Dühring Rule: Boiling Point of a Solution at Any Pressure

Boiling point of a solution at a new pressure from two measured boiling points against water's boiling points (a straight Dühring line); water from IAPWS-IF97.

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Water boiling point, reference 1	100.00	°C
Solution boiling point, reference 1	108.00	°C
Water boiling point, reference 2	60.000	°C
Solution boiling point, reference 2	67.000	°C
New pressure (absolute)	20.000	kPa

Calculated results

Parameter	Value	Unit
Slope of the Dühring line	1.0250	
Water boiling point at p	60.059	°C
Solution boiling point at p	67.060	°C
Boiling-point rise	7.0015	K

Formula and method

$$T_s = T_{s1} + K(T_w - T_{w1}), \quad K = \frac{T_{s1} - T_{s2}}{T_{w1} - T_{w2}}$$

Variables

T_{w1}	Water boiling point, reference 1	K
T_{s1}	Solution boiling point, reference 1	K
T_{w2}	Water boiling point, reference 2	K
T_{s2}	Solution boiling point, reference 2	K
p	New pressure (absolute)	Pa
K	Slope of the Dühring line	-
T_w	Water boiling point at p	K
T_s	Solution boiling point at p	K
BPR	Boiling-point rise	K

Method and standards

Linear Dühring line with IF97 water saturation.

Assumptions and limits

- One fixed concentration.
- Reference points with the solution boiling below water are rejected; a note appears when the water boiling point at p is more than one reference span outside the two references (extrapolation).

References

• Perry's Chemical Engineers' Handbook
• 9th ed. (McGraw-Hill, 2019)
• sec. 11 (evaporators): Dühring's rule
• Water saturation temperature from IAPWS-IF97

Report details

Report reference	FCC-DDGX-8N87 (the same inputs always give the same reference)
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Calculator	Dühring Rule: Boiling Point of a Solution at Any Pressure
Method last reviewed	13 November 2026
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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/unit-operations/duhring-boiling-point

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.