Wash (Beer) Alcohol from Sugar in the Mash

Alcohol strength of the fermented wash in % v/v and g/L from the fermentable sugar concentration of the mash and the fermentation efficiency.

Method: Gay-Lussac stoichiometry $C_6H_{12}O_6 \rightarrow 2\ C_2H_5OH + 2\ CO_2$ with IUPAC atomic masses; ethanol density 789.24 kg/m³ at 20 °C (OIML R 22)

Input parameters

Unit system: SI

Parameter	Value	Unit
Fermentable sugar in the mash (as invert)	180.00	g/L
Fermentation efficiency	90.000	%
Ethanol density at 20 °C	789.24	kg/m³

Calculated results

Parameter	Value	Unit
Ethanol in wash	82.852	g/L
Wash strength	10.498	%

Notes for this case

- Volume change during fermentation is neglected; high-gravity mashes need tolerant yeast.

Formula and method

$$c_e = c_s \frac{2M_{EtOH}}{M_{C_6H_{12}O_6}} \eta_f, \quad s_v = \frac{c_e}{\rho_e}$$

Variables

c_s	Fermentable sugar in the mash (as invert)	kg/m³
η_f	Fermentation efficiency	-
ρ_e	Ethanol density at 20 °C	kg/m³
c_e	Ethanol in wash	kg/m³
s_v	Wash strength	-

Method and standards

Stoichiometry.

Assumptions and limits

- No volume change: mash and wash volumes are taken as equal. Sugar consumed and CO_2 released reduce the volume, so the wash strength in % v/v is slightly understated.

References

- Gay-Lussac stoichiometry $C_6H_{12}O_6 \rightarrow 2\ C_2H_5OH + 2\ CO_2$ with IUPAC atomic masses; ethanol density 789.24 kg/m³ at 20 °C (OIML R 22)

Report details

Report reference	FCC-X7X9-EAV7 (the same inputs always give the same reference)
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Method last reviewed	13 November 2026
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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/wash-alcohol-from-sugar

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.