Fermentation Productivity (g/L·h) and Output

Volumetric productivity of a fermentation from the final ethanol concentration and the fermentation time, and the ethanol output of a fermenter volume.

Method: Definition P = (c_e − c_0)/t

Input parameters

Unit system: SI

Parameter	Value	Unit
Ethanol in final wash	71.000	g/L
Ethanol at start (from seed)	3.0000	g/L
Fermentation time	30.000	h
Working volume	500.00	m³
Ethanol density at 20 °C	789.24	kg/m³

Calculated results

Parameter	Value	Unit
Volumetric productivity	2.2667	g/(L·h)
Ethanol output while fermenting (fill, empty and cleaning excluded)	1,133.3	kg/h
Ethanol output while fermenting (absolute)	34.464	kL/d

Formula and method

$$P = \frac{c_e - c_0}{t}, \quad \dot{m}_e = PV$$

Variables

c_e	Ethanol in final wash	kg/m³
c_0	Ethanol at start (from seed)	kg/m³
t	Fermentation time	s
V	Working volume	m³
ρ_e	Ethanol density at 20 °C	kg/m³
P	Volumetric productivity	kg/(m³·s)
$\dot{m}_e$	Ethanol output of the fermenter	kg/s
$\dot{V}_e$	Ethanol output (absolute)	m³/s

Method and standards

Definition.

Assumptions and limits

- Batch average over the fermentation time only. The outputs are rates while fermenting; over a full cycle with filling, emptying and cleaning the plant output is lower.

References

- Definition P = (c_e − c_0)/t

Report details

Report reference	FCC-A4WN-FSWB (the same inputs always give the same reference)
Generated	17 November 2026, 19:45 UTC
Calculator	Fermentation Productivity (g/L·h) and Output
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/ethanol/fermentation-productivity

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.