Important Formulas on Enzyme Kinetics PDF



1) Catalytic Rate Constant from Michaelis Menten Kinetics Equation Formula 🕝

FormulaExample with UnitsEvaluate Formula
$$k_{cat_MM} = \frac{V_0 \cdot (K_M + S)}{[E_0] \cdot S}$$
 $0.0135_{s^{-1}} = \frac{0.45 \text{ mol/L}^* s \cdot (3 \text{ mol/L} + 1.5 \text{ mol/L})}{100 \text{ mol/L} \cdot 1.5 \text{ mol/L}}$

2) Catalytic Rate Constant if Substrate Concentration is higher than Michaelis Constant Formula



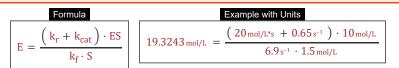
3) Dissociation Constant of Enzyme given Modifying Factor of Enzyme Formula 🕝

Formula	Example with Units
$K_{ei} = \frac{I}{\alpha - 1}$	$2.25 \text{mol/L} = \frac{9 \text{mol/L}}{5 - 1}$

4) Dissociation Rate Constant in Enzymatic Reaction Mechanism Formula 🕝

Formula	Example with Units		
$K_{\rm D} = \frac{k_{\rm r}}{k_{\rm f}}$	$2.8986 \text{mol/L} = \frac{20 \text{mol/L*s}}{6.9 \text{s}^{-1}}$		

5) Enzyme Catalyst Concentration given Forward, Reverse, and Catalytic Rate Constants Formula





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Evaluate Formula (

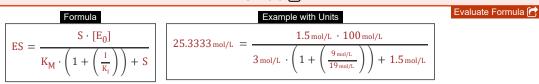
Evaluate Formula

Evaluate Formula

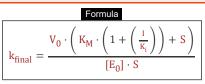
6) Enzyme Concentration from Michaelis Menten Kinetics equation Formula 🕝

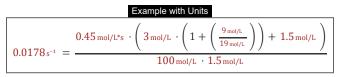
$[E_{i}] = \frac{V_{0} \cdot (K_{M} + S)}{k_{L} + S} = \frac{0.45 \text{ mol/L}^{*} \cdot (3 \text{ mol/L} + 1.5 \text{ mol/L})}{0.65 \text{ s}^{-1} \cdot 1.5 \text{ mol/L}}$	Formula	Example with Units
	$[E_{1}] = \frac{V_{0} \cdot (K_{M} + S)}{V_{0} \cdot (K_{M} + S)}$	2.0769 mol/L =
incat 5	$k_{cat} \cdot S$	0.65 s ⁻¹ · 1.5 mol/L

7) Enzyme Substrate Complex Concentration for Competitive Inhibition of Enzyme Catalysis Formula



8) Final Rate Constant for Competitive Inhibition of Enzyme Catalysis Formula 🕝



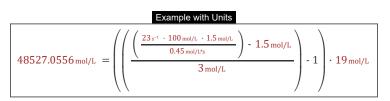


9) Forward Rate Constant given Dissociation Rate Constant Formula 🕝



10) Inhibitor Concentration for Competitive Inhibition of Enzyme Catalysis Formula 🕝

Formula $I_{IEC} = \left(\left(\frac{\left(\frac{k_2 \cdot [E_0] \cdot S}{V_0} \right) - S}{K_M} \right) - 1 \right) \cdot K_i$





Evaluate Formula 🦳

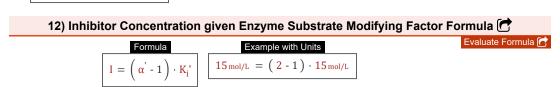
Evaluate Formula 🦳

Evaluate Formula 🦳

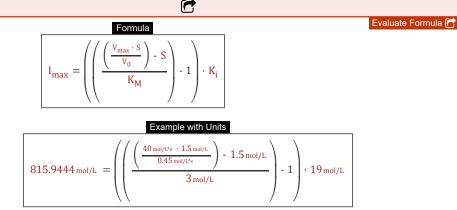
Evaluate Formula

11) Inhibitor Concentration given Apparent Initial Enzyme Concentration Formula 🕝 👘

FormulaExample with UnitsEvaluate Formula
$$I_{CI} = \left(\left(\frac{[E_0]}{E0^{app}} \right) - 1 \right) \cdot K_i$$
 $31647.6667 \text{ mol/L} = \left(\left(\frac{100 \text{ mol/L}}{0.06 \text{ mol/L}} \right) - 1 \right) \cdot 19 \text{ mol/L}$ 19 mol/L



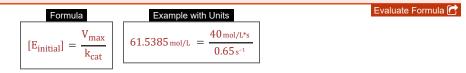
13) Inhibitor Concentration in Competitive Inhibition given Maximum Rate of System Formula



14) Initial Concentration of Enzyme in presence of Inhibitor by Enzyme Conservation Law Formula

Formula	Example with Units	Evaluate Formula 🕝
$[E_{\text{initial}}] = (E + ES + EI)$	64 mol/L = (25 mol/L + 10 mol/L + 29 mol/L)	

15) Initial Enzyme Concentration if Substrate Concentration is Higher than Michaelis Constant Formula 🕝



 16) Initial Enzyme Concentration given Dissociation Rate Constant Formula

 Formula
 Evaluate Formula

 Formula
 Evaluate Formula

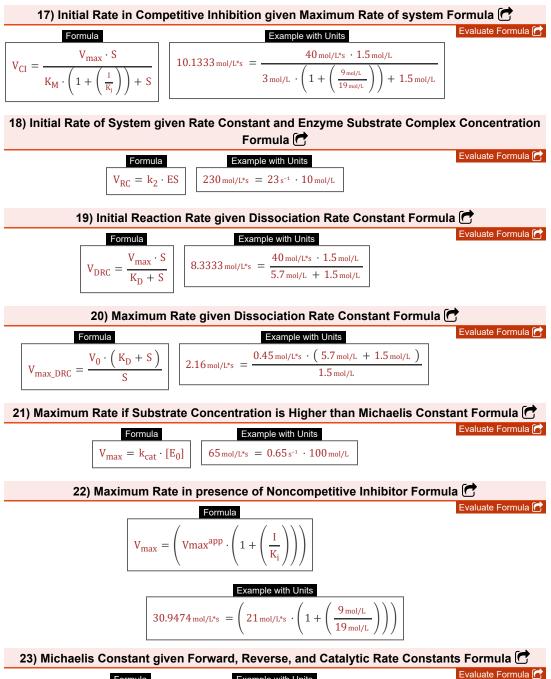
 Formula
 Evaluate Formula

 Image: Solution Rate Constant Formula

 Evaluate Formula

 Evaluate Formula

 Image: Solution Rate Constant Form

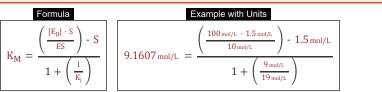


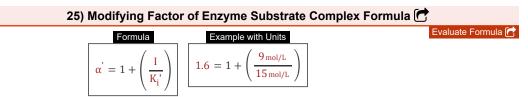
 Formula
 Example with Units

 $K_{\rm M} = \frac{k_{\rm r} + k_{\rm cat}}{k_{\rm f}}$ 2.8986 mol/L = $\frac{20 \, \text{mol/L*s} + 0.65 \, \text{s}^{-1}}{6.9 \, \text{s}^{-1}}$

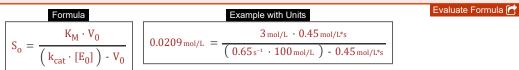


24) Michaelis Constant in Competitive Inhibition given Enzyme Substrate Complex Concentration Formula





26) Substrate Concentration given Catalytic Rate Constant and Initial Enzyme Concentration Formula





Evaluate Formula

Variables used in list of Important Formulas on Enzyme Kinetics above

- [E₀] Initial Enzyme Concentration (Mole per Liter)
- [E_i] Initial Concentration of Enzyme (*Mole per Liter*)
- [E_{initial}] Enzyme Concentration Initially (Mole per Liter)
- E Catalyst Concentration (Mole per Liter)
- **E0**^{app} Apparent Initial Enzyme Concentration (*Mole per Liter*)
- El Enzyme Inhibitor Complex Concentration (Mole per Liter)
- ES Enzyme Substrate Complex Concentration (Mole per Liter)
- I Inhibitor Concentration (Mole per Liter)
- I_{CI} Inhibitor Concentration for CI (Mole per Liter)
- Ilec Inhibitor Concentration given IEC (Mole per Liter)
- Imax Inhibitor Concentration given Max Rate
 (Mole per Liter)
- k₂ Final Rate Constant (1 Per Second)
- k_{cat} Catalytic Rate Constant (1 Per Second)
- k_{cat_MM} Catalytic Rate Constant for MM (1 Per Second)
- K_D Dissociation Rate Constant (Mole per Liter)
- K_{ei} Enzyme Inhibitor Dissociation Constant given MF (*Mole per Liter*)
- k_f Forward Rate Constant (1 Per Second)
- k_{final} Final Rate Constant for Catalysis (1 Per Second)
- K_i Enzyme Inhibitor Dissociation Constant (Mole per Liter)
- K_i' Enzyme Substrate Dissociation Constant (Mole per Liter)
- K_M Michaelis Constant (Mole per Liter)
- k_r Reverse Rate Constant (Mole per Liter Second)

Constants, Functions, Measurements used in list of Important Formulas on Enzyme Kinetics above

- Measurement: Molar Concentration in Mole per Liter (mol/L)
 Molar Concentration Unit Conversion
- Measurement: Reaction Rate in Mole per Liter Second (mol/L*s) Reaction Rate Unit Conversion
- Measurement: First Order Reaction Rate
 Constant in 1 Per Second (s⁻¹)
 First Order Reaction Rate Constant Unit
 Conversion

- S Substrate Concentration (Mole per Liter)
- So Concentration of Substrate (Mole per Liter)
- V₀ Initial Reaction Rate (Mole per Liter Second)
- V_{CI} Initial Reaction Rate in CI (Mole per Liter Second)
- VDRC Initial Reaction Rate given DRC (Mole per Liter Second)
- Vmax Maximum Rate (Mole per Liter Second)
- Vmax DRC Maximum Rate given DRC (Mole per Liter Second)
- V_{RC} Initial Reaction Rate given RC (Mole per Liter Second)
- Vmax^{app} Apparent Maximum Rate (Mole per Liter Second)
- α Enzyme Modifying Factor
- α Enzyme Substrate Modifying Factor



- Important Enzyme Kinetics
 Formulas
- Important First Order Reaction
 Formulas
- Important Second Order Reaction
 Formulas
- Important Zero Order Reaction
 Formulas

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HCF of two numbers

Improper fraction C

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