Yeast Propagation: Seed Volume and Number of Stages

Seed (inoculum) volume for a fermenter and the number of propagation stages from the laboratory culture at a given step-up ratio.

Method: Geometric scale-up: stages = ⌈log(V_s/V_0)/log r⌉

Input parameters

Unit system: SI

Parameter	Value	Unit
Fermenter working volume	500.00	m³
Inoculum share of fermenter volume	10.000	%
Laboratory culture volume	10.000	L
Step-up ratio per stage	10.000	

Calculated results

Parameter	Value	Unit
Seed volume	50.000	m³
Propagation stages	4.0000	

Notes for this case

- Continuous plants recycle yeast and propagate only at start-up or after contamination.

Formula and method

$$V_s = V_f i, \quad N = \left\lceil \frac{\ln(V_s/V_0)}{\ln r} \right\rceil$$

Variables

V_f	Fermenter working volume	m³
i	Inoculum share of fermenter volume	-
V_0	Laboratory culture volume	m³
r	Step-up ratio per stage	-
V_s	Seed volume	m³
N	Propagation stages	-

Method and standards

Scale-up.

Assumptions and limits

- Fixed step-up ratio.

References

- Geometric scale-up: stages = ⌈log(V_s/V_0)/log r⌉

Report details

Report reference	FCC-8S6J-H3TT (the same inputs always give the same reference)
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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/ethanol/yeast-propagation-stages

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.