Important Number of Theoretical Plates Formulas PDF

Formulas
Examples
with Units

List of 9
Important Number of Theoretical Plates Formulas

1) Height of Column given Number of Theoretical Plates Formula

Evaluate Formula

Formula

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

Example with Units

$$2.2\,\text{m} = \left(\frac{22\,\text{m}}{10}\right)$$

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

Evaluate Formula

Formula

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

Example with Units

$$1.8333 = \left(\frac{22\,\text{m}}{12\,\text{m}}\right)$$

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

Evaluate Formula

Formula

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

Example with Units

$$0.2903 = \frac{(22\,\text{m})^2}{(40.83)^2}$$

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

Evaluate Formula

Formula

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

Example with Units

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

5) Number of Theoretical Plates given Resolution and Separation Factor Formula

Evaluate Formula

Formula

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

Example

$$53.7778 = \frac{(4 \cdot 11)^2}{(7 - 1)^2}$$

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

Evaluate Formula

Formula

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

Example with Units

$$26.0542 = \frac{5.55 \cdot \left(13\,\text{s}\right)^2}{\left(6\,\text{s}\right)^2}$$

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

Evaluate Formula

Formula

$$N_{RTandSD} = \frac{\left(t_r\right)^2}{\left(\sigma\right)^2}$$

Example with Units

$$0.1014 = \frac{\left(13\,\text{s}\right)^2}{\left(40.83\right)^2}$$

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

Evaluate Formula

Formula

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

Example with Units

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

9) Separation Factor given Resolution and Number of Theoretical Plates Formula

Evaluate Formula

Formula

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

Example

$$14.914 = \left(\left(\frac{4 \cdot 11}{\sqrt{10}}\right) + 1\right)$$

Variables used in list of Number of Theoretical Plates Formulas above

- **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 in list of Number of Theoretical Plates Formulas above

- Functions: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Time** in Second (s)
  Time Unit Conversion

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