ B_2 &\equiv \text{Brix of the cold digester extract (°Bx)} \end{aligned}$$

Report to the nearest unit.

7. Example

$$\begin{aligned} \text{Brix of the tumbled extract at 20.0°C} &= 2.27\text{°Bx} \\ \text{Brix of the digester extract at 20.0°C} &= 2.63\text{°Bx} \end{aligned}$$

$$\begin{aligned} \text{PI} &= \frac{2.27}{2.63} \times 100 \\ &= 86\% \end{aligned}$$

8. References

SASTA (1985). *Laboratory Manual for South African Sugar Factories*. 3rd Edition: 238 - 239.

SMRI (1997). Determination of the refractometer Brix of juice. *SMRI Test Methods*, TM005.