Relative Volatility and K-Values from Antoine Constants

Vapour pressures, ideal K-values and relative volatility of two components at a temperature and pressure from their Antoine constants (mmHg, °C form).

Method: Antoine equation $\log_{10}p = A - B/(C + t)$; Raoult K = p_sat/p; α = p_1_sat/p_2_sat

Input parameters

Unit system: SI

Parameter	Value	Unit
Component 1 (light): A mmHg and °C form (not the bar and K form of the bubble and dew point page). Defaults: the commonly tabulated benzene and toluene sets; check the range in your source.	6.9056	
Component 1: B	1,211.0	
Component 1: C	220.79	
Component 2 (heavy): A	6.9546	
Component 2: B	1,344.8	
Component 2: C	219.48	
Temperature	95.000	°C
Pressure (absolute)	101.33	kPa

Calculated results

Parameter	Value	Unit
Vapour pressure 1	156.90	kPa
Vapour pressure 2	63.578	kPa
K-value 1 (ideal)	1.5485	
K-value 2 (ideal)	0.62746	
Relative volatility	2.4678	

Notes for this case

- Antoine constants for $\log_{10}$(p/mmHg) and t in °C, valid only over their stated range; ideal (Raoult) K-values.

Formula and method

$$\log_{10} p^{sat} = A - \frac{B}{C+t}, \quad K_i = \frac{p_i^{sat}}{p}, \quad \alpha_{12} = \frac{p_1^{sat}}{p_2^{sat}}$$

Variables

A_1	Component 1 (light): A	-
B_1	Component 1: B	-
C_1	Component 1: C	-
A_2	Component 2 (heavy): A	-
B_2	Component 2: B	-
C_2	Component 2: C	-
T	Temperature	K
p	Pressure (absolute)	Pa
p_1^{sat}	Vapour pressure 1	Pa
p_2^{sat}	Vapour pressure 2	Pa
K_1	K-value 1 (ideal)	-

K_2	K-value 2 (ideal)	-
α_{12}	Relative volatility	-

Method and standards

Antoine and Raoult.

Assumptions and limits

- Ideal liquid and vapour.
- Antoine constants in the mmHg and °C form, $\log_{10}(p/\text{mmHg}) = A - B/(C + t/°C)$; the bubble and dew point page uses the bar and K form instead.
- The defaults are a commonly tabulated benzene and toluene set; each set holds only over its own temperature range, which the page does not check.

References

- Antoine equation $\log_{10}p = A - B/(C + t)$; Raoult $K = p_{sat}/p$; $\alpha = p_{1_sat}/p_{2_sat}$

Report details

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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/relative-volatility-antoine

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Reopens the calculator with the inputs of this report.