Latent Heat at Another Temperature (Watson Correlation)

Heat of vaporisation at a second temperature from a known value and the critical temperature by the Watson correlation (exponent 0.38).

Method: Watson (1943); Ind. Eng. Chem. 35(4): $\Delta H_2 = \Delta H_1[(1 - T_{r2})/(1 - T_{r1})]^{0.38}$ (Reid, Prausnitz and Poling)

Input parameters

Unit system: SI

Parameter	Value	Unit
Known latent heat	2,257.0	kJ/kg
Temperature of the known value	100.00	°C
Temperature wanted	180.00	°C
Critical temperature	373.95	°C

Calculated results

Parameter	Value	Unit
Latent heat at T_2	1,979.4	kJ/kg

Formula and method

$$\Delta H_2 = \Delta H_1 \left(\frac{1 - T_2/T_c}{1 - T_1/T_c} \right)^{0.38}$$

Variables

ΔH_1	Known latent heat	J/kg
T_1	Temperature of the known value	K
T_2	Temperature wanted	K
T_c	Critical temperature	K
ΔH_2	Latent heat at T_2	J/kg

Method and standards

Watson.

Assumptions and limits

- Below the critical temperature.

References

• Watson (1943)
• Ind. Eng. Chem. 35(4): $\Delta H_2 = \Delta H_1[(1 - T_{r2})/(1 - T_{r1})]^{0.38}$ (Reid, Prausnitz and Poling)

Report details

Report reference	FCC-E3H1-SP8Y (the same inputs always give the same reference)
Generated	17 November 2026, 19:49 UTC
Calculator	Latent Heat at Another Temperature (Watson Correlation)
Method last reviewed	12 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/separation/watson-latent-heat

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.