Liquid Thermal Conductivity by Baroncini

Thermal conductivity of a liquid of a known family (alcohols, acids, ketones, esters, ethers, hydrocarbons) from boiling point, T_c and molar mass.

Method: Perry's Chemical Engineers' Handbook; 9th ed. (McGraw-Hill, 2019); ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Temperature	126.85	°C
Normal boiling point	201.98	°C
Critical temperature	431.50	°C
Molar mass	108.14	kg/kmol
Chemical family	Alcohols	

Calculated results

Parameter	Value	Unit
Thermal conductivity	0.14203	W/(m·K)
Reduced temperature	0.56766	

Notes for this case

- Perry's: about 10 % within the listed families. Estimate for design; use measured data where they exist.

Formula and method

$$k = \frac{A\,T_b^{\alpha}\,M^{-\beta}\,T_c^{-\gamma}\,(1-T_r)^{0.38}}{T_r^{1/6}} \quad \mathrm{W/(m\,K)}$$

Variables

T	Temperature	K
T_b	Normal boiling point	K
T_c	Critical temperature	K
M	Molar mass	kg/kmol
family	Chemical family	-
k	Thermal conductivity	W/(m·K)
T_r	Reduced temperature	-

Method and standards

Baroncini correlation, Perry's Chemical Engineers' Handbook, 9th ed., Eq. 2-110 with the family constants of Table 2-176 (p. 2-357); Perry gives about 10 % uncertainty.

Assumptions and limits

- Families listed only.
- A note appears outside a reduced temperature of about 0.3–0.8. Perry gives no range; this is FireCAD's caution for a correlation fitted to ordinary liquids.

References

- Perry's Chemical Engineers' Handbook
- 9th ed. (McGraw-Hill, 2019)
- sec. 2
- Eq. (2-110) and Table 2-176 (Baroncini, DiFilippo, Latini and Pacetti, 1981) with the p-cresol example

Report details

Report reference	FCC-YNWW-PBT4 (the same inputs always give the same reference)
Generated	17 November 2026, 19:50 UTC
Calculator	Liquid Thermal Conductivity by Baroncini
Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 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/chemical/physical-properties/baroncini-liquid-thermal-conductivity

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.