Two-Massecuite Boiling Scheme Balance

Sugar, final molasses and both massecuites in a two-massecuite scheme (second sugar as seed), from syrup solids and the purities, by SJM balances (Hugot ch. 33).

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Syrup dry solids	15,000	kg/h
Syrup purity	85.000	%
Commercial sugar purity	99.000	%
Second sugar purity	88.000	%
Second massecuite purity (first molasses)	62.000	%
Final molasses purity	38.000	%
First massecuite brix	92.000	%
Second massecuite brix	96.000	%
Massecuite density	1,470.0	kg/m³
Crushing rate	100.00	t/h

Calculated results

Parameter	Value	Unit
Commercial sugar (dry solids)	11,557	kg/h
Final molasses (dry solids)	3,442.6	kg/h
Second sugar (dry solids)	3,177.8	kg/h
Second massecuite (dry solids)	6,620.4	kg/h
First massecuite (dry solids)	18,178	kg/h
First massecuite purity	85.524	%
First massecuite per tonne cane	134.41	L/t
Second massecuite per tonne cane	46.913	L/t

Notes for this case

- Hugot's two-massecuite figures: first massecuite about 75, second 60 purity; final molasses 35–41.

Formula and method

$$S = S_0\frac{j-m}{s-m},\quad M = S_0 - S,\quad S_2 = M\frac{p_2-m}{s_2-p_2},\quad Q_2 = M\frac{s_2-m}{s_2-p_2},\quad Q_1 = S_0 + S_2$$

Variables

S_0	Syrup dry solids	kg/s
j	Syrup purity	-
s	Commercial sugar purity	-
s_2	Second sugar purity	-
p_2	Second massecuite purity (first molasses)	-
m	Final molasses purity	-
B_1	First massecuite brix	-

B_2	Second massecuite brix	-
ρ_m	Massecuite density	kg/m³
A	Crushing rate	kg/s
S	Commercial sugar (dry solids)	kg/s
M	Final molasses (dry solids)	kg/s
S_2	Second sugar (dry solids)	kg/s
Q_2	Second massecuite (dry solids)	kg/s
Q_1	First massecuite (dry solids)	kg/s
p_1	First massecuite purity	-
v_1	First massecuite per tonne cane	m³/kg
v_2	Second massecuite per tonne cane	m³/kg

Method and standards

Dry-solids and sucrose balances (SJM).

Assumptions and limits

- No losses; second massecuite from first molasses only.
- A second massecuite purity at or above the syrup purity is flagged as unrealistic.

References

• Hugot
• Handbook of Cane Sugar Engineering
• 3rd ed. (Elsevier, 1986)
• ch. 33
• boiling schemes and the SJM balance (eqns 33.36, 39.1–39.3)
• pp. 670–677

Report details

Report reference	FCC-82QW-ND8Z (the same inputs always give the same reference)
Generated	17 November 2026, 19:49 UTC
Calculator	Two-Massecuite Boiling Scheme Balance
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/pan-boiling/two-massecuite-scheme

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.