Practice Question Set For A-Level
Subject : Biology
Paper-1 Topic:1 Biological Molecules

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Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

Q1.

(a) A non-competitive inhibitor decreases the rate of an enzyme-controlled reaction.

Explain how.

_____

_____

_____

_____

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_____

(3)

(b) A scientist investigated the hydrolysis of the protein casein.

The scientist:

- mixed a solution of a protease enzyme with a solution of casein
- then measured the casein concentration in the mixture at intervals
- controlled all relevant variables appropriately.

For this investigation, identify:

the independent variable _____

_____

_____

the dependent variable _____

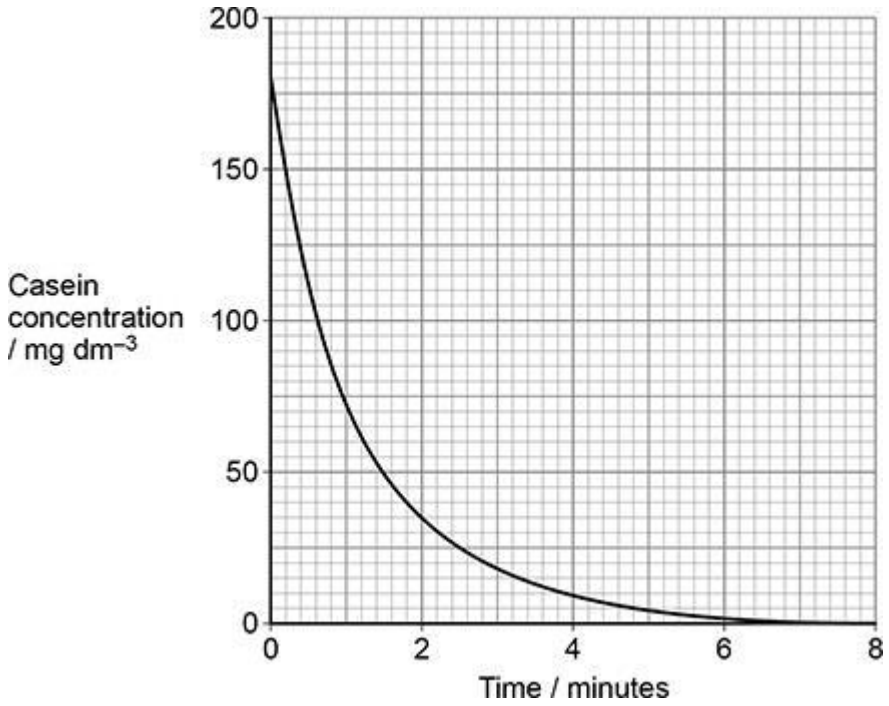
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_____

(2)

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(c) The graph below shows the scientist's results.



Use the graph above to determine the rate of casein hydrolysis at 2 minutes.

Show how you obtained your answer.

Answer _____ mg dm^{-3} minute^{-1}

(2)

(d) The scientist repeated the investigation but increased the temperature to the optimum temperature for this protease.

Sketch a line on the graph above showing the results you predict if the investigation is repeated at the optimum temperature for the protease.

(2)

(Total 9 marks)

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Q2.

Read the following passage.

DNA is a stable molecule but, even under normal cell conditions, spontaneous changes occur to the DNA nucleotide sequence. One example of a spontaneous change occurs when a cytosine base in a guanine–cytosine nucleotide pair is changed to a uracil base. This produces a guanine–uracil nucleotide pair in the DNA molecule. Scientists estimate this type of spontaneous change occurs to 100 guanine–cytosine nucleotide pairs in the genome of healthy human cells every day.

In healthy cells, enzyme-controlled processes repair these spontaneous changes in the DNA molecule by changing uracil bases back to cytosine bases. If these repairs do **not** happen, the uracil DNA nucleotide attracts an adenine DNA nucleotide when the DNA is replicated in the cell cycle. A mutation of the original DNA has now occurred.

Healthy cells with damaged DNA produce enzyme **X**. This enzyme slows the cell cycle by delaying the start of DNA replication. People with the disease ataxia telangiectasia (AT) do not produce functional enzyme **X**. Mutations occur at a higher rate in people with AT.

Use the information in the passage and your own knowledge to answer the following questions.

(a) Give **one** similarity in structure between a guanine–cytosine nucleotide pair and a guanine–uracil nucleotide pair in a DNA molecule (lines 3–5).

Do **not** refer to guanine in your answer.

_____

_____

_____

(1)

(b) The DNA in a human genome contained 3×10^9 nucleotide pairs.

Assume 40% of these nucleotide pairs are guanine–cytosine nucleotide pairs.

Use this information and lines 5–7 to calculate the percentage of guanine–cytosine nucleotide pairs that change to guanine–uracil nucleotide pairs in this genome every day.

Give your answer in standard form.

Show your working.

Answer _____ %

(2)

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(c) The type of mutation that occurs when ‘repairs do **not** happen’ (lines 10–11) may still produce a functional protein.

Suggest and explain why.

(4)

(d) Suggest and explain why ‘mutations occur at a higher rate’ in people with AT (lines 15–16).

(3)

(Total 10 marks)

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