



Retention Time Formulas

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Examples!

Conversions!

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List of 10 Retention Time Formulas

Retention Time

1) Adjusted Retention Time given Retention Time

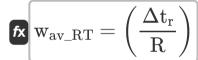


fx
$${
m t'_{RT}}=({
m t_r}-{
m t_m})$$

ex 8.2s = (13s - 4.8s)

Open Calculator 2

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



Open Calculator

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

3) Half Width of Peak given Number of Theoretical Plates and Retention Time [7

$$\mathbf{w}_{1/2\mathrm{av}} = \left(\sqrt{rac{5.55}{\mathrm{N}}}
ight)\cdot (\mathrm{t_r})$$

Open Calculator

$$oxed{ex} 9.684782 ext{s} = \left(\sqrt{rac{5.55}{10}}
ight) \cdot (13 ext{s})$$



4) Retention Time given Adjusted Retention Time

 $ag{t_{
m ART} = (tr^{'} + t_{
m m})}$

Open Calculator 🗗

Open Calculator 🖸

- $= 6.8 \mathrm{s} = (2 \mathrm{s} + 4.8 \mathrm{s})$
- 5) Retention Time given Capacity Factor
- fx $T_{cf} = t_{m} \cdot (k^{c} + 1)$
- $\mathbf{ex} \ 21.6 \mathrm{s} = 4.8 \mathrm{s} \cdot (3.5 + 1)$
- 6) Retention Time given Number of Theoretical Plate and Half Width of Peak
- $ag{t_{ ext{NP_HP}}} = \left(ext{w}_{1/2 ext{av}}
 ight) \cdot \left(\sqrt{rac{ ext{N}}{5.55}}
 ight)$

Open Calculator 🖸

Open Calculator

- $oxed{ex} 8.053873 \mathrm{s} = (6 \mathrm{s}) \cdot \left(\sqrt{rac{10}{5.55}}
 ight)$
- 7) Retention Time given Number of Theoretical Plates and Standard Deviation 🖸
- $t_{
 m NP_SD} = (\sigma) \cdot \left(\sqrt{N}
 ight)$
- \mathbf{ex} | 129.1158s = $(40.83) \cdot \left(\sqrt{10}\right)$





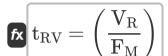
8) Retention Time given Number of Theoretical Plates and Width of Peak

fx
$$t_{\mathrm{NP_WP}} = \left(rac{\mathrm{w}}{4}
ight) \cdot \left(\sqrt{\mathrm{N}}
ight)$$

Open Calculator

ex
$$2.450765 \mathrm{s} = \left(rac{3.1 \mathrm{s}}{4}
ight) \cdot \left(\sqrt{10}
ight)$$

9) Retention Time given Retention Volume



Open Calculator 🗗

$$oxed{1.6 ext{s} = \left(rac{11.2 ext{L}}{7 ext{L/s}}
ight)}$$

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

$$\mathbf{f}\mathbf{x} egin{aligned} \mathbf{w}_{\mathrm{NPandRT}} = rac{4 \cdot t_{\mathrm{r}}}{\sqrt{N_{\mathrm{TP}}}} \end{aligned}$$

Open Calculator 🚰

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



Variables Used

- F_M Flow Rate of Mobile Phase (Liter per Second)
- k^C Capacity Factor for Analytical
- N Number of Theoretical Plates
- N_{TP} Count of Theoretical Plates
- R Resolution
- t_{ART} Retention Time given ART (Second)
- T_{cf} Retention Time given CF (Second)
- tm Unretained Solute Travel Time (Second)
- t_{NP HP} Retention Time given NP and HP (Second)
- t_{NP} _{SD} Retention Time given NP and SD (Second)
- t_{NP} w_P Retention Time given NP and WP (Second)
- t_r Retention Time (Second)
- t'_{RT} Adjusted Retention Time given RT (Second)
- t_{RV} Retention Time given RV (Second)
- tr Adjusted Retention Time (Second)
- V_R Retention Volume (Liter)
- w Width of Peak (Second)
- W_{1/2av} Half of Average Width of Peaks (Second)
- Wav RT Average Width of Peaks given RT (Second)
- W_{NPandRT} Width of Peak NP and RT (Second)
- Δt_r Change in Retention Time (Second)





• σ Standard Deviation





Constants, Functions, Measurements used

- Function: sqrt, sqrt(Number)
 Square root function
- Measurement: Time in Second (s)

 Time Unit Conversion
- Measurement: Volume in Liter (L)
 Volume Unit Conversion
- Measurement: Volumetric Flow Rate in Liter per Second (L/s)

 Volumetric Flow Rate Unit Conversion





Check other formula lists

- Number of Theoretical Plates
 Formulas
- Capacity factor Formulas
- Change in Retention Time and Volume Formulas
- Distribution Ratio Formulas G
- Length of Column Formulas
- Phase Formulas
- Relative and Adjusted Retention
 Formulas

- Resolution Formulas
- Retention Time Formulas
- Retention Volume Formulas
- Scaling Equation Formulas
- Standard Deviation Formulas
- Van Deemter Equation Formulas
- Volume and Concentration of Mobile and Stationary Phase Formulas

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