Diffuser Draft, Juice Brix and Imbibition Balance

Draft juice, its brix, final bagasse and imbibition water of a diffuser from cane brix, extraction, draft and fibre in the final bagasse (mass balance).

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Crushing rate	250.00	t/h
Fibre % cane	14.500	%
Brix % cane	16.000	%
Brix extraction	97.500	%
Draft (draft juice per cane) Hugot: 100–105 % on cane; above 110 % no water is added.	105.00	%
Fibre % final bagasse	50.000	%

Calculated results

Parameter	Value	Unit
Draft juice	262.50	t/h
Brix of draft juice	14.857	%
Final bagasse	72.500	t/h
Imbibition water	85.000	t/h
Imbibition % fibre	234.48	%

Formula and method

$$J = dA, \quad B_J = \frac{B_c e}{d}, \quad B = \frac{Af}{f'}, \quad W = J + B - A$$

Variables

A	Crushing rate	kg/s
f	Fibre % cane	-
B_c	Brix % cane	-
e	Brix extraction	-
d	Draft (draft juice per cane)	-
f'	Fibre % final bagasse	-
J	Draft juice	kg/s
B_J	Brix of draft juice	-
B	Final bagasse	kg/s
W	Imbibition water	kg/s
$W/(Af)$	Imbibition % fibre	-

Method and standards

Mass and soluble-solids balance.

Assumptions and limits

- Losses and evaporation neglected.
- Direct steam injected to heat the diffuser condenses into the juice and is not an input; with direct heating W overstates the imbibition water by that condensate.

- Extraction and fibre % bagasse are independent inputs; a note appears when the brix they leave in the bagasse, B_c(1 − e)A/B, exceeds 5 %.

References

- Hugot
- Handbook of Cane Sugar Engineering
- 3rd ed. (Elsevier, 1986)
- ch. 23
- draft and juice balance (Table 23.3 and pp. 369–380)
- Mass balance: cane + water = draft juice + bagasse (losses neglected)

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/diffusion/diffuser-draft-balance

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.