Heat of Vaporisation by Corresponding States (Pitzer)

Heat of vaporisation of a pure liquid at a temperature from its critical temperature and acentric factor by corresponding states (Perry's Eq. 2-41).

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Temperature	178.85	°C
Critical temperature	372.45	°C
Acentric factor	0.35017	
Molar mass	108.14	kg/kmol

Calculated results

Parameter	Value	Unit
Molar heat of vaporisation	36.697	kJ/mol
Specific heat of vaporisation	339.35	kJ/kg
Reduced temperature	0.70012	

Notes for this case

- Perry's: uncertainty under about 6 % for organic compounds. Estimate for design; use measured data where they exist.

Formula and method

$$\frac{\Delta H_v}{RT_c} = 7.08\tau^{0.354} + 10.95\,\omega\,\tau^{0.456}, \quad \tau = 1 - T_r$$

Variables

T	Temperature	K
T_c	Critical temperature	K
ω	Acentric factor	-
M	Molar mass	kg/kmol
ΔH_v	Molar heat of vaporisation	J/mol
Δh_v	Specific heat of vaporisation	J/kg
T_r	Reduced temperature	-

Method and standards

Corresponding-states correlation.

Assumptions and limits

- Organic compounds; 0.6 < T_r < 1.

References

- Perry's Chemical Engineers' Handbook
- 9th ed. (McGraw-Hill, 2019)
- sec. 2
- Eq. (2-41) (corresponding states, from Poling, Prausnitz and O'Connell) with the anisole example

Report details

Report reference	FCC-CW4K-5K80 (the same inputs always give the same reference)
Generated	17 November 2026, 19:50 UTC
Calculator	Heat of Vaporisation by Corresponding States (Pitzer)
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/chemical/physical-properties/pitzer-heat-of-vaporisation

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.