Beer–Lambert Absorbance and Concentration

Absorbance from measured transmittance and the analyte concentration from molar absorptivity and path length, in molar and mass units.

Method: Beer–Lambert–Bouguer law

Input parameters

Unit system: SI

Parameter	Value	Unit
Transmittance	35.000	%
Molar absorptivity (L/(mol·cm))	6,220.0	
Path length	1.0000	cm
Molar mass	663.40	kg/kmol

Calculated results

Parameter	Value	Unit
Absorbance	0.45593	
Molar concentration	0.073301	mmol/L
Mass concentration	48.628	mg/L

Notes for this case

• A = −log₁₀T = εlc. ε in L/(mol·cm) equals 0.1 m²/mol. Keep absorbance roughly between 0.1 and 1 for best precision; above about 1–2 stray light and chemical effects bend the calibration line. Calibrate with standards rather than trusting a literature ε for routine work.

Formula and method

$$A = -\log_{10} T = \varepsilon l c, \quad c = \frac{A}{\varepsilon l}$$

Variables

T	Transmittance	-
ε	Molar absorptivity (L/(mol·cm))	-
l	Path length	m
M	Molar mass	kg/kmol
A	Absorbance	-
c	Molar concentration	mol/m³
c_m	Mass concentration	kg/m³

Method and standards

Absorbance.

Assumptions and limits

- Monochromatic light; dilute, non-scattering sample.

References

Beer–Lambert–Bouguer law

Report details

Report reference	FCC-E7WB-CZW5 (the same inputs always give the same reference)
Generated	23 November 2026, 18:08 UTC
Calculator	Beer–Lambert Absorbance and Concentration
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
Release checks	3 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/instrumentation/analysers/beer-lambert-absorbance

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.