

# Important Relative and Adjusted Retention and Phase Formulas PDF



**Formulas  
Examples  
with Units**

## List of 13 Important Relative and Adjusted Retention and Phase Formulas

### 1) Adjusted Retention of First Component given Relative Retention Formula ↻

Formula

$$trC1' = \left( \frac{tr2'}{\alpha} \right)$$

Example with Units

$$1.1111s = \left( \frac{10s}{9} \right)$$

Evaluate Formula ↻

### 2) Adjusted Retention of Second Component given Relative Retention Formula ↻

Formula

$$trC2' = \left( \alpha \cdot tr1' \right)$$

Example with Units

$$45s = \left( 9 \cdot 5s \right)$$

Evaluate Formula ↻

### 3) Mobile Phase Travel Time given Capacity Factor Formula ↻

Formula

$$t_{CP} = \frac{t_r}{k' + 1}$$

Example with Units

$$3.25s = \frac{13s}{3 + 1}$$

Evaluate Formula ↻

### 4) Mobile Phase Travel Time through Column Formula ↻

Formula

$$t_C = \left( t_r - tr' \right)$$

Example with Units

$$11s = \left( 13s - 2s \right)$$

Evaluate Formula ↻

### 5) Molar Concentration of Third Component in First Phase Formula ↻

Formula

$$C_{P1} = \left( k_{DC}' \cdot C_{S2} \right)$$

Example with Units

$$273 \text{ mol/L} = \left( 10.5 \cdot 26 \text{ mol/L} \right)$$

Evaluate Formula ↻

### 6) Molar Concentration of Third Component in Second Phase Formula ↻

Formula

$$C_{P2} = \left( \frac{C_1}{k_{DC}'} \right)$$

Example with Units

$$1.9048 \text{ mol/L} = \left( \frac{20 \text{ mol/L}}{10.5} \right)$$

Evaluate Formula ↻



### 7) Partition Coefficient of Solute 1 given Relative Retention Formula

Formula

$$K_{C1} = \left( \frac{K_2}{\alpha} \right)$$

Example

$$1.6667 = \left( \frac{15}{9} \right)$$

Evaluate Formula 

### 8) Partition Coefficient of Solute 2 given Relative Retention Formula

Formula

$$K_{C2} = (\alpha \cdot K_1)$$

Example

$$54 = (9 \cdot 6)$$

Evaluate Formula 

### 9) Relative Retention given Adjusted Retention Times Formula

Formula

$$\alpha_R = \left( \frac{tr2'}{tr1'} \right)$$

Example with Units

$$2 = \left( \frac{10s}{5s} \right)$$

Evaluate Formula 

### 10) Relative Retention given Capacity Factor of Two Components Formula

Formula

$$\alpha_R = \left( \frac{k_2'}{k_1'} \right)$$

Example

$$1.4 = \left( \frac{3.5}{2.5} \right)$$

Evaluate Formula 

### 11) Relative Retention given Partition Coefficient of Two Components Formula

Formula

$$\alpha_R = \left( \frac{K_2}{K_1} \right)$$

Example

$$2.5 = \left( \frac{15}{6} \right)$$

Evaluate Formula 

### 12) Total Concentration of Solute in Aqueous Phase Formula

Formula

$$C_{aqP} = \left( \frac{C_o}{D} \right)$$

Example with Units

$$83.3333 \text{ mol/L} = \left( \frac{50 \text{ mol/L}}{0.6} \right)$$

Evaluate Formula 

### 13) Total Concentration of Solute in Organic Phase Formula

Formula

$$C_{orgP} = (D \cdot C_{aq})$$

Example with Units

$$24 \text{ mol/L} = (0.6 \cdot 40 \text{ mol/L})$$



Evaluate Formula 



## Variables used in list of Relative and Adjusted Retention and Phase Formulas above

- $C_1$  Concentration of Solute in Solvent 1 (Mole per Liter)
- $C_{aq}$  Concentration in Aqueous Phase (Mole per Liter)
- $C_{aqP}$  Concentration in Aqueous Solvent (Mole per Liter)
- $C_o$  Concentration in Organic Phase (Mole per Liter)
- $C_{orgP}$  Concentration in Organic Solvent (Mole per Liter)
- $C_{P1}$  Concentration of Solute in Phase1 (Mole per Liter)
- $C_{P2}$  Concentration of Solute in Phase2 (Mole per Liter)
- $C_{S2}$  Solute Concentration in Solvent2 (Mole per Liter)
- $D$  Distribution Ratio
- $K_1$  Partition Coefficient of Solute 1
- $K_2$  Partition Coefficient of Solute 2
- $K_{C1}$  Partition Coefficient of Comp 1
- $K_{C2}$  Partition Coefficient of Comp 2
- $k_{DC}$  Distribution Coefficient of Solution
- $k'$  Capacity Factor
- $k_1'$  Capacity Factor of Solute 1
- $k_2'$  Capacity Factor of Solute 2
- $t_C$  Unretained Solute Travel Time through Column (Second)
- $t_{CP}$  Unretained Solute Travel Time given CP (Second)
- $t_r$  Retention Time (Second)
- $t_r'$  Adjusted Retention Time (Second)
- $t_{r1}'$  Adjusted Retention Time of Solute 1 (Second)
- $t_{r2}'$  Adjusted Retention Time of Solute 2 (Second)

## Constants, Functions, Measurements used in list of Relative and Adjusted Retention and Phase Formulas above

- **Measurement: Time** in Second (s)  
Time Unit Conversion 
- **Measurement: Molar Concentration** in Mole per Liter (mol/L)  
Molar Concentration Unit Conversion 



- **trC1'** Adjusted Retention Time of Comp 1  
(Second)
- **trC2'** Adjusted Retention Time of Comp 2  
(Second)
- **$\alpha$**  Relative Retention
- **$\alpha_R$**  Actual Relative Retention



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