

Seventh directed work of biochemistry

Enzymology concepts

Exercise 1. Answer true or false

- Enzymes are reaction catalysts.
- Enzymes have a protein structure.
- The fixation of the substrate on the amino acids of the active site of the enzymes is carried out by weak bonds.
- The Michaelis constant (K_m) accounts for the affinity of enzymes for a substrate, corresponding to the enzyme concentration which gives half the maximum speed.

Exercise 2.

We study the kinetics of the carboxypeptidase at different substrate concentrations. The results are given in the following table:

Speed in mg of product.min ⁻¹	167	143	111	111	67
[substrate] en M	0.0713	0.0521	0.0384	0.0285	0.0125

- Calculate the kinetic constants V_{max} and K_m of the enzyme.

Exercise 3.

- Enzyme A: K_m for substrate X = 10 M
- Enzyme B: K_m for substrate X = 10⁻¹ M

Determine which of these 2 enzymes has the most affinity for substrate X.

Exercise 4.

Pyruvate dehydrogenase catalyzes the oxidative decarboxylation of pyruvate to produce Acetyl CoA. This reaction is inhibited by diacetyl.

The following table gives the initial speeds of the reaction that were measured at different concentrations of pyruvate and in the presence or absence of diacetyl:

	[pyruvate] (μM)				
	25	50	100	200	400
Speed in the absence of inhibitor ($\mu\text{M}/\text{min}$)	0.03	0.038	0.044	0.048	0.05
Speed in the presence of inhibitor ($\mu\text{M}/\text{min}$) [Diacetyl]= 0.5mM	0.02	0.029	0.0375	0.044	0.048

- Determine the maximum speeds and the Michaelis constants in the absence of K_m and in the presence of inhibitor K_m' .
- Deduce the type of inhibition.