Target Final Molasses Purity and the Cost of a Gap

Target final molasses purity from reducing sugars and ash (SRI, South African, general, Réunion and Douwes Dekker, Hugot 33.37–33.42) and the recovery lost.

Method: Hugot; Handbook of Cane Sugar Engineering; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Reducing sugars % molasses	14.000	%
Sulphated ash % molasses	13.000	%
Non-sucrose % molasses (dry solids − sucrose)	44.000	%
Actual true purity of final molasses	42.000	%
Mixed juice purity	85.000	%
Sucrose % cane	13.000	%
Mill extraction	95.000	%
Crushing rate	100.00	t/h

Calculated results

Parameter	Value	Unit
Target, SRI 40.67 − 17.8 log(R/C)	40.097	%
Target, South Africa 39.94 − 19.6 log(R/C)	39.309	%
Target, general 40 − 18.5 log(R/C)	39.405	%
Target, Réunion 40 − 4R/C	35.692	%
Target, Douwes Dekker 36 − 0.08r + 0.26c	41.136	%
Gap: actual − general target	2.5954	%
Boiling-house recovery lost	1.2474	%
Sucrose lost	154.05	kg/h

Notes for this case

• Hugot (eqn 39.6): one point of molasses purity costs about 0.4 % of the sugar made. Sucrose lost = recovery lost × sucrose in mixed juice (sucrose % cane × extraction × crush).

Formula and method

$$P_{SRI} = 40.67 - 17.8\log\frac{R}{C}, \quad P_{SA} = 39.94 - 19.6\log\frac{R}{C}, \quad P_g = 40 - 18.5\log\frac{R}{C}, \quad P_R = 40 - 4\frac{R}{C}$$

$$P_{DD} = 36 - 0.08r + 0.26c, \quad r = \frac{100R}{NS}, \quad c = \frac{100C}{NS}, \quad m = P_g$$

$$\Delta\rho = \Delta P\frac{1-j}{j(1-m)^2}, \quad \Delta\dot{m} = \Delta\rho\, S_c\, e\, A$$

Variables

R	Reducing sugars % molasses	-
C	Sulphated ash % molasses	-
NS	Non-sucrose % molasses (dry solids − sucrose)	-

P_a	Actual true purity of final molasses	-
j	Mixed juice purity	-
S_c	Sucrose % cane	-
e	Mill extraction	-
A	Crushing rate	kg/s
P_{SRI}	Target, SRI 40.67 − 17.8 log(R/C)	-
P_{SA}	Target, South Africa 39.94 − 19.6 log(R/C)	-
P_g	Target, general 40 − 18.5 log(R/C)	-
P_R	Target, Réunion 40 − 4R/C	-
P_{DD}	Target, Douwes Dekker 36 − 0.08r + 0.26c	-
ΔP	Gap: actual − general target	-
$\Delta\rho$	Boiling-house recovery lost	-
$\Delta\dot{m}$	Sucrose lost	kg/s
r	Reducing sugars on non-sucrose, per cent	-
c	Ash on non-sucrose, per cent	-
m	Target purity used for the recovery loss (the general target)	-

Method and standards

Empirical target-purity formulae cited by Hugot.

Assumptions and limits

- Formulae fitted to cane molasses of normal composition; a target purity outside 20–60 % is flagged as an extrapolation (the Réunion form can even go negative).
- The gap and the recovery lost are measured against the general target P_g only.

References

• Hugot
• Handbook of Cane Sugar Engineering
• 3rd ed. (Elsevier, 1986)
• ch. 33
• eqns 33.37–33.42
• pp. 679–681; ch. 39
• eqn 39.6
• p. 841

Report details

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Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/sugar-ethanol/pan-boiling/target-molasses-purity

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.