2018 Biomolecules and Enzymes MCQ

2018 / H2 / ACJC PRELIM / P1 Q4

1 Proteins can be categorised as globular or fibrous, depending on their structure.

How many of the following statements describes fibrous proteins only?

	1	Monomers are linked by peptide bonds formed during translation
	2	Long molecules which are insoluble in water
	3	Helical molecules consisting of non-repeating sequences of amino acids
	4	Contains hydrogen bonds between polypeptides

A 0

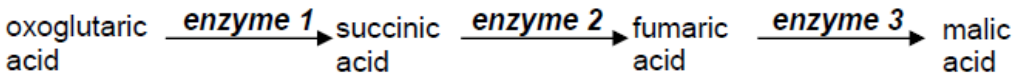
B 1

C 2

D 3

2018 / H2 / ACJC PRELIM / P1 Q5

2 Malic acid is produced by a series of enzyme-catalysed reactions.



The addition of malonic acid results in an accumulation of succinic acid, a near absence of both fumaric acid and malic acid, and has no effect on the concentration of oxoglutaric acid.

Further addition of fumaric acid results in the formation of malic acid.

What does this information indicate about malonic acid?

A It is an inhibitor of enzyme 1.

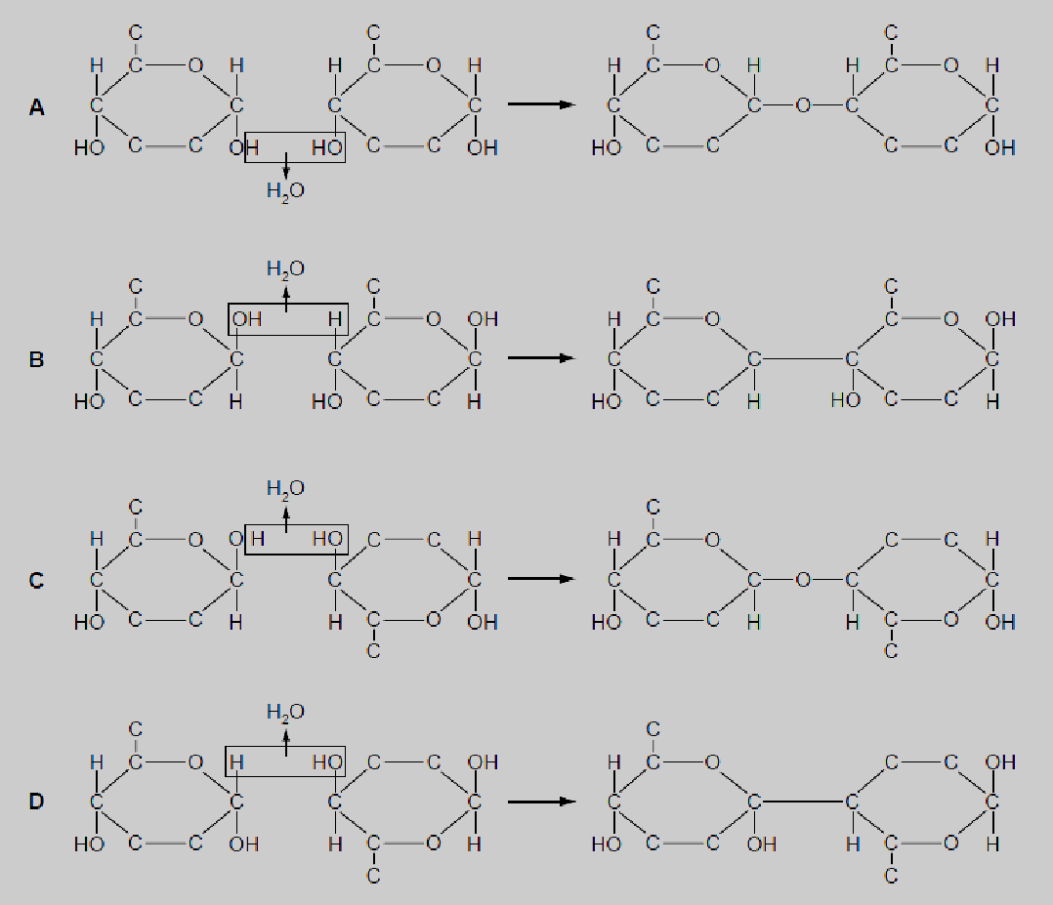
B It catalyses the formation of succinic acid.

C It is an inhibitor of enzyme 2.

D It reacts with fumaric acid.

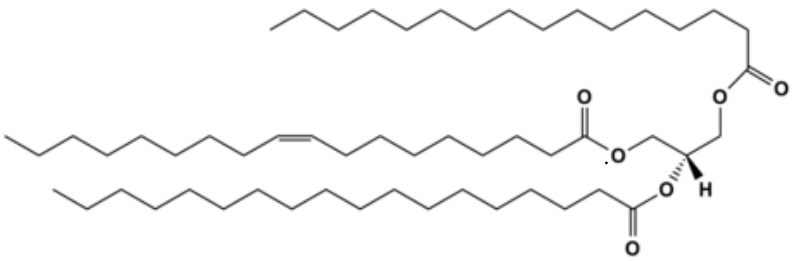
2018 / H2 / AJC PRELIM / P1 Q2

3 Which diagram shows the linking of two monomers together to form cellulose?



2018 / H2 / AJC PRELIM / P1 Q3

4 The diagram shows the structure of a lipid molecule.



Which statements are **not** correct?

1 The fatty acid occupying the central (second) position of the lipid molecule has a molecular formula of $C_{16}H_{32}O_2$, while the fatty acid occupying the other two positions has a molecular formula of $C_{18}H_{34}O_2$.

2 More ATP can be obtained from the lipid molecule than equal mass of glycogen.

3 The molecule is able to dissolve in an aqueous medium due to the presence of polar bonds.

4 The molecule increases fluidity of membranes as it contains a kink.

A 1 and 4

B 2 and 3

C 3 and 4

D 1, 3 and 4

2018 / H2 / AJC PRELIM / P1 Q5

5 Human hair is made up from bundles of a fibrous protein called keratin, which is similar to collagen.

The diagram shows the folded structure of keratin polypeptide chain, which forms the basic unit of hair fibre structure.

When hair is wet, it can lengthen temporarily due to the breaking of bonds in the folded keratin polypeptide chain. When it dries, the hair gradually returns to its original length.

What are broken to produce this length of the keratin chain structure?

A peptide bonds

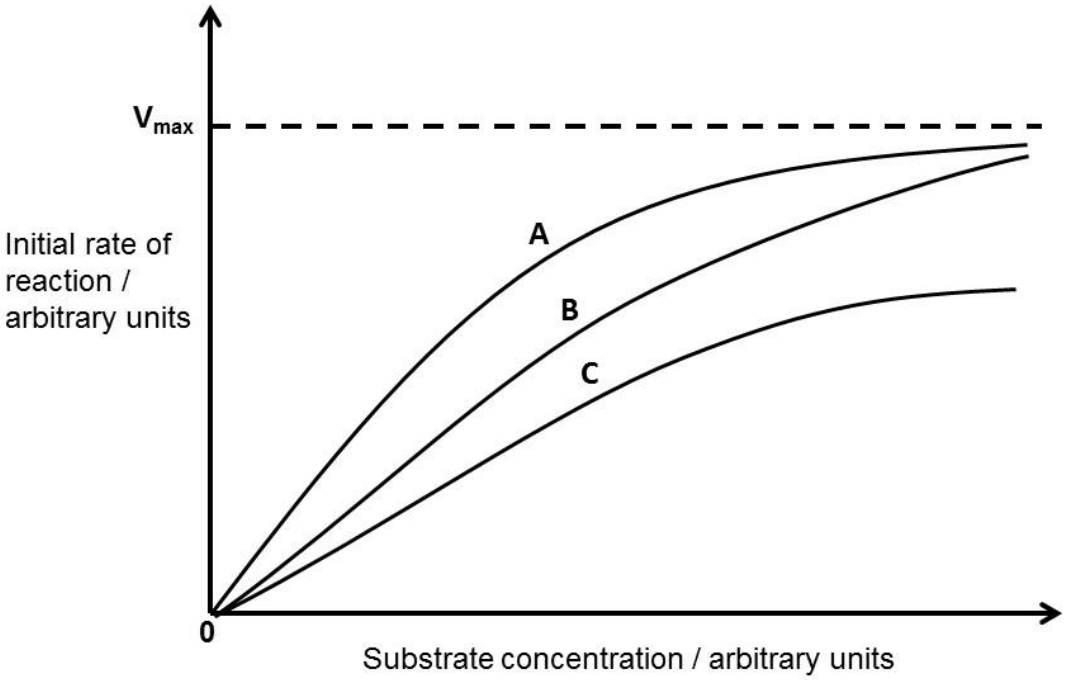
B disulfide bonds

C hydrophobic interactions

D hydrogen bonds

2018 / H2 / AJC PRELIM / P1 Q6

6 The diagram shows the effect of increasing substrate concentration on the rate of an enzyme-catalysed reaction at different concentrations of an inhibitor of the enzyme.



A: no inhibitor added **B**: 0.05% inhibitor added **C**: 0.1% inhibitor added

Which statements correctly explain the results of this investigation?

1 The inhibitor is a competitive inhibitor.

2 The inhibitor is a non-competitive inhibitor.

3 Adding 0.1% inhibitor lowers the effective enzyme concentration by altering enzyme tertiary structure, therefore the maximal rate of reaction cannot be restored at high substrate concentration.

4 Increasing inhibitor concentration results in the inhibitor being able to compete effectively with the substrate molecules to form more enzyme – inhibitor complexes, therefore higher concentration of inhibitor leads to rate of reaction not reaching maximum at high substrate concentration.

A 1 and 4

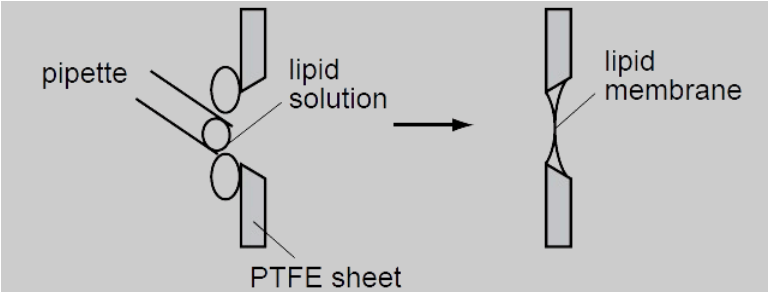
B 1 and 3

C 2 and 3

D 2 and 4

2018 / H2 / DHS PRELIM / P1 Q3

7 Lipid membranes can be formed in the laboratory by painting phospholipids over a support (PTFE sheet) with a hole in it.



Such a lipid membrane is impermeable to water-soluble materials including charged ions such as Na^+ or K^+. In one experiment with Na^+ ions, no current flowed across the membrane until a substance called gramicidin was added.

Which statement is consistent with this information and your knowledge of membrane structure?

Gramicidin becomes incorporated into the membrane and is _____.

A a carbohydrate molecule found only on the outside of the membrane.

B a non-polar lipid which passes all the way through the membrane.

C a protein molecule with both hydrophilic and hydrophobic regions.

D a protein molecule which has only hydrophobic regions.

2018 / H2 / DHS PRELIM / P1 Q4

8 Which of the following is / are ***TRUE*** of triglycerides and phospholipids?

1 Both contain glycerol.

2 Both are not amphipathic.

3 Triglycerides have a higher carbon content than phospholipids for storage purposes.

4 Phospholipids have hydrophilic regions to interact with cell cytoplasm unlike triglycerides.

5 Triglycerides are formed from glycerol and fatty acids but phospholipids are formed from glycerol and phosphoric acid only.

A 1, 3 and 5

B 1, 2 and 3

C 1, 3 and 4

D 2, 3 and 4

2018 / H2 / DHS PRELIM / P1 Q5

9 Which set of statements correctly describes haemoglobin?

A	Four polypeptide chains, each containing a prosthetic group	Iron ions can associate with oxygen forming oxyhaemoglobin	In each chain, hydrophobic R groups of amino acids point towards the centre of the molecule	At 50% saturation, two oxygen molecules are transported by the molecule
B	Polypeptide chains interact to produce a globular chain	Each chain contains a prosthetic group of amino acids surrounding an iron ion	Two identical alpha chains and two identical beta chains	Each chain can transport an oxygen molecule
C	Polypeptide chains interact to produce an almost spherical molecule	An iron ion is present within each haem group	Quaternary structure of two alpha chains and two beta chains	Each molecule can transport a total of four oxygen atoms
D	Polypeptide chains produce a loose helical shape, which curls to form a spherical molecule	Iron ions in the molecule can bind reversibly with oxygen	In each chain, hydrophobic R groups of amino acids surround the iron ion	Each molecule can transport a total of eight oxygen atoms

2018 / H2 / DHS PRELIM / P1 Q6

10 The flowchart below shows part of an enzyme-catalysed sequence which involves 4 compounds (W – Z) and 3 enzymes (E1 – E3).

The addition of another compound M results in no change in the concentration of compound W, an accumulation of compound X, and a near absence of both compound Y and compound Z.

What does this information indicate about the mode of action of compound M, and which is a method by which the production of compound Z can be increased in the presence of compound M?

	Mode of action of compound M	**Method to increase production of compound Z**
A	It inhibits E1.	Increase concentration of compound X in the reaction mixture.
B	It activates E1.	Increase concentration of E2 in the reaction mixture.
C	It inhibits E2.	Increase concentration of compound Y in the reaction mixture.
D	It inhibits E3.	Increase concentration of compound Y in the reaction mixture.

E1

2018 / H2 / EJC PRELIM / P1 Q1

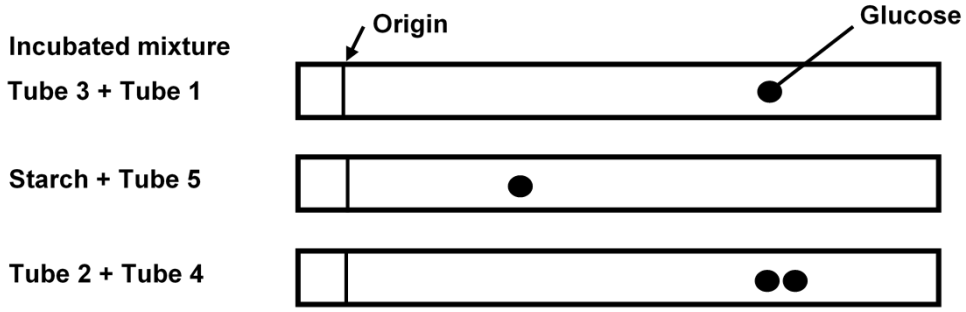
11 A lab technician has 5 tubes containing unknown compounds. However, he knows that each tube contains only either a carbohydrate or enzyme. To determine the identities of the compounds in the 5 tubes, the lab technician conducted various tests and he made the following observations.

I Sample in tube 2 is soluble in water. Sample in tube 3 was insoluble in water.

II Tube 5 tested positive with Biuret's test.

III Contents of all 5 samples tested negative with Benedict's test.

IV However, after he mixed and incubated the contents of certain tubes together, a positive result was obtained for Benedict's test. The mixtures were also subjected to paper chromatography, and the results were shown below.



Which of the following correctly shows the contents of each tube?

	tube 1	tube 2	tube 3	tube 4	tube 5
A	amylase	cellulose	sucrose	cellulase	sucrose
B	cellulase	sucrose	cellulose	sucrase	amylase
C	cellulose	sucrose	cellulose	sucrase	amylase
D	sucrose	cellulose	sucrase	amylase	cellulase

2018 / H2 / EJC PRELIM / P1 Q2

12 The graph below shows the effect of increasing substrate concentrations on the activity of an allosteric enzyme under optimum conditions.

Which of the following statements is correct?

A There is low kinetic energy at **X** to overcome the activation energy, thus resulting in a low rate of reaction.

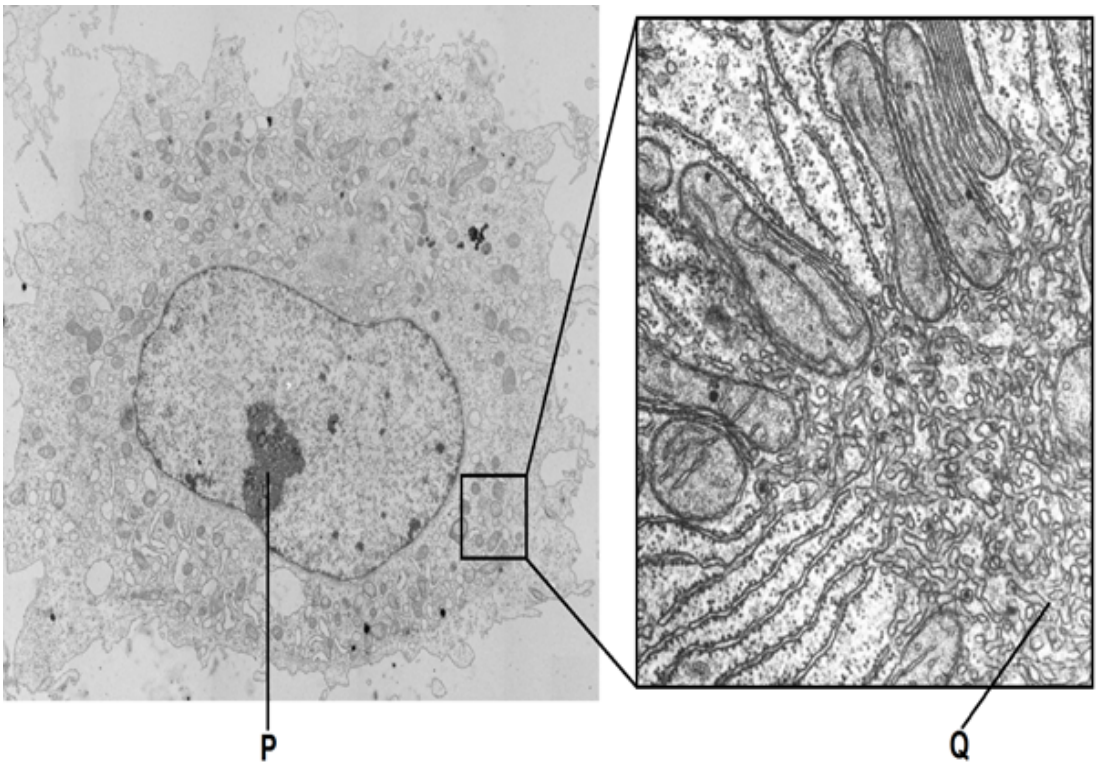
B Rate of reaction increases at a faster rate at **Y** as the allosteric activator outcompetes the allosteric inhibitor to bind to the allosteric site.

C At **Z**, enzyme molecules are in the active state and active sites are saturated.

D Substrate concentration is the limiting factor at **X** and **Y** but temperature is the limiting factor at **Z**.

2018 / H2 / EJC PRELIM / P1 Q3

13 The diagram on the left below shows the electron-micrograph of a cell found in a healthy individual. A region of the cell, indicated by the box, is magnified and shown in the diagram on the right.

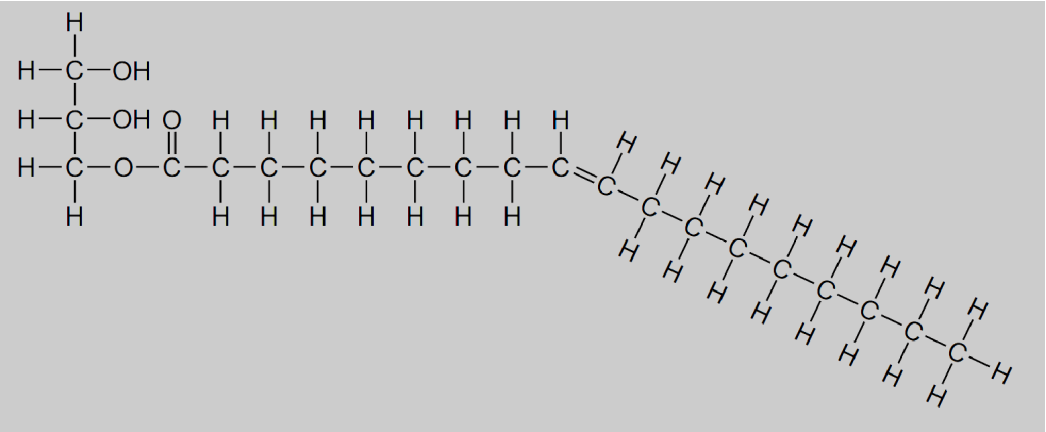


Which of the following shows the correct identities and functions of **P** and **Q**?

	Identity of P	**Function of P**	**Identity of Q**	**Function of Q**
A	Nucleosome	Transcription of rRNA	Smooth ER	Detoxification
B	Nucleosome	Assembly of ribosomal subunits	Secretary vesicles	Storage of Ca^{2+}
C	Nucleolus	Assembly of ribosomal subunits	Smooth ER	Synthesis of lipids
D	Nucleolus	Transcription of rRNA	Secretary vesicles	Modification of protein

2018 / H2 / IJC PRELIM / P1 Q3

14 The diagram shows a triglyceride molecule that has been partially hydrolysed.



What will be the products of the total hydrolysis of the molecule shown?

A a molecule of glycerol and a saturated fatty acid molecule only

B a molecule of glycerol and an unsaturated fatty acid molecule only

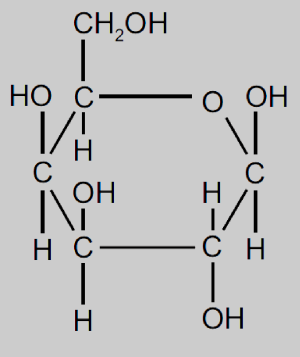
C a molecule of glycerol and three fatty acid molecules

D a molecule of water, a molecule of glycerol and a fatty acid molecule

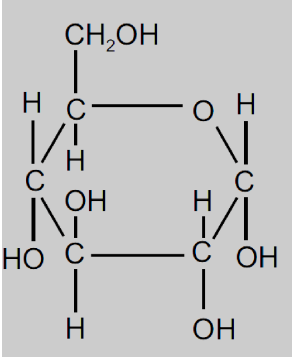
2018 / H2 / IJC PRELIM / P1 Q5

15 Which of the following shows a β-glucose?

A

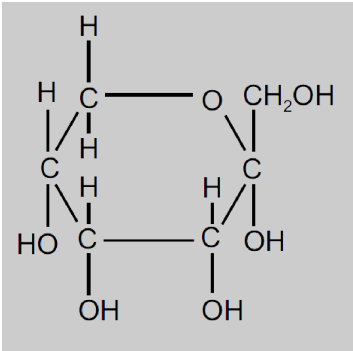


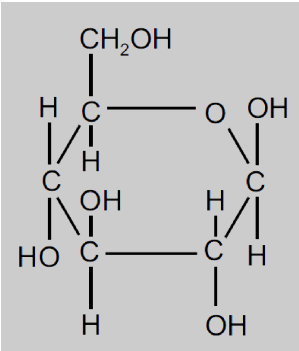
B



C

D





2018 / H2 / IJC PRELIM / P1 Q7

16 A metabolic pathway is

enzyme 1 enzyme 2 enzyme 3

reactant substance X substance Y end product

What would be the effect of adding a small amount of a non-competitive inhibitor of enzyme 2?

A Enzyme 2 would be partially denatured.

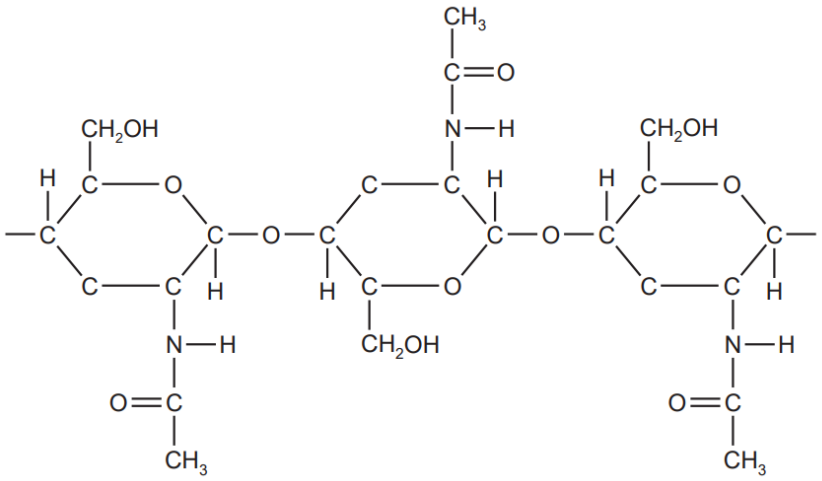
B Substance X would increase in concentration.

C Substance Y would no longer be formed.

D The initial reactant would no longer be metabolised.

2018 / H2 / JJC PRELIM / P1 Q3

17 The diagram shows the structure of the polysaccharide chitin which is found in the cell wall of fungi.



Which statements are correct for chitin and for cellulose?

1 The monomers are joined by 1, 4 glycosidic bonds.

2 Every second monosaccharide in the polysaccharide chain is rotated by 180°.

3 The polysaccharide contains the elements carbon, hydrogen, oxygen and nitrogen.

A 1, 2 and 3

B 1 and 2 only

C 1 and 3 only

D 2 only

2018 / H2 / JJC PRELIM / P1 Q4

18 The cells in the roots of beetroot plants contain a red pigment.

When pieces of root tissue are soaked in cold water, some of the red pigment leaks out of the cells into the water.

An experiment was carried out to investigate the effect of temperature on the loss of red pigment from the root cells. It was found that the higher the temperature of the water, the higher the rate of loss of red pigment from the root cells.

Which of these statements could explain this trend?

1 Enzymes in the cells denature as the temperature increases, so the pigment can no longer be used for reactions inside the cells and diffuses out.

2 As the temperature increases, the tertiary structure of protein molecules in the cell surface membrane changes, increasing the permeability of the membrane.

3 Phospholipid molecules gain kinetic energy as temperature rises, increasing the fluidity of the phospholipid bilayer and allowing pigment molecules to diffuse out more easily.

A 1 and 2

B 2 and 3

C 2 only

D 3 only

2018 / H2 / JJC PRELIM / P1 Q5

19 The R group of the amino acid serine is $-CH_2-OH$. The R group of the amino acid alanine is $-CH_3$. Where would you expect to find these amino acids in a globular protein soluble in aqueous solution?

A Serine would be in the interior, and alanine would be on the exterior of the globular protein.

B Alanine would be in the interior, and serine would be on the exterior of the globular protein.

C Both serine and alanine would be in the interior of the globular protein.

D Both serine and alanine would be in the interior and on the exterior of the globular protein.

2018 / H2 / JJC PRELIM / P1 Q6

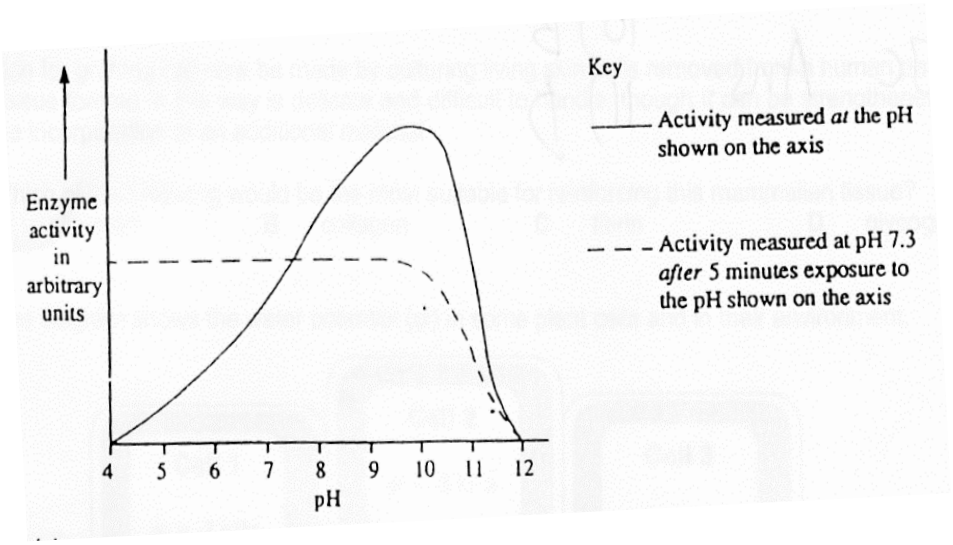
20 Which row correctly describes the structure of collagen?

A	covalent bonds hold the polypeptides within the triple helices together	about one third of the amino acids in a molecule are glycine	collagen does not have a quaternary structure
B	each of the three polypeptide strands forms a right-handed helix	there is a high proportion of the amino acids proline and glycine	the triple helices are insoluble in water
C	the polypeptides in a triple helix are held together by hydrogen bonds	the triple helices are cross bonded to one another by hydrogen bonds	the glycine side chains are always on the outside of the helix

D	three polypeptide helices are twisted together into a right-handed triple helix	triple helices cross bond to one another with staggered ends	every third amino acid in a polypeptide is usually glycine

2018 / H2 / JJC PRELIM / P1 Q7

21 The graph shows the effects of pH on the activity of the enzyme monoamine oxidase, as measured by two different methods.



Which hypothesis is not supported by these results?

A Both acid and strong alkali denature the enzyme.

B The optimum pH is alkaline.

C Strong alkali causes a reversible change in the tertiary structure of the enzyme.

D The change in the catalytic properties of the enzyme caused by acid is reversible.

2018 / H2 / JJC PRELIM / P1 Q8

22 Following a heart attack, the enzyme lactate dehydrogenase leaks into the blood plasma from damaged heart muscle.

Which steps are required to obtain the best estimate of lactate dehydrogenase activity in a sample of blood plasma?

	sterilise blood plasma by heating	incubate with substrate for lactate dehydrogenase	incubate with lactate dehydrogenase inhibitor
A			
B			

key

= step required

C				= step not required
D				

2018 / H2 / MJC PRELIM / P1 Q4

QUESTION 23

Which row gives the correct description of **both** a collagen molecule and a collagen fibre?

	collagen molecule	collagen fibre
A	α and β polypeptide chains forming a double helix, held together by peptide bonds	molecules of collagen arranged randomly to each other, linked by hydrogen bonds
B	a polypeptide chain, with repeating amino acids, forming an α-helix	three molecules of collagen, forming a triple helix, held together by hydrogen bonds
C	a polypeptide chain, with repeating amino acids, forming a helix	three α helical collagen molecules, forming a triple helix, held together by covalent bonds
D	three helical polypeptide chains, forming a triple helix, held together by hydrogen bonds	molecules of collagen lying parallel and cross-linked to each other

2018 / H2 / MJC PRELIM / P1 Q5

QUESTION 24

Glycogen is a compact molecule with many branches.

Which types of glycosidic bond result in the biologically important characteristics of the glycogen molecule?

	characteristic of glycogen molecule				
	branching chains	coiled chains	compact shape	large osmotically neutral molecule	rapid hydrolysis
A	1,4	1,4	1,4	1,6 and 1,4	1,6
B	1,6	1,4	1,6 and 1,4	1,6 and 1,4	1,6
C	1,6	1,6	1,6 and 1,4	1,4	1,4
D	1,6 and 1,4	1,6 and 1,4	1,6	1,4	1,6 and 1,4

2018 / H2 / MJC PRELIM / P1 Q7

QUESTION 25

The table contains results recorded by a student from an investigation into the effect of temperature on an enzyme-catalysed reaction. All other variables were standardised.

temperature / ˚C	rate of reaction / arbitrary units
10	3
20	7
30	16
40	33
50	32
60	14

What can be best concluded from the results?

A The enzyme had the highest kinetic energy at 40˚C.

B The data for 50˚C was anomalous.

C The optimum temperature was between 30˚C and 50˚C.

D The enzyme was held by only disulfide bonds at 60˚C.

2018 / H2 / NJC PRELIM / P1 Q4

26 Magnesium ions are usually added to a polymerase chain reaction in the form of magnesium chloride. The reaction rate of *Taq* polymerase decreases as the concentration of magnesium chloride is reduced.

What is the role of the magnesium ions?

A co-enzyme for *Taq* polymerase

B co-factor for *Taq* polymerase

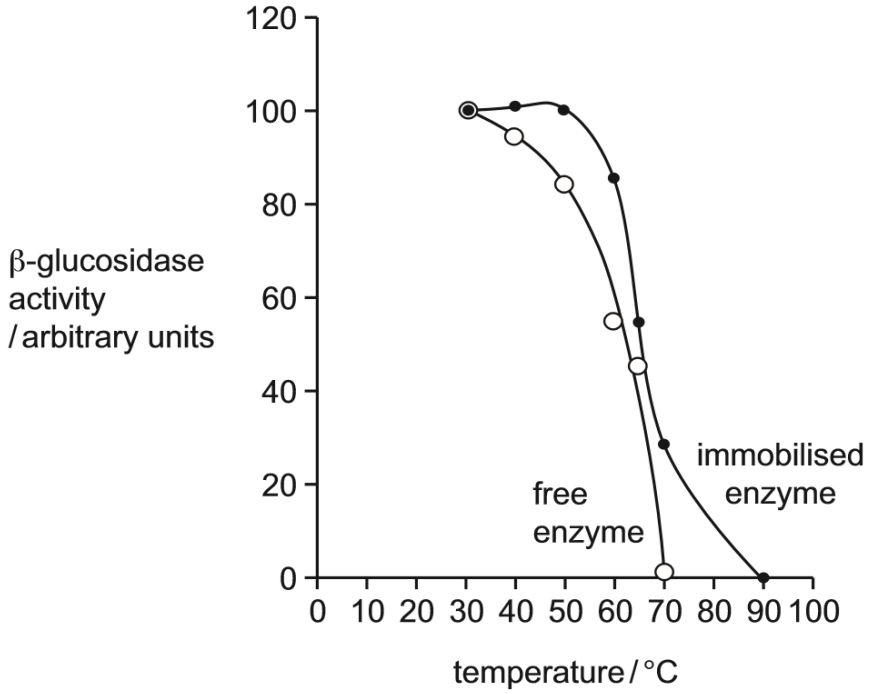
C competitive inhibitor of *Taq* polymerase

D non-competitive inhibitor of *Taq* polymerase

2018 / H2 / NYJC PRELIM / P1 Q4

27 An experiment was conducted to investigate the effect of temperature on the activity of the enzyme β-glucosidase. The enzyme was tested when in solution (free) and when immobilised in alginate beads.

The results are shown in the graph below.



Which statement about the effect of immobilisation of β-glucosidase is correct?

A It increases the kinetic energy of the enzyme.

B It inhibits the activity of the enzyme.

C It reduces the optimum temperature of the enzyme.

D It stabilizes the enzyme against denaturation.

2018 / H2 / PJC PRELIM / P1 Q4

28 A student tested four samples of food, **A, B, C** and **D,** for the presence of

- lipids
- protein
- reducing sugars
- starch

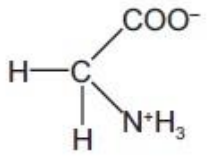
One of the food samples, milk, was found to contain lipid, protein and reducing sugar.

Which of the food samples, shown in the results below, is milk?

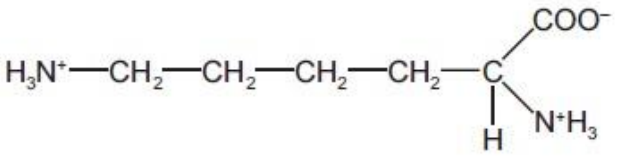
sample	observation			
	adding biuret reagent	**adding iodine in potassium iodide solution**	**boiling with Benedict's solution**	**mixing with ethanol and adding to water**
A	purple	orange	orange precipitate	milky emulsion
B	purple	blue-black	blue	milky emulsion
C	pale blue	blue-black	orange precipitate	clear
D	pale blue	orange	blue	clear

2018 / H2 / PJC PRELIM / P1 Q5

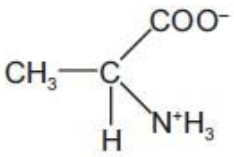
29 The diagram shows the structure of four amino acids in solution.



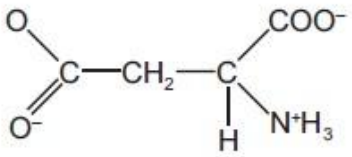
glycine



lysine



alanine



aspartate

Which of these four amino acids have an overall charge?

A alanine and aspartate

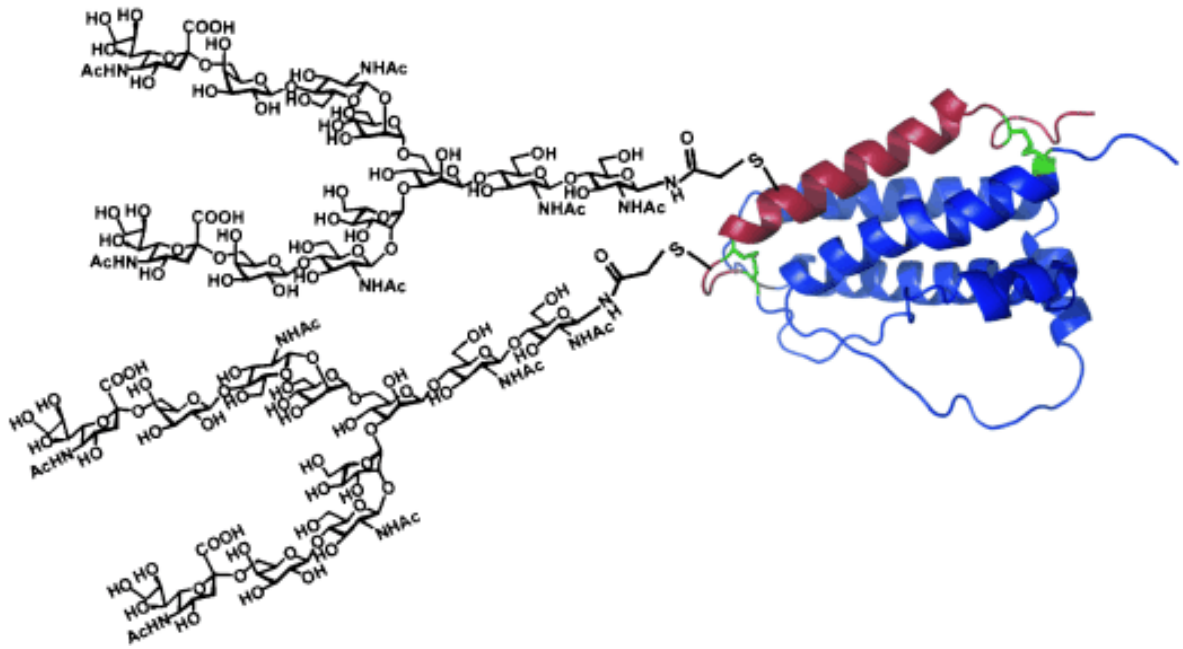
B alanine and glycine

C aspartate and lysine

D glycine and lysine

2018 / H2 / PJC PRELIM / P1 Q6

30 The figure below shows the structure of a biomolecule extracted from a cell.



Below are some statements regarding the structure, property and function of biomolecules with structures similar to that shown above. Which of the following statements are true?

1 This biomolecule has both hydrophilic and hydrophobic properties.
2 This kind of biomolecule plays a role in blood group determination.
3 This biomolecule is contained within the secretory vesicle.
4 When completely hydrolysed, all the monomers of this biomolecule are soluble in water.

A 1 and 3 only

B 2 and 4 only

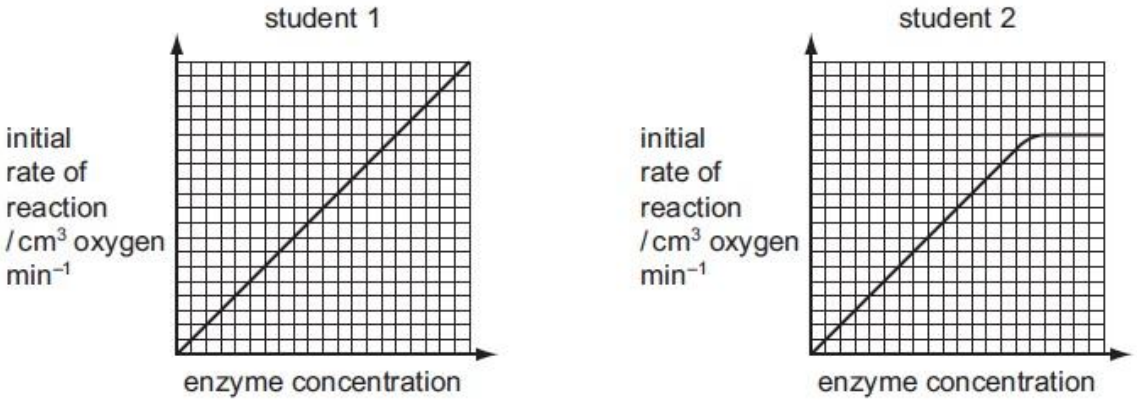
C 1, 2 and 4 only

D 2, 3 and 4 only

2018 / H2 / PJC PRELIM / P1 Q7

31 Catalase is an enzyme that catalyses the conversion of hydrogen peroxide into water and oxygen.

Two students investigated the effect of enzyme concentration on the rate of reaction of the enzyme catalase. The students predicted their results would show the same trend. The graphs show the rates obtained by each student.



Which statement explains the different trend shown by student 2's results?

A Student 2 included a competitive inhibitor in the investigation.

B Student 2 performed the investigation at a higher temperature.

C Student 2 performed the investigation of pH6 compared to pH8.

D Student 2 used a lower concentration of substrate in the investigation.

2018 / H2 / PJC PRELIM / P1 Q8

32 Ethylene glycol is a chemical used to prevent water from freezing. If ethylene glycol is swallowed accidentally, it is metabolised by an enzyme found in liver cells to produce a toxic product.

The enzyme normally catalyses the oxidation of ethanol to a harmless product.

People who have swallowed ethylene glycol are treated with large doses of ethanol. This prevents formation of a toxic product and allows the body to excrete the ethylene glycol

Which statements describe why this treatment works?

A Ethanol binds near the active site on the enzyme, altering its shape.

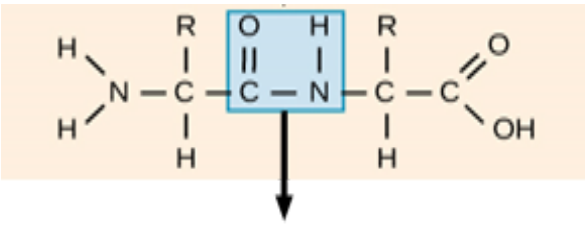
B Ethanol binds permanently to the active site of the enzyme, blocking it.

C Ethanol changes the tertiary structure of the enzyme, denaturing it.

D Ethanol is more likely to bind to the active site on the enzyme.

2018 / H2 / RI PRELIM / P1 Q1

33. The diagram shows a molecular structure.



What is enclosed by the box X?

A Phosphodiester bond

B Glycosidic bond

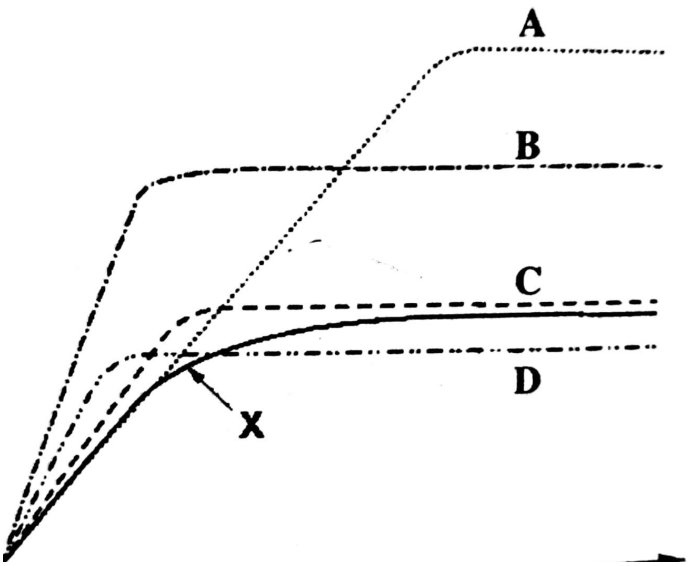
C Ester bond

D Peptide bond

2018 / H2 / RI PRELIM / P1 Q2

34. Line X shows the activity of an enzyme at 20°C. Lines **A** to **D** show the effect of different conditions on the activity of the enzyme.

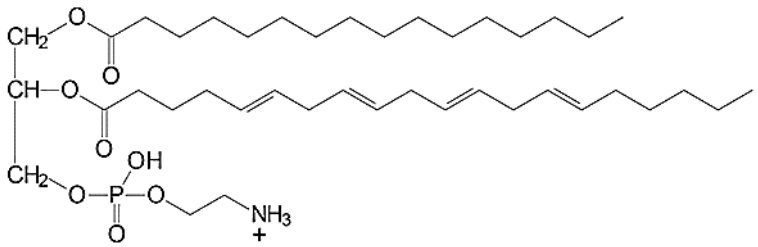
Which line shows the effect of increasing the temperature by 10°C and adding extra substrate?



amount of product

2018 / H2 / RVHS PRELIM / P1 Q3

35 The structure of phosphatidylcholine, a common membrane phospholipid, is shown.



Which combination correctly describes the synthesis, structure and property of one molecule of phosphatidylcholine?

	number of water molecules eliminated during synthesis	number of ester bonds	property
A	3	3	amphipathic
B	2	2	amphipathic
C	2	2	amphoteric
D	3	3	amphoteric

2018 / H2 / RVHS PRELIM / P1 Q4

36 The following statements describe the four levels of organisation of the structure of haemoglobin.

How many of the following statement(s) is true?

1 In primary structure, α and β subunits consist of any number of amino acids joined in a specific sequence by peptide bonds.

2 In secondary structure, the α-helices in each subunit are a result of hydrogen bonding between C=O and N-H groups of regions of the polypeptide backbone that are far apart.

3 In tertiary structure, R group interactions between amino acids allow hydrophilic amino acids to be clustered in the interior of the protein.

4 In quaternary structure, R group interactions between amino acids of different subunits allow for the molecule to exhibit cooperative binding.

A 1

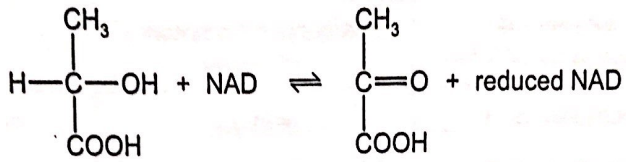
B 2

C 3

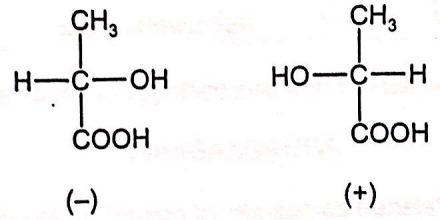
D 4

2018 / H2 / RVHS PRELIM / P1 Q5

37 Lactic dehydrogenase catalyses the conversion of lactic acid to pyruvic acid as shown in the following equation.



Two isomers of lactic acid, (-) and (+), are shown below.



Reduced NAD absorbs ultraviolet light but NAD does not. The activity of bacterial lactic dehydrogenases on the two different isomers of lactic acid was compared. The absorbance of ultraviolet light was measured using an ultraviolet spectrophotometer. The graphs show the results.

What can be concluded about bacterial lactic acid dehydrogenases?

A The enzyme is specific to the (-) isomer.

B The enzyme is specific to the (+) isomer.

C Both isomers fit the active site.

D Neither isomer fit the active site.

2018 / H2 / RVHS PRELIM / P1 Q6

38 Both bacterium *Streptococcus salivarius* and fungus *Aspergillus niger* produce enzymes which digest complex sugars. The enzyme produced by *A. niger* has a higher molecular weight and is encoded by a different gene.

How can these enzymes digest the same complex sugars in the same way?

A Both enzymes have the same primary structures.

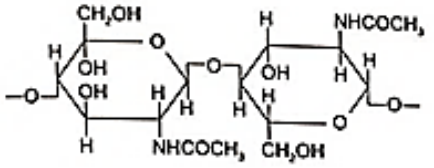
B Both enzymes have the same tertiary structures.

C The enzyme-substrate complexes formed by both enzymes are identical.

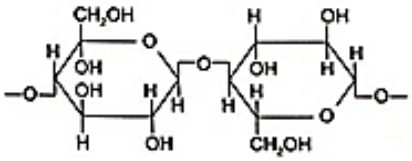
D The amino acids forming the active site are the same in both enzymes.

2018 / H2 / SAJC PRELIM / P1 Q2

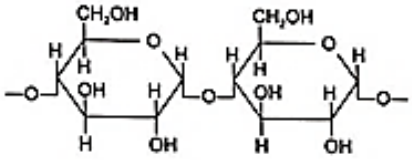
39 The diagrams show short sections of some common polysaccharides and modified polysaccharides.



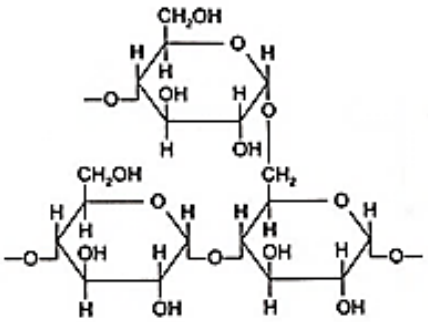
1



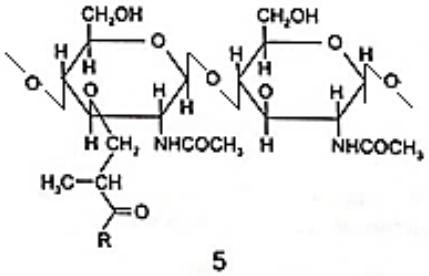
2



3



4



5

The polysaccharides can be described as below.

- Polysaccharide **F** is composed of β-glucose monomers with 1,4 glycosidic bonds.
- Polysaccharide **G** is composed of α-glucose monomers with 1,4 and 1,6 glycosidic bonds.

- Polysaccharide **H** is composed of N-acetylglucosamine and N-acetylmuramic acid monomers with β-1,4 glycosidic bonds.
- Polysaccharide **J** is composed of α-glucose monomers with 1,4 glycosidic bonds.
- Polysaccharide **K** is composed of N-acetylglucosamine monomers with β-1,4 glycosidic bonds.

Which shows the correct pairings of polysaccharide descriptions and diagrams?

	Polysaccharide				
	F	**G**	**H**	**J**	**K**
A	2	4	5	3	1
B	2	5	4	1	3
C	3	4	1	2	5
D	3	5	4	1	2

2018 / H2 / SAJC PRELIM / P1 Q3

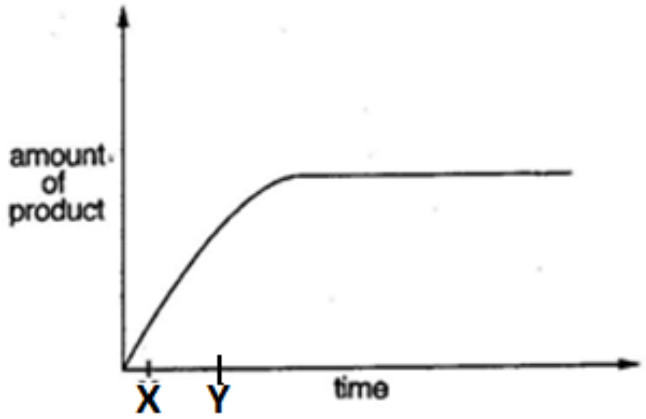
40 With reference to carrier proteins, which of the following statements is/are true for all carrier proteins?

1 They contain binding sites for specific molecules or ions.
2 They directly require ATP to transport substances across the membrane.
3 They are soluble globular proteins.
4 They are embedded in membranes.

A 1 only
B 1 and 4
C 3 and 4
D 1, 2 and 4

2018 / H2 / SAJC PRELIM / P1 Q4

41 The graph below shows the amount of product formed in an enzyme-catalysed reaction over a certain period of time at 37° C.



What is true at time **X**?

A Most enzyme molecules will have free active sites.
B The number of unreacted substrate molecules is high.
C The number of enzyme-substrate complexes is low.
D The rate of enzymatic reaction is lower than at time **Y**.

2018 / H2 / TJC PRELIM / P1 Q3

42 Particular biological molecules react with chemicals called reagents to give distinct colour changes. The colour depends on the kind of biological molecule and the type of reagent used, as shown in the following table.

chemical reagent	biological molecule	colour change observed
L	protein	violet
M	lipid	red
N	nucleic acid	green

A researcher added different reagents to some isolated ribosomes.

The colour change observed are

A green only.

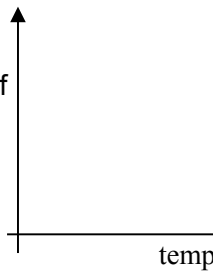
B red and green.

C green and violet.

D violet, red and green.

2018 / H2 / TJC PRELIM / P1 Q4

The diagram shows the initial rate of reaction using constant amounts of substrate and enzyme at different temperatures.



What is the reason for the decline in the level of activity in region **X**?

A breaking of sulphur bridges and ionic bonds in the enzymes

B competition between substrate and product for the active site

C breaking of hydrogen bonds and hydrolysis of peptide bonds in the enzyme

D insufficient substrates to occupy all the active sites

2018 / H2 / TJC PRELIM / P1 Q5

4 Proteins in the cell surface membranes of human cells and mouse cells were labelled with red and green fluorescent dyes respectively.

When a human cell and a mouse cell were fused together, the red and green fluorescent dyes were at first found in different regions of the cell surface membrane of the hybrid cell, but after 40 minutes, they were evenly distributed in the entire cell surface membrane.

What explains this observation?

A All protein molecules in the cell surface membrane are fixed to structures within the cell, but phospholipid molecules move freely between them.

B Groups of protein and phospholipid molecules in the cell surface membrane are attached to each another and move together.

C Only protein molecules in the outer layer of the cell surface membrane can move freely between phospholipid molecules.

D Protein molecules in the outer layer of the cell surface membrane and those which span the bilayer can move freely between phospholipid molecules.

2018 / H2 / VJC PRELIM / P1 Q2

45 Which of the following options correctly matches the functional and structural features of cellulose, collagen, glycogen and triglycerides?

		Function	Structure		
			Linear/ Fibrous	Molecule held together by hydrogen bonds	Branched chains
A	Cellulose	Support	✓		✓

	Collagen	Strengthening	✓	✓	
B	Cellulose	Support	✓	✓	
	Triglyceride	Storage			
C	Collagen	Strengthening	✓	✓	✓
	Glycogen	Storage			✓
D	Glycogen	Storage		✓	✓
	Triglyceride	Storage		✓	

2018 / H2 / VJC PRELIM / P1 Q3

46 Influenza virus has an enzyme called neuraminidase which breaks down glycoproteins in the membrane of the cell that the virus will infect. The glycoprotein binds to the active site of neuraminidase by induced fit.

Which statements about the induced fit hypothesis of enzyme action are correct?

1. The active site must have a complementary shape to the substrate for them to bind together.
2. This enzyme is less likely to be affected by non-competitive inhibitors than an enzyme working by the lock and key mechanism.
3. The substrate is converted to product by specific R-groups in the active site just like the lock and key mechanism.

A 1 and 2

B 2 and 3

C 2 only

D 3 only

2018 / H2 / VJC PRELIM / P1 Q4

47 An unusual enzyme has been found in a tropical grass.

- It catalyses the hydrolysis of the fungal polysaccharide, chitin, into amino sugars.
- It also inhibits the activity of an enzyme in locust guts which catalyses the digestion of amylose.

What describes the actions of this unusual enzyme?

	reaction catalysed	**reaction inhibited**
A	hydrolysis of glycosidic bonds	condensation of glycosidic bonds

B	hydrolysis of glycosidic bonds	hydrolysis of glycosidic bonds
C	hydrolysis of peptide bonds	condensation of glycosidic bonds
D	hydrolysis of peptide bonds	hydrolysis of glycosidic bonds

2018 / H2 / ACJC PRELIM / P1 Q6

48 Which statement is correct regarding the enzymatic activity of catalase under the following conditions?

1 Addition of a non-competitive inhibitor
2 Addition of pH 13 buffer solution
3 Incubation at 10°C

	A The hydrogen and ionic bonds between R groups of residues are broken in conditions 2 and 3, hence the rate of reaction decreases.
	B The catalytic and binding residues in all active sites are affected in condition 1, hence the rate of reaction decreases.
	C The chances of effective collisions to form enzyme-substrate complexes are low in condition 3, hence the rate of reaction decreases.
	D The changes in the 3D conformation of enzymes are irreversible in conditions 1, 2 and 3, hence the rate of reaction decreases.

2018 Biomolecules and Enzymes MCQ ANS			
Question	**Answer**	**Question**	**Answer**
1	**B**	21	**C**
2	**C**	22	**A**
3	**C**	23	**D**
4	**D**	24	**B**
5	**D**	25	**C**
6	**A**	26	**B**
7	**C**	27	**D**
8	**C**	28	**A**
9	**A**	29	**C**
10	**C**	30	**C**
11	**B**	31	**D**
12	**C**	32	**D**
13	**C**	33	**D**
14	**B**	34	**B**
15	**D**	35	**A**
16	**B**	36	**A**
17	**B**	37	**A**
18	**B**	38	**D**
19	**B**	39	**A**
20	**D**	40	**B**
		41	**B**
		42	**C**
		43	**A**

		44	**D**
		45	**B**
		46	**D**
		47	**B**
		48	**C**