Reduced Boiling-House Recovery (Gundu Rao, Hugot)

Boiling-house recovery reduced to 85 juice purity by Gundu Rao, Hugot's true-purity form and his 115 approximation (eqns 39.14–39.17), and general reduced recovery.

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Actual boiling-house recovery ESG	90.000	%
Gravity purity of mixed juice	88.000	%
Gravity purity of final molasses	38.000	%
True purity of final molasses	45.000	%
Final molasses % cane	3.0000	%
Dry solids % final molasses	81.600	%
Refractometric brix of final molasses	85.000	%
Mixed juice % cane	100.00	%
Refractometric brix of mixed juice	14.000	%
Reduced extraction	95.000	%

Calculated results

Parameter	Value	Unit
Gundu Rao (eqn 39.14)	87.542	%
With true purity and dry solids (39.15)	87.370	%
Approximate, factor 115 (39.16)	87.340	%
Share of juice non-sucrose left in final molasses	80.143	%
General reduced recovery $e_{12.5}\, r''_{85}$ (39.17, with the factor-115 form)	82.973	%

Notes for this case

- Hugot's example: r_g 90, q 100, y 3, M 38, B_m 85, DS 81.6, J 88, B_j 14, M′ 45 gives 87.37 (true purity) and 87.34 (factor 115).

Formula and method

$$r_{85} = r_g + \frac{100M}{100 - M} \cdot \frac{85 - J}{0.85J}$$

$$r'_{85} = r_g + \frac{100M'(85 - J)\, y\, DS_m}{0.85J(100 - J)\, qB_j}, \quad r''_{85} = r_g + \frac{115M(85 - J)\, yB_m}{0.85J(100 - J)\, qB_j}, \quad R = e_{12.5}\, r''_{85}$$

Variables

r_g	Actual boiling-house recovery ESG	-
J	Gravity purity of mixed juice	-
M	Gravity purity of final molasses	-
M'	True purity of final molasses	-
y	Final molasses % cane	-
DS_m	Dry solids % final molasses	-
B_m	Refractometric brix of final molasses	-

q	Mixed juice % cane	-
B_j	Refractometric brix of mixed juice	-
$e_{12.5}$	Reduced extraction	-
r_{85}	Gundu Rao (eqn 39.14)	-
r'_{85}	With true purity and dry solids (39.15)	-
r''_{85}	Approximate, factor 115 (39.16)	-
λ	Share of juice non-sucrose left in final molasses	-
R	General reduced recovery $e_{12.5}$ r_{85} (39.17)	-

Method and standards

Gundu Rao's formula and Hugot's corrections.

Assumptions and limits

- Percent forms as in Hugot; fractions at the interface.
- The general reduced recovery R uses r''_{85}, the factor-115 form.
- Molasses purity must be below juice purity; a note flags a true molasses purity below the gravity purity.

References

• Hugot
• Handbook of Cane Sugar Engineering
• 3rd ed. (Elsevier, 1986)
• ch. 39
• eqns 39.14–39.17 and example
• pp. 844–846

Report details

Report reference	FCC-EKX0-RNH9 (the same inputs always give the same reference)
Generated	17 November 2026, 19:50 UTC
Calculator	Reduced Boiling-House Recovery (Gundu Rao, Hugot)
Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 November 2026
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/chemical-control/gundu-rao-reduced-recovery

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.