Best Split of Water in Double Simple Imbibition

Share of imbibition water to apply at the last mill and at the one before for the best extraction, Hugot eqn 19.20, from imbibition on fibre and bagasse fibres.

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Crushing rate	250.00	t/h
Fibre per unit cane	14.500	%
Imbibition water per unit cane	30.000	%
Fibre in bagasse from the antepenultimate mill	44.000	%
Fibre in bagasse from the penultimate mill	47.000	%

Calculated results

Parameter	Value	Unit
Imbibition per unit fibre	2.0690	
Share of the water at the last mill	53.506	%
Water at the last mill	40.129	t/h
Water at the penultimate mill	34.871	t/h
Imbibition below which all water goes to the last mill	0.14507	

Notes for this case

- The optimum is flat: if the last mill chokes, a nearly equal split costs little extraction.

Formula and method

$$\lambda = \frac{w}{f}, \quad \lambda_{lim} = \frac{1}{m_1} - \frac{1}{m_2}, \quad x = \min\left(1, \frac{1}{2} + \frac{\lambda_{lim}}{2\lambda}\right), \quad W_l = x\,A w, \quad W_p = (1-x)Aw$$

Variables

A	Crushing rate	kg/s
f	Fibre per unit cane	-
w	Imbibition water per unit cane	-
m_1	Fibre in bagasse from the antepenultimate mill	-
m_2	Fibre in bagasse from the penultimate mill	-
λ	Imbibition per unit fibre	-
x	Share of the water at the last mill	-
W_l	Water at the last mill	kg/s
W_p	Water at the penultimate mill	kg/s
λ_{lim}	Imbibition below which all water goes to the last mill	-

Method and standards

Hugot's maximum of the extraction of the last two mills.

Assumptions and limits

- Double simple imbibition at the last two mills.
- When λ is at or below λ_lim the share is capped at 100 % (all water at the last mill) and a note says so.

References

- Hugot
- Handbook of Cane Sugar Engineering
- 3rd ed. (Elsevier, 1986)
- ch. 19
- eqn 19.20
- pp. 304–307

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/milling/double-imbibition-water-split

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.