

8.1 Metabolism

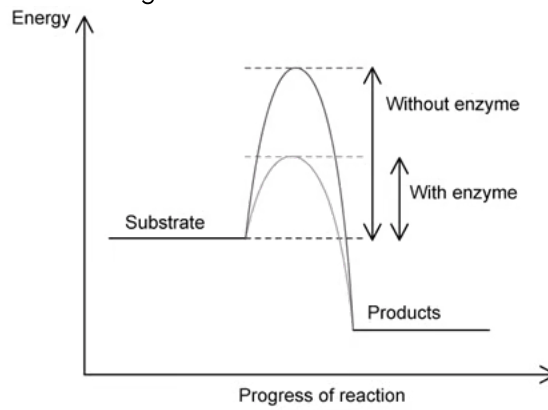
Question Paper

Course	DP IB Biology
Section	8. Metabolism, Cell Respiration & Photosynthesis (HL Only)
Topic	8.1 Metabolism
Difficulty	Easy

Time allowed: 60
Score: /46
Percentage: /100

Question 1a

a)
The graph below shows how enzymes affect biological reactions.



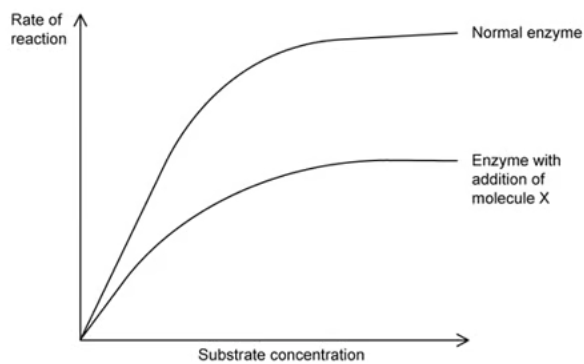
Use the graph and your own knowledge of enzyme function to explain how enzymes function as biological catalysts.

[1 mark]

[1 mark]

Question 1b

b)
The graph shows how the addition of a molecule named here as molecule **X** affects the rate of an enzyme-controlled reaction.



Describe how the addition of molecule **X** affects the rate of reaction in the graph.

[2 marks]

[2 marks]

Question 1c

c)

The image below shows how molecule **X** interacts with the enzyme.



Use the image to explain the results shown in the graph in part (b).

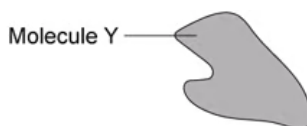
[2 marks]

[2 marks]

Question 1d

d)

The image below shows another molecule, molecule **Y**.



Suggest how molecule **Y** might interact with the enzyme shown in part (c).

[1 mark]

[1 mark]

Question 1e

e)

Sketch a line on the graph from part (b) to show how molecule **Y** might affect the rate of reaction.

[2 marks]

[2 marks]

Question 2a

a)

Define the term 'bioinformatics'.

[1 mark]

[1 mark]

Question 2b

b)

The parasite *Plasmodium* causes the disease malaria when injected into the human bloodstream.

Using bioinformatics, scientists can analyse the proteome of the *Plasmodium* parasite to better understand its metabolic pathways including the enzymes which catalyse them.

Define what is meant by the term proteome.

[1 mark]

[1 mark]

Question 2c

c)

So far over 300,000 chemicals have been screened to identify 19 new chemicals that can be used to treat malaria.

Calculate the percentage chance of finding a chemical that can be used to treat malaria.

Give your answer in standard form.

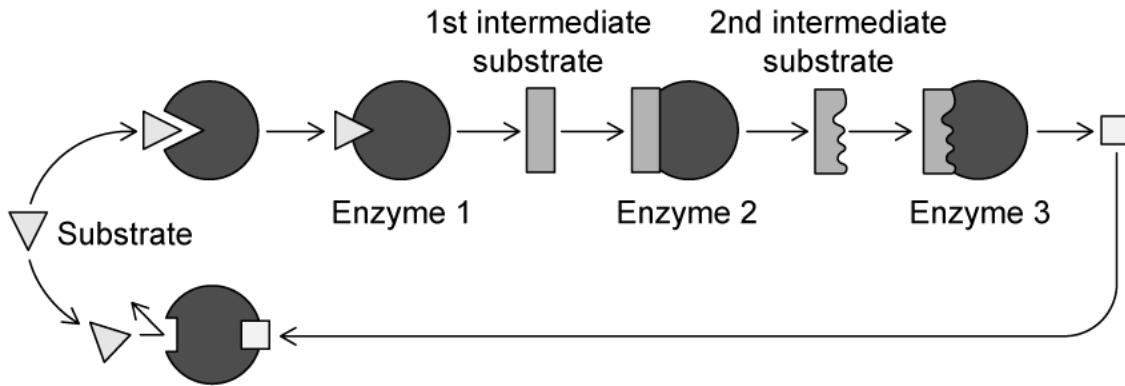
[3 marks]

[3 marks]

Question 3a

a)

State, with a reason, the type of enzyme inhibition shown in the image below.



[2 marks]

[2 marks]

Question 3b

b)

Explain what is meant by allosteric inhibition.

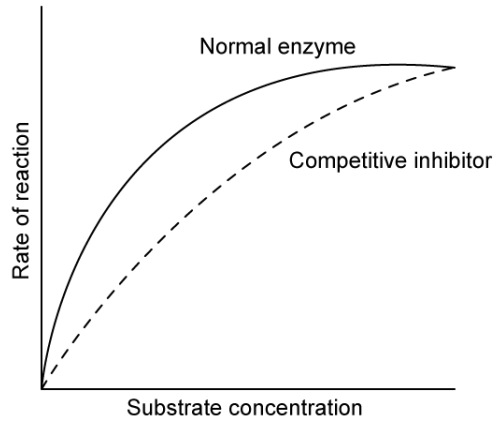
[3 marks]

[3 marks]

Question 3c

c)

The graph below shows the relationship between substrate concentration and rate of reaction for a normal enzyme and a competitive inhibitor.



Explain the effect competitive inhibition has on the rate of reaction.

[3 marks]

[3 marks]

Question 3d

d)

State an example of a competitive and non-competitive inhibitor.

[2 marks]

[2 marks]

Question 4a

a)

Metabolic pathways exist in all living organisms.

Explain what is meant by a metabolic pathway.

[3 marks]

[3 marks]

Question 4b

b)

Describe the differences between anabolism, catabolism and metabolism.

[3 marks]

[3 marks]

Question 4c

c)

Metabolic paths require enzymes. Hexose kinase is the initial enzyme needed during glycolysis, it catalyses the phosphorylation of glucose by ATP. This reaction would occur without the presence of hexose kinase.

Explain the role hexose kinase has in this reaction.

[2 marks]

[2 marks]

Question 5a

One mark is available for clarity of communication throughout this question.

a)

This question is about metabolic pathways.

i) Describe the meaning of the term metabolic pathway.

[3 marks]

ii) Outline how end-product inhibition can act to limit a metabolic pathway.

[4 marks]

[7 marks]

Question 5b

b)

State some of the ways scientists can use bioinformatics to help with their research.

[4 marks]

[4 marks]

Question 5c

c)

Compare and contrast the allosteric and active sites of an enzyme.

[4 marks]**[4 marks]**