



Method 7.3 – Raw sugar: affination

1. Rationale

This method is applicable to all raw sugars and is used to remove partially the coating of molasses or high test molasses (HTM) around the raw sugar crystal. This laboratory scale procedure should be more efficient than affination on a large scale *e.g.* in a refinery and can be used to benchmark such a process.

2. Principle

The sugar sample is mixed with a filtered, saturated solution of refined sugar in water and washed in a centrifuge to remove the coating of molasses or high test molasses.

3. Apparatus

- 3.1 **Wide-mouthed container:** plastic, 4 litres
- 3.2 **Tumbling apparatus:** 20 rpm
- 3.3 **Laboratory centrifuge** with a basket attachment
- 3.4 **Heavy duty balance** readable to 1 g
- 3.5 **Stop watch**
- 3.6 **Measuring cylinder:** 1 000 cm³
- 3.7 **Wash bottle:** graduated
- 3.8 **Beaker:** 2 litre
- 3.9 **Magnetic stirrer** with stirrer bar
- 3.10 **Bottle with lid:** 500 cm³

4. Reagents

- 4.1 **Course calico** or other cloth
- 4.2 **Sugar solution** (saturated)

Add 300 g distilled water to 700 g refined sugar in a 2 litre beaker. Stir at room temperature until no further sugar dissolves (approximately 12 hours). Check that the solution is saturated by measuring the Brix (the sucrose saturation point at 20°C is $\pm 66.6^{\circ}\text{Bx}$). Filter the syrup through coarse calico or other cloth to obtain approximately 850 cm³ of syrup.

5. Procedure

Weigh $1\,200 \pm 10$ g raw sugar into the wide-mouthed container. Add $1\,000\text{ cm}^3$ of the saturated sugar solution, using the measuring cylinder. Screw the lid on tightly and tumble at 20 rpm for 30 minutes. Pour the magma in a steady stream into the centrifuge basket already spinning at 500 - 1 000 rpm. Wash the sugar with 50 cm^3 cold distilled water using a wash bottle with a fine jet. Increase the speed to $3\,500 \pm 200$ rpm and spin for 6 minutes. Stop the centrifuge and remove the basket. Empty the sugar on to a sheet of brown paper and spread out to dry. Store in a stoppered bottle.

6. References

SASTA (1985). *Laboratory Manual for South African Sugar Factories*. 3rd Edition: 317.

SMRI (1997). Affination of raw sugar. *SMRI Test Methods*, TM004.