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Number of Theoretical Plates Formulas

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List of 9 Number of Theoretical Plates Formulas

Number of Theoretical Plates

1) Height of Column given Number of Theoretical Plates

$$fx \quad H_{TP} = \left(\frac{L}{N} \right)$$

[Open Calculator !\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\)](#)

$$ex \quad 2.2m = \left(\frac{22m}{10} \right)$$

2) Number of Theoretical Plates given Length and Height of Column

$$fx \quad N_{LandH} = \left(\frac{L}{H} \right)$$

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d_img.jpg\)](#)

$$ex \quad 1.833333 = \left(\frac{22m}{12m} \right)$$



3) Number of Theoretical Plates given Length of Column and Standard Deviation

$$\text{fx } N_{\text{LandSD}} = \frac{(L)^2}{(\sigma)^2}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$\text{ex } 0.290326 = \frac{(22\text{m})^2}{(40.83)^2}$$

4) Number of Theoretical Plates given Length of Column and Width of Peak

$$\text{fx } N_{\text{LandW}} = \frac{16 \cdot ((L)^2)}{(w)^2}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$\text{ex } 805.8273 = \frac{16 \cdot ((22\text{m})^2)}{(3.1\text{s})^2}$$

5) Number of Theoretical Plates given Resolution and Separation Factor

$$\text{fx } N_{\text{RandSF}} = \frac{(4 \cdot R)^2}{(\beta - 1)^2}$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$\text{ex } 53.77778 = \frac{(4 \cdot 11)^2}{(7 - 1)^2}$$



6) Number of Theoretical Plates given Retention Time and Half Width of Peak

$$\text{fx } N_{\text{RTandHP}} = \frac{5.55 \cdot (t_r)^2}{(w_{1/2\text{av}})^2}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

$$\text{ex } 26.05417 = \frac{5.55 \cdot (13\text{s})^2}{(6\text{s})^2}$$

7) Number of Theoretical Plates given Retention Time and Standard Deviation

$$\text{fx } N_{\text{RTandSD}} = \frac{(t_r)^2}{(\sigma)^2}$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

$$\text{ex } 0.101374 = \frac{(13\text{s})^2}{(40.83)^2}$$

8) Number of Theoretical Plates given Retention Time and Width of Peak

$$\text{fx } N_{\text{RTandWP}} = \frac{16 \cdot ((t_r)^2)}{(w)^2}$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

$$\text{ex } 281.3736 = \frac{16 \cdot ((13\text{s})^2)}{(3.1\text{s})^2}$$



9) Separation Factor given Resolution and Number of Theoretical Plates



$$\text{fx } \beta_{\text{TP}} = \left(\left(\frac{4 \cdot R}{\sqrt{N}} \right) + 1 \right)$$

[Open Calculator](#)

$$\text{ex } 14.91402 = \left(\left(\frac{4 \cdot 11}{\sqrt{10}} \right) + 1 \right)$$





Variables Used

- **H** Plate Height (Meter)
- **H_{TP}** Plate Height given TP (Meter)
- **L** Length of Column (Meter)
- **N** Number of Theoretical Plates
- **N_{LandH}** Number of Theoretical Plates given L and H
- **N_{LandSD}** Number of Theoretical Plates given L and SD
- **N_{LandW}** Number of Theoretical Plates given L and W
- **N_{RandSF}** Number of Theoretical Plates given R and SF
- **N_{RTandHP}** Number of Theoretical Plates given RT and HP
- **N_{RTandSD}** Number of Theoretical Plates given RT and SD
- **N_{RTandWP}** Number of Theoretical Plates given RT and WP
- **R** Resolution
- **t_r** Retention Time (Second)
- **w** Width of Peak (Second)
- **w_{1/2av}** Half of Average Width of Peaks (Second)
- **β** Separation Factor
- **β_{TP}** Separation Factor given TP
- **σ** Standard Deviation






Constants, Functions, Measurements used

- **Function:** **sqrt**, sqrt(Number)
Square root function
- **Measurement:** **Length** in Meter (m)
Length Unit Conversion 
- **Measurement:** **Time** in Second (s)
Time Unit Conversion 



Check other formula lists

- [Distribution Ratio and Length of Column Formulas](#) 
- [Important formulae on Retention and Deviation Formulas](#) 
- [Number of Theoretical Plates and Capacity Factor Formulas](#) 
- [Relative and Adjusted Retention and Phase Formulas](#) 

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