Liquid Viscosity–Temperature Fit (Andrade Equation)

Andrade constants ln μ = A + B/T from a liquid's viscosity at two temperatures, and the viscosity at a third temperature.

Method: Andrade (Arrhenius-type) liquid viscosity correlation

Input parameters

Unit system: SI

Parameter	Value	Unit
Viscosity at the first temperature	1.0000	cP
First temperature	20.000	°C
Viscosity at the second temperature	0.54700	cP
Second temperature	50.000	°C
Temperature wanted	40.000	°C

Calculated results

Parameter	Value	Unit
Constant A (μ in Pa·s)	-13.406	
Constant B	1,905.1	K
Viscosity at the temperature wanted	0.66031	cP
Apparent activation energy of flow B·R	15.840	kJ/mol

Notes for this case

• Andrade's equation ln μ = A + B/T fits most liquids over moderate ranges, giving a straight line of ln μ against 1/T. Interpolating between the two data points is reliable; extrapolating far beyond them is not, especially near the freezing point or for oils, whose viscosity follows a double-logarithmic (Walther) law better.

Formula and method

$$\ln \mu = A + \frac{B}{T}, \quad B = \frac{\ln(\mu_1/\mu_2)}{1/T_1 - 1/T_2}$$

Variables

μ_1	Viscosity at the first temperature	Pa·s
T_1	First temperature	K
μ_2	Viscosity at the second temperature	Pa·s
T_2	Second temperature	K
T	Temperature wanted	K
A	Constant A (μ in Pa·s)	-
B	Constant B	K
μ	Viscosity at the temperature wanted	Pa·s
E_μ	Apparent activation energy of flow B·R	J/mol

Method and standards

Andrade equation.

Assumptions and limits

- Two-constant fit; Newtonian liquid.

References

Andrade (Arrhenius-type) liquid viscosity correlation

Report details

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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/chemical/physical-properties/andrade-viscosity-fit

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.