Saccharate Liming: Milk, Juice and Tank (Hugot)

Milk of lime, juice to form saccharate at a sucrose to lime ratio, and the reaction tank volume for a contact time, after Hugot's example (ch. 24, p. 403).

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Crushing rate	100.00	t/h
Lime dose as CaO per tonne cane Hugot (Pongola): 700 g CaO/t cane.	0.70000	kg/t
CaO in the milk of lime 15 °Bé milk holds about 148 g CaO/L.	148.00	g/L
Sucrose : CaO ratio Hugot: above 6.1 : 1; use 7 : 1.	7.0000	
Brix of the juice used	15.000	%
Purity of the juice used (apparent)	85.000	%
Juice density	1,060.0	kg/m³
Contact time	5.0000	min

Calculated results

Parameter	Value	Unit
CaO	70.000	kg/h
Milk of lime	472.97	L/h
Juice for the saccharate	3,625.6	L/h
Reaction tank volume	0.34155	m³

Notes for this case

- Hugot: keep the saccharate below 58 °C and use it within minutes; 100 t/h at 700 g CaO/t takes about 473 L/h of 15 °Bé milk.

Formula and method

$$\dot{m}_{CaO} = dA, \quad \dot{V}_m = \frac{\dot{m}_{CaO}}{c}, \quad \dot{V}_j = \frac{R\dot{m}_{CaO}}{BP\rho_J}, \quad V = (\dot{V}_m + \dot{V}_j)t$$

Variables

A	Crushing rate	kg/s
d	Lime dose as CaO per tonne cane	kg/kg
c	CaO in the milk of lime	kg/m³
R	Sucrose : CaO ratio	-
B	Brix of the juice used	-
P	Purity of the juice used (apparent)	-
ρ_J	Juice density	kg/m³
t	Contact time	s
$\dot{m}_{CaO}$	CaO	kg/s
$\dot{V}_m$	Milk of lime	m³/s
$\dot{V}_j$	Juice for the saccharate	m³/s
V	Reaction tank volume	m³

Method and standards

Hugot's mass balance for saccharate.

Assumptions and limits

- Juice sucrose = brix × purity, with the apparent purity normally measured in the factory (pol for sucrose); true purity gives a slightly different juice quantity.

References

- Hugot
- Handbook of Cane Sugar Engineering
- 3rd ed. (Elsevier, 1986)
- ch. 24
- saccharate liming
- pp. 403–404

Report details

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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/clarification/saccharate-liming

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Reopens the calculator with the inputs of this report.