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Distribution Ratio and Length of Column Formulas

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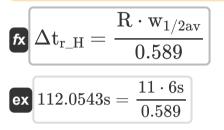
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List of 15 Distribution Ratio and Length of Column Formulas

Distribution Ratio and Length of Column 🔗

1) Change in Retention Time given Half of Average Width of Peaks 🔗

fx $$\Delta t_{r\_H} = \frac{R \cdot w_{1/2av}}{0.589}$$

Open Calculator 🔗

ex $$112.0543s = \frac{11 \cdot 6s}{0.589}$$

2) Change in Retention Time given Resolution and Average Width of Peak 🔗

fx $$\Delta t_{r\_RandW} = (R \cdot w_{av})$$

Open Calculator 🔗

ex $$44s = (11 \cdot 4s)$$

3) Change in Retention Volume given Resolution and Average Width of Peak 🔗

fx $$\Delta V_{r\_RandW} = (R \cdot w_{av})$$

Open Calculator 🔗

ex $$733333.3mL = (11 \cdot 4s)$$

4) Column Length given Number of Theoretical Plates

fx $L_c = (N \cdot H)$

Open Calculator

ex $120m = (10 \cdot 12m)$

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

fx $L_c = \sigma \cdot \left(\sqrt{N} \right)$

Open Calculator

ex $129.1158m = 40.83 \cdot \left(\sqrt{10} \right)$

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

fx $L_{cl} = \left(\dfrac{w_{NandL}}{4} \right) \cdot \left(\sqrt{N} \right)$

Open Calculator

ex $9.882118m = \left(\dfrac{12.5}{4} \right) \cdot \left(\sqrt{10} \right)$

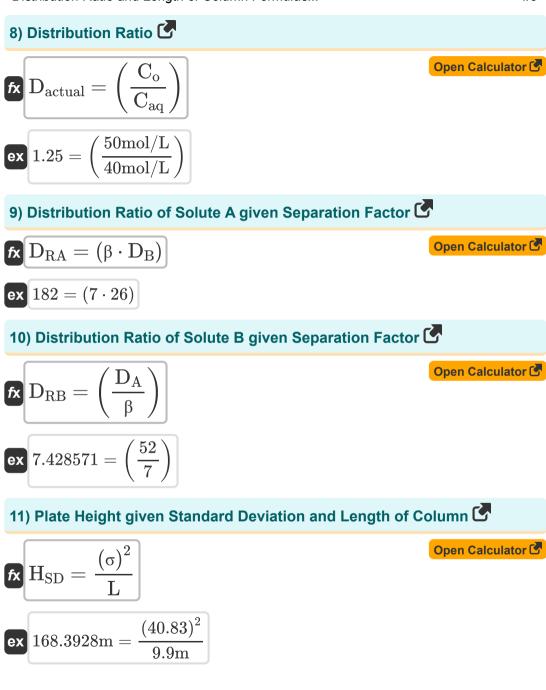## 7) Column Length given Standard Deviation and Plate Height

fx $L_c = \dfrac{(\sigma)^2}{H}$

Open Calculator

ex $138.9241m = \dfrac{(40.83)^2}{12m}$

8) Distribution Ratio 🡕

fx $D_{actual} = \left(\dfrac{C_o}{C_{aq}} \right)$

ex $1.25 = \left(\dfrac{50 mol/L}{40 mol/L} \right)$

9) Distribution Ratio of Solute A given Separation Factor 🡕

fx $D_{RA} = (\beta \cdot D_B)$

ex $182 = (7 \cdot 26)$

10) Distribution Ratio of Solute B given Separation Factor 🡕

fx $D_{RB} = \left(\dfrac{D_A}{\beta} \right)$

ex $7.428571 = \left(\dfrac{52}{7} \right)$

11) Plate Height given Standard Deviation and Length of Column 🡕

fx $H_{SD} = \dfrac{(\sigma)^2}{L}$

ex $168.3928m = \dfrac{(40.83)^2}{9.9m}$
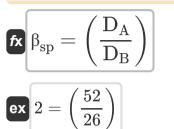
12) Separation Factor of two solutes A and B ⌃

fx $\beta_{sp} = \left(\dfrac{D_A}{D_B}\right)$

Open Calculator ⌃

ex $2 = \left(\dfrac{52}{26}\right)$

13) Standard Deviation given Length of Column and Number of Theoretical Plates ⌃

fx $\sigma_{LandN} = \dfrac{L}{\sqrt{N}}$

Open Calculator ⌃

ex $3.130655 = \dfrac{9.9m}{\sqrt{10}}$

14) Standard Deviation given Plate Height and Length of Column ⌃

fx $\sigma_{HandL} = \sqrt{H \cdot L}$

Open Calculator ⌃

ex $10.89954 = \sqrt{12m \cdot 9.9m}$

15) Width of Peak given Number of Theoretical Plates and Length of Column ⌃

fx $w_{NandL} = \dfrac{4 \cdot L}{\sqrt{N}}$

Open Calculator ⌃

ex $12.52262 = \dfrac{4 \cdot 9.9m}{\sqrt{10}}$

Variables Used

- C_{aq} Concentration in Aqueous Phase *(Mole per Liter)*
- C_o Concentration in Organic Phase *(Mole per Liter)*
- D_A Distribution Ratio of Solute A
- D_{actual} Actual Distribution Ratio
- D_B Distribution Ratio of Solute B
- D_{RA} Distribution Ratio A
- D_{RB} Distribution Ratio B
- H Plate Height *(Meter)*
- H_{SD} Plate Height given SD *(Meter)*
- L Length of Column *(Meter)*
- L_c Chromatographic Column Length *(Meter)*
- L_{cl} Chromatographic Column Length given NP and WP *(Meter)*
- N Number of Theoretical Plates
- R Resolution
- $w_{1/2av}$ Half of Average Width of Peaks *(Second)*
- w_{av} Average Width of Peaks *(Second)*
- w_{NandL} Width of Peak N and L
- β Separation Factor
- β_{sp} Separation Factor A and B
- Δt_{r_H} Change in Retention Time given H *(Second)*
- Δt_{r_RandW} Change in Retention Time given R and W *(Second)*

- **ΔV$_{r\_RandW}$** Change in retention volume given Rand W *(Milliliter)*

- **σ** Standard Deviation

- **σ$_{HandL}$** Standard Deviation given H and L

- **σ$_{LandN}$** Standard Deviation given L and N

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 ⬀
- Measurement: **Volume** in Milliliter (mL)
  Volume Unit Conversion ⬀
- Measurement: **Molar Concentration** in Mole per Liter (mol/L)
  Molar Concentration Unit Conversion ⬀

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