Expected Alcoholometer Reading at t for a True Strength

What a soda-lime glass alcoholometer (% vol) will read at temperature t for a spirit of known true strength at 20 °C: the inverse of OIML R 22 Table VIIIb.

Method: OIML R 22 (1973); Alcoholometry; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
True strength by volume at 20 °C	40.000	%
Temperature of the liquid R 22 formula range −20 to +40 °C.	20.000	°C
Cubical (volume) expansion of the glass, about 3 × linear Enter the cubical (volume) coefficient, about three times the linear one: about 25 × 10^{-6} /K for soda-lime glass.	25.000	µm/(m·K)

Calculated results

Parameter	Value	Unit
Density at t	948.05	kg/m³
Density the instrument indicates	948.05	kg/m³
Expected reading	40.000	%
Reading minus true strength	-5.5511e-15	%

Formula and method

The formula is shown on the calculator page: https://calc.firecad.com/sugar-ethanol/alcoholometry/alcoholometer-expected-reading

Variables

q	True strength by volume at 20 °C	-
t	Temperature of the liquid	K
a	Cubical (volume) expansion of the glass, about 3 × linear	1/K
ρ_t	Density at t	kg/m³
\rho'_{20}	Density the instrument indicates	kg/m³
r	Expected reading	-
$r - q$	Reading minus true strength	-

Method and standards

Inverse of the R 22 Table VIII method.

Assumptions and limits

- % vol alcoholometer graduated at 20 °C.
- The glass correction uses the first-order form 1/(1 − a(t − 20)); the difference from (1 + a(t − 20)) is negligible over −20 to +40 °C. The surface-tension correction (R 22 Annex II) is not included.

References

- OIML R 22 (1973)
- Alcoholometry
- and International Alcoholometric Tables (1975)
- Annex I
- Tables VIIIb (inverted)

Report details

Report reference	FCC-14FQ-1PYS (the same inputs always give the same reference)
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Calculator	Expected Alcoholometer Reading at t for a True Strength
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/alcoholometry/alcoholometer-expected-reading

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.