Antoine Constants from Three Vapour-Pressure Points

Antoine constants A, B and C (mmHg, °C form) fitted exactly through three measured vapour-pressure points, with a check value at another temperature.

Method: Exact three-point solution of the Antoine equation; linearised as y t = A t + (AC − B) − C y

Input parameters

Unit system: SI

Parameter	Value	Unit
Point 1: temperature	50.000	°C
Point 1: vapour pressure	12.300	kPa
Point 2: temperature	80.000	°C
Point 2: vapour pressure	47.400	kPa
Point 3: temperature	110.00	°C
Point 3: vapour pressure	140.60	kPa
Temperature to check	95.000	°C

Calculated results

Parameter	Value	Unit
A (for $\log_{10}$ p in mmHg, t in °C)	7.4187	
B (°C, for p in mmHg)	1,359.4	
C (°C)	199.26	
Vapour pressure at the check temperature	83.930	kPa

Notes for this case

- Use the constants only between the fitted temperatures; three points fix the curve exactly, so measurement errors carry straight into it.

Formula and method

$$\log_{10} p = A - \frac{B}{C + t}$$

Variables

T_1	Point 1: temperature	K
p_1	Point 1: vapour pressure	Pa
T_2	Point 2: temperature	K
p_2	Point 2: vapour pressure	Pa
T_3	Point 3: temperature	K
p_3	Point 3: vapour pressure	Pa
T_q	Temperature to check	K
A	A, for $\log_{10}$ p with p in mmHg and t in °C	-
B	B, in °C for p in mmHg	°C
C	C, in °C	°C
t	temperature in °C (T − 273.15)	°C
p	vapour pressure in mmHg in the Antoine form	mmHg
$p(T_q)$	Vapour pressure at the check temperature	Pa

Method and standards

Exact fit of the Antoine equation through three points, in the mmHg and °C form: $\log_{10} p = A - B/(C + t)$, linearised as $y\ t = A\ t + (AC - B) - C\ y$ and solved as three linear equations. Constants in other forms (bar, kPa, K, natural log) differ: convert before using them in another calculator.

Assumptions and limits

- Antoine form valid over the range.
- Nearly collinear points (an ill-conditioned fit) are rejected.

References

• Exact three-point solution of the Antoine equation
• linearised as $y\ t = A\ t + (AC - B) - C\ y$

Report details

Report reference	FCC-EH9S-DEBV (the same inputs always give the same reference)
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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/separation/antoine-fit-three-points

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.