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Important formulae on Retention and Deviation Formulas

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List of 10 Important formulae on Retention and Deviation Formulas

Important formulae on Retention and Deviation

1) Adjusted Retention Time given Retention Time

fx $t'_{RT} = (t_r - t_m)$

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

ex $8.2\text{s} = (13\text{s} - 4.8\text{s})$

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

fx $W_{av_RT} = \left(\frac{\Delta t_r}{R} \right)$

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

ex $1.090909\text{s} = \left(\frac{12\text{s}}{11} \right)$

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

fx $W_{av_RV} = \left(\frac{\Delta V_r}{R} \right)$

[Open Calculator !\[\]\(f60b7a900783ac3fd531bfd9c111be6d_img.jpg\)](#)

ex $0.000818\text{s} = \left(\frac{9\text{L}}{11} \right)$



4) Mass of Second Analyte according to Scaling Equation ↗

fx $M_{2nd} = \left(\left(\frac{R_2}{R_1} \right)^2 \right) \cdot M_1$

[Open Calculator ↗](#)

ex $2.222222g = \left(\left(\frac{2m}{3m} \right)^2 \right) \cdot 5g$

5) Radius of First Column according to Scaling Equation ↗

fx $R_{c1} = \left(\sqrt{\frac{M_1}{M_2}} \right) \cdot R_2$

[Open Calculator ↗](#)

ex $1.414214m = \left(\sqrt{\frac{5g}{10g}} \right) \cdot 2m$

6) Retention Factor ↗

fx $RF = \frac{d_{solu}}{d_{solv}}$

[Open Calculator ↗](#)

ex $3.2 = \frac{80m}{25m}$

7) Retention Time given Capacity Factor ↗

fx $T_{cf} = t_m \cdot (k^c + 1)$

[Open Calculator ↗](#)

ex $21.6s = 4.8s \cdot (3.5 + 1)$



8) Standard Deviation given Retention Time and Number of Theoretical Plates ↗

fx $\sigma_{RTandNP} = \frac{t_r}{\sqrt{N_{TP}}}$

[Open Calculator ↗](#)

ex $4.596194 = \frac{13s}{\sqrt{8}}$

9) Time for Diffusion given Standard Deviation ↗

fx $t_D = \frac{(\sigma)^2}{2 \cdot D}$

[Open Calculator ↗](#)

ex $0.001106s = \frac{(1.33)^2}{2 \cdot 800m^2/s}$

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



fx $w_{NPandRT} = \frac{4 \cdot t_r}{\sqrt{N_{TP}}}$

[Open Calculator ↗](#)

ex $18.38478s = \frac{4 \cdot 13s}{\sqrt{8}}$



Variables Used

- **D** Diffusion Coefficient (*Square Meter Per Second*)
- **d_{solu}** Solute Distance (*Meter*)
- **d_{solv}** Solvent Distance (*Meter*)
- **k^c** Capacity Factor for Analytical
- **M₁** Mass of 1st analyte (*Gram*)
- **M₂** Mass of 2nd analyte (*Gram*)
- **M_{2nd}** Mass of Analyte 2 (*Gram*)
- **N_{TP}** Count of Theoretical Plates
- **R** Resolution
- **R₁** Radius of 1st column (*Meter*)
- **R₂** Radius of 2nd column (*Meter*)
- **R_{c1}** 1st Column Radius (*Meter*)
- **RF** Actual Retention Factor
- **T_{cf}** Retention Time given CF (*Second*)
- **t_D** Diffusion Time (*Second*)
- **t_m** Unretained Solute Travel Time (*Second*)
- **t_r** Retention Time (*Second*)
- **t'_{RT}** Adjusted Retention Time given RT (*Second*)
- **w_{av_RT}** Average Width of Peaks given RT (*Second*)
- **w_{av_RV}** Average Width of Peaks given RV (*Second*)
- **w_{NPandRT}** Width of Peak NP and RT (*Second*)



- Δt_r Change in Retention Time (Second)
- ΔV_r Change in retention volume (Liter)
- σ Standard Deviation
- $\sigma_{RT\text{and}NP}$ Standard Deviation given RT and NP



Constants, Functions, Measurements used

- **Function:** **sqrt**, sqrt(Number)
Square root function
- **Measurement:** **Length** in Meter (m)
Length Unit Conversion 
- **Measurement:** **Weight** in Gram (g)
Weight Unit Conversion 
- **Measurement:** **Time** in Second (s)
Time Unit Conversion 
- **Measurement:** **Volume** in Liter (L)
Volume Unit Conversion 
- **Measurement:** **Diffusivity** in Square Meter Per Second (m^2/s)
Diffusivity Unit Conversion 



Check other formula lists

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

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