Chromatography: Theoretical Plates, HETP and Resolution

Number of theoretical plates and plate height of a chromatographic column from a peak's retention time and width, and the resolution between two adjacent peaks.

Method: N = 16(t_R/w)²; R_s = 2(t_R2 − t_R1)/(w₁ + w₂) (analytical chemistry definitions)

Input parameters

Unit system: SI

Parameter	Value	Unit
Retention time, peak 1	300.00	s
Base width, peak 1	12.000	s
Retention time, peak 2	325.00	s
Base width, peak 2	13.000	s
Column length	30.000	m

Calculated results

Parameter	Value	Unit
Theoretical plates (peak 2)	10,000	
Plate height (HETP)	3.0000	mm
Resolution	2.0000	

Formula and method

$$N = 16\left(\frac{t_R}{w}\right)^2, \quad H = \frac{L}{N}, \quad R_s = \frac{2(t_{R2} - t_{R1})}{w_1 + w_2}$$

Variables

t_{R1}	Retention time, peak 1	s
w_1	Base width, peak 1	s
t_{R2}	Retention time, peak 2	s
w_2	Base width, peak 2	s
L	Column length	m
N	Theoretical plates (peak 2)	-
H	Plate height (HETP)	m
R_s	Resolution	-

Method and standards

Chromatography definitions.

Assumptions and limits

- Gaussian peaks.

References

- N = 16(t_R/w)²
- R_s = 2(t_R2 − t_R1)/(w₁ + w₂) (analytical chemistry definitions)

Report details

Report reference	FCC-HY7X-7WYG (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/instrumentation/analysers/chromatography-plates-resolution

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.