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Kinetics for Set of Two Parallel Reactions Formulas

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List of 11 Kinetics for Set of Two Parallel Reactions Formulas

Kinetics for Set of Two Parallel Reactions

1) Average Life-Time for Set of Two Parallel Reactions

Open Calculator

fx $$t_{1/2avg} = \frac{0.693}{k_1 + k_2}$$

ex $$7343.435s = \frac{0.693}{0.00000567s^{-1} + 0.0000887s^{-1}}$$

2) Concentration of Product B in Set of Two Parallel Reactions

Open Calculator

fx $$R_b = \frac{k_1}{k_1 + k_2} \cdot A_0 \cdot (1 - \exp(-(k_1 + k_2) \cdot t))$$

ex $$1.730614mol/L = \frac{0.00000567s^{-1}}{0.00000567s^{-1} + 0.0000887s^{-1}} \cdot 100mol/L \cdot (1 - \exp(-(0.00000567s^{-1} + 0.0000887s^{-1}) \cdot 360$$

3) Concentration of Product C in Set of Two Parallel Reactions

Open Calculator

fx $$R_C = \frac{k_2}{k_1 + k_2} \cdot A_0 \cdot (1 - \exp(-(k_1 + k_2)))$$

ex $$0.00887mol/L = \frac{0.0000887s^{-1}}{0.00000567s^{-1} + 0.0000887s^{-1}} \cdot 100mol/L \cdot (1 - \exp(-(0.00000567s^{-1} + 0.0000887s^{-1})))$$

4) Concentration of Reactant A after time t in Set of Two Parallel Reactions

Open Calculator

fx $$R_A = A_0 \cdot \exp(-(k_1 + k_2) \cdot t)$$

ex $$71.19611mol/L = 100mol/L \cdot \exp(-(0.00000567s^{-1} + 0.0000887s^{-1}) \cdot 3600s)$$

5) Initial Concentration of Reactant A for Set of Two Parallel Reactions

Open Calculator

fx $$A_0 = R_A \cdot \exp((k_1 + k_2) \cdot t)$$

ex $$84.97655mol/L = 60.5mol/L \cdot \exp((0.00000567s^{-1} + 0.0000887s^{-1}) \cdot 3600s)$$

6) Rate Constant for Reaction A to B for Set of Two Parallel Reactions

Open Calculator

$$k_1 = \frac{1}{t} \cdot \ln\left(\frac{A_0}{R_A}\right) - k_2$$

ex $5.1E^{-5}s^{-1} = \frac{1}{3600s} \cdot \ln\left(\frac{100mol/L}{60.5mol/L}\right) - 0.0000887s^{-1}$

7) Rate Constant for Reaction A to C in Set of Two Parallel Reactions

Open Calculator

$$k_2 = \frac{1}{t} \cdot \ln\left(\frac{A_0}{R_A}\right) - k_1$$

ex $0.000134s^{-1} = \frac{1}{3600s} \cdot \ln\left(\frac{100mol/L}{60.5mol/L}\right) - 0.00000567s^{-1}$

8) Ratio of Products B to C in Set of Two Parallel Reactions

Open Calculator

$$Rb{:}Rc = \frac{k_1}{k_2}$$

ex $0.063923 = \frac{0.00000567s^{-1}}{0.0000887s^{-1}}$

9) Time taken for Set of Two Parallel Reactions

Open Calculator

$$t_{1/2av} = \frac{1}{k_1 + k_2} \cdot \ln\left(\frac{A_0}{R_A}\right)$$

ex $5325.07s = \frac{1}{0.00000567s^{-1} + 0.0000887s^{-1}} \cdot \ln\left(\frac{100mol/L}{60.5mol/L}\right)$

10) Time taken to form Product B from Reactant A in Set of Two Parallel Reactions

Open Calculator

$$T_{PR} = \frac{k_1}{k_1 + k_2} \cdot A_0$$

ex $6008.265s = \frac{0.00000567s^{-1}}{0.00000567s^{-1} + 0.0000887s^{-1}} \cdot 100mol/L$

11) Time taken to form Product C from Reactant A in Set of Two Parallel Reactions

Open Calculator

$$T_{CtoA} = \frac{k_2}{k_1 + k_2} \cdot A_0$$

ex $93991.73s = \frac{0.0000887s^{-1}}{0.00000567s^{-1} + 0.0000887s^{-1}} \cdot 100mol/L$

Variables Used

- A_0 Initial Concentration of Reactant A *(Mole per Liter)*
- k_1 Reaction Rate Constant 1 *(1 Per Second)*
- k_2 Reaction Rate Constant 2 *(1 Per Second)*
- R_A Reactant A Concentration *(Mole per Liter)*
- R_b Concentration of Reactant B *(Mole per Liter)*
- R_C Concentration of Reactant C *(Mole per Liter)*
- **Rb:Rc** Ratio B to C
- **t** Time *(Second)*
- $t_{1/2av}$ Life Time for Parallel Reaction *(Second)*
- $t_{1/2avg}$ Average Life Time *(Second)*
- T_{CtoA} Time C to A for 2 Parallel Reaction *(Second)*
- T_{PR} Time for Parallel Reaction *(Second)*

Constants, Functions, Measurements used

- Function: **exp**, exp(Number)
  Exponential function
- Function: **ln**, ln(Number)
  Natural logarithm function (base e)
- Measurement: **Time** in Second (s)
  Time Unit Conversion
- Measurement: **Molar Concentration** in Mole per Liter (mol/L)
  Molar Concentration Unit Conversion
- Measurement: **First Order Reaction Rate Constant** in 1 Per Second (s^{-1})
  First Order Reaction Rate Constant Unit Conversion

Check other formula lists

- **Consecutive Reactions Formulas**

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