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# BIOLOGY

## THE CONTROL OF GENE EXPRESSION

Level & Board	AQA (A-LEVEL)
TOPIC:	DNA
PAPER TYPE:	QUESTION PAPER - 1
TOTAL QUESTIONS	5
TOTAL MARKS	34

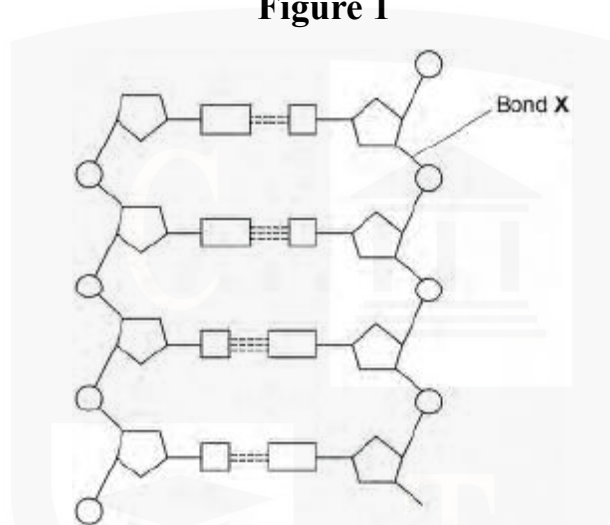
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## DNA - 1

1.

Figure 1 shows part of a DNA molecule.

**Figure 1**



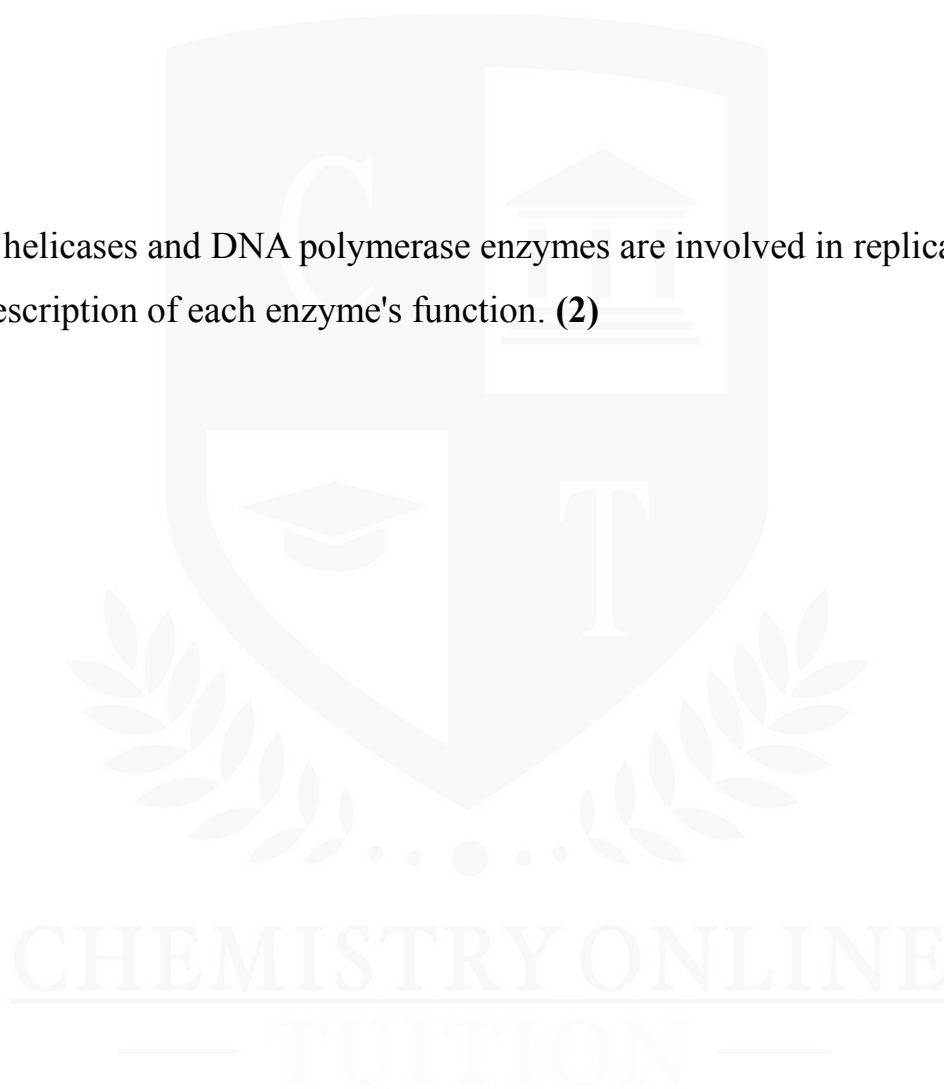
(a) Figure 1 shows how many nucleotides are present? **(1)**

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**(b)** See Figure 1 to identify the type of bond marked X. **(1)**

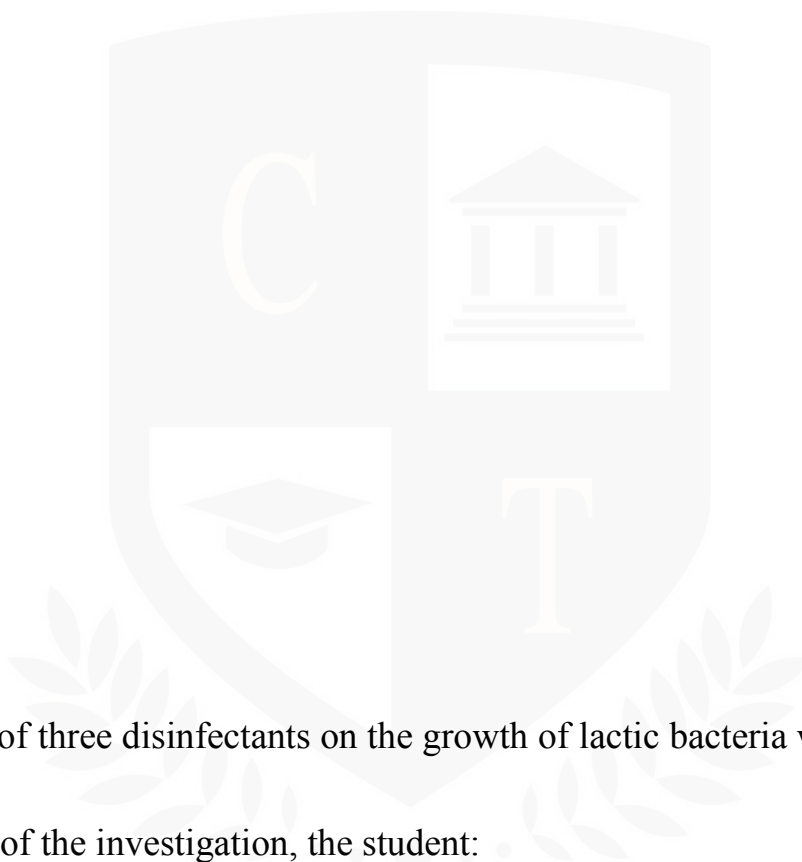
**(c)** DNA helicases and DNA polymerase enzymes are involved in replication.  
Give a description of each enzyme's function. **(2)**



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**(d)** ATP is a nucleoside derivative of adenosine triphosphate.

To give two different views, we contrast ATP structures with the nucleotides present in DNA. **(2)**



**2.** The effect of three disinfectants on the growth of lactic bacteria was investigated by a student.

In the course of the investigation, the student:

- Before pouring agar's plates, boil the agar.
- On each agar plate, 0.5 cm<sup>3</sup> of a diluted liquid culture of *Lactobacillus* was transferred.
- As controls, some agar plates were left.
- add different concentrations of the disinfectant, as shown in Table 1 at page 5, to additional agar plates.

She recorded the number of bacterial colonies on each agar plate after two days.

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(a) Describe the purpose of boiling agar. (2)

Transfer each agar plate to be filled with the same volume of liquids culture.

Lysol, Propan-2-ol and Ammonia were the 3 disinfectants provided by the student.

The results of the students are shown in Table 1.

**Table 1**

Concentration of disinfectant / arbitrary units	Number of colonies of bacteria		
	Lysol	Propan-2-ol	Ammonia
0	300		
5	0		
10	0		
15	0		
20	0		

**(b)** The liquid culture the student transferred was diluted by 1 in 10 000 ( $10^{-4}$ ).

Calculate the number of bacteria that were found in a 1 cm<sup>3</sup> uncultured fluid sample by using information contained in this question. **(2)**

**(c)** The student established that a minimum propan-2-ol concentration of 15 units was required for the suppression of Lactobacillus growth. It is wrong to conclude that way.

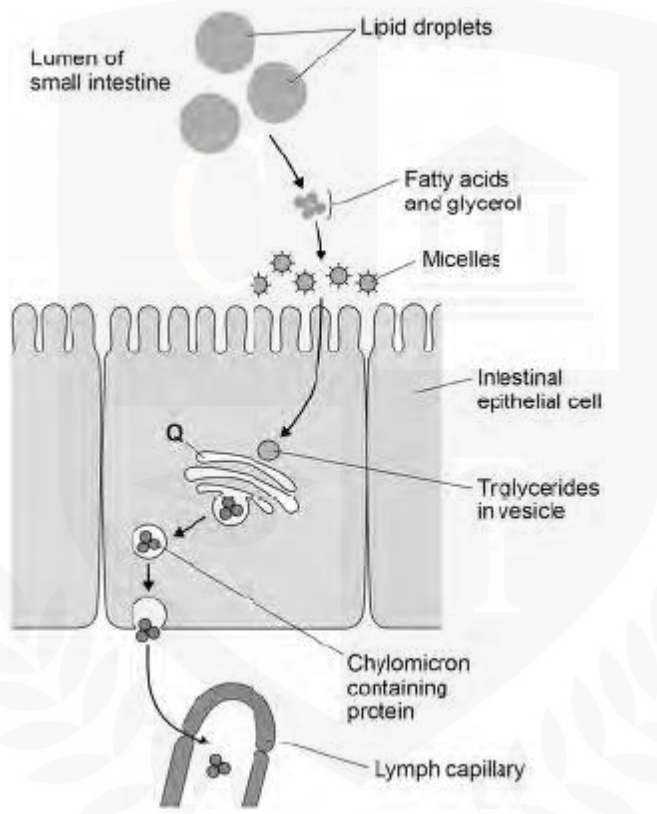
Consider how it might be possible to get an accurate estimate as to the concentration of propan-2-ol that is required for this bacterium's growth inhibition. **(2)**

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3. The digestion and absorption of lipids are described in Figure 2.

**Figure 2**



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Tick () the box by the name of the process by which fatty acids and glycerol enter the intestinal epithelial cell. **(1)**

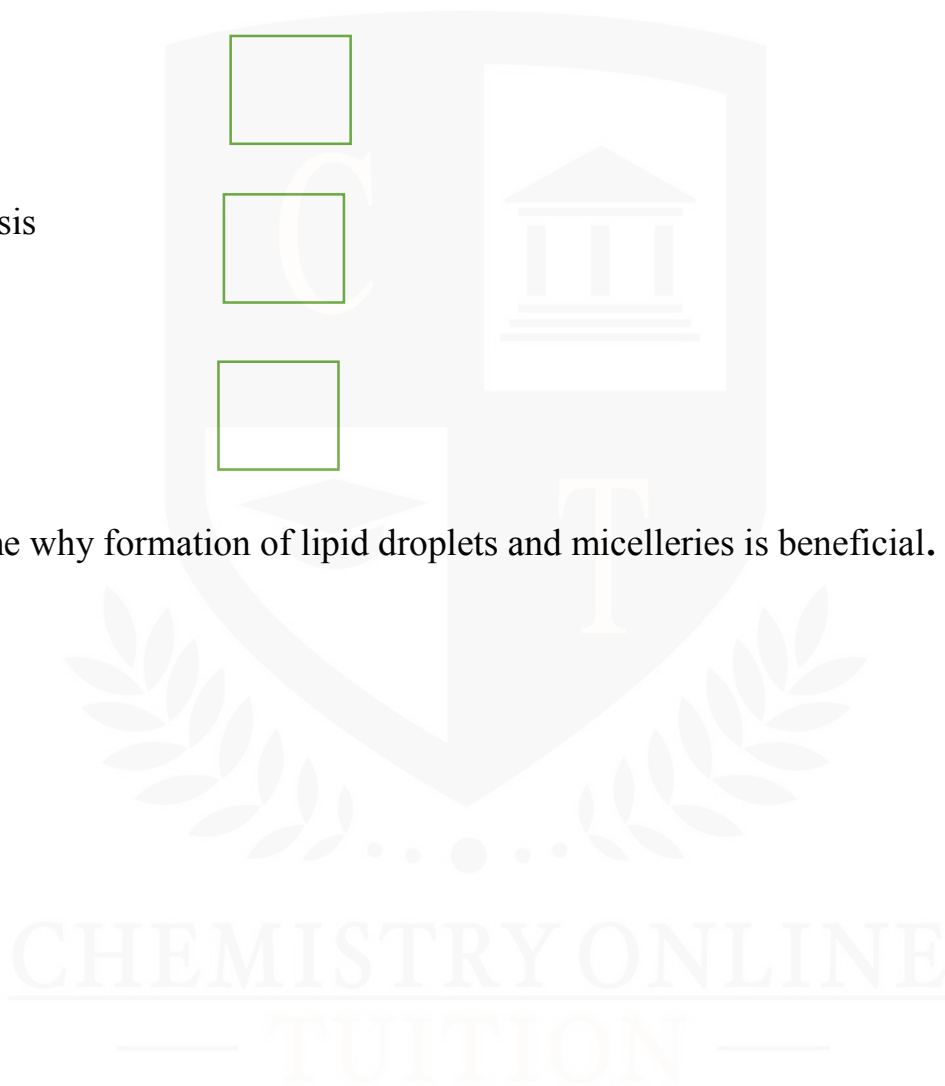
Active transport

Diffusion

Endocytosis

Osmosis

**(b)** Tell me why formation of lipid droplets and micelleries is beneficial. **(3)**



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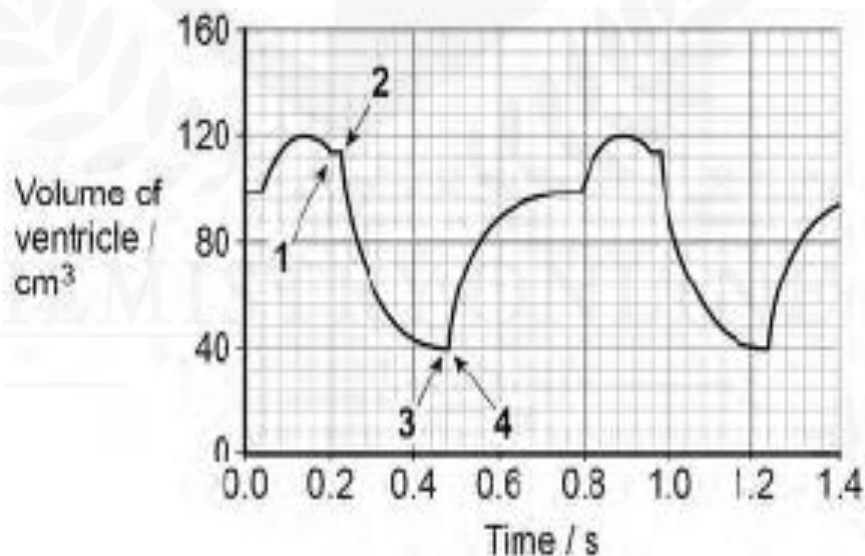


(c) In Figure 2 you can see the name structure Q, which explains how it plays a role in lipid absorption. (4)

4.

The volume changes of the heart's Left Ventricle during a 2nd Cardiac Cycle are shown in Figure 3. The times of opening or closing the heart valves are given in numbers 1, 2, 3 and 4.

**Figure 3**



(a) To complete Table 2, use the information set out in Figure 3. In the correct box, put your number 1, 2, 3 or 4. (2)

**Table 2**

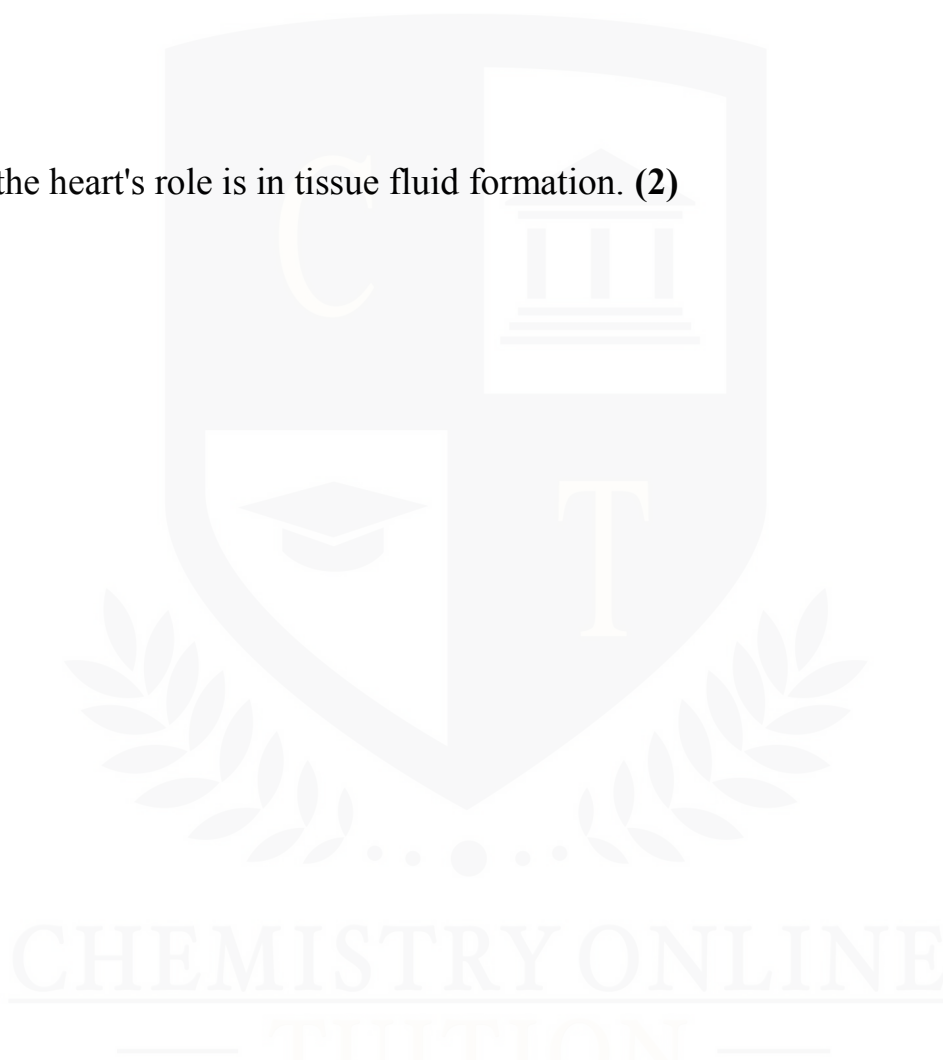
	<b>Valve open</b>	<b>Valve close</b>
<b>Semi-lunar valve</b>		
<b>Atrioventricular valve</b>		

**(b)** To calculate the volume of blood pumped in a left ventricle per minute, use Figure 3. **(2)**

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**(c)** What the heart's role is in tissue fluid formation. **(2)**



**(d)** Lymphedema is a swelling in the legs which can be due to an obstruction of lymphatic circulation.

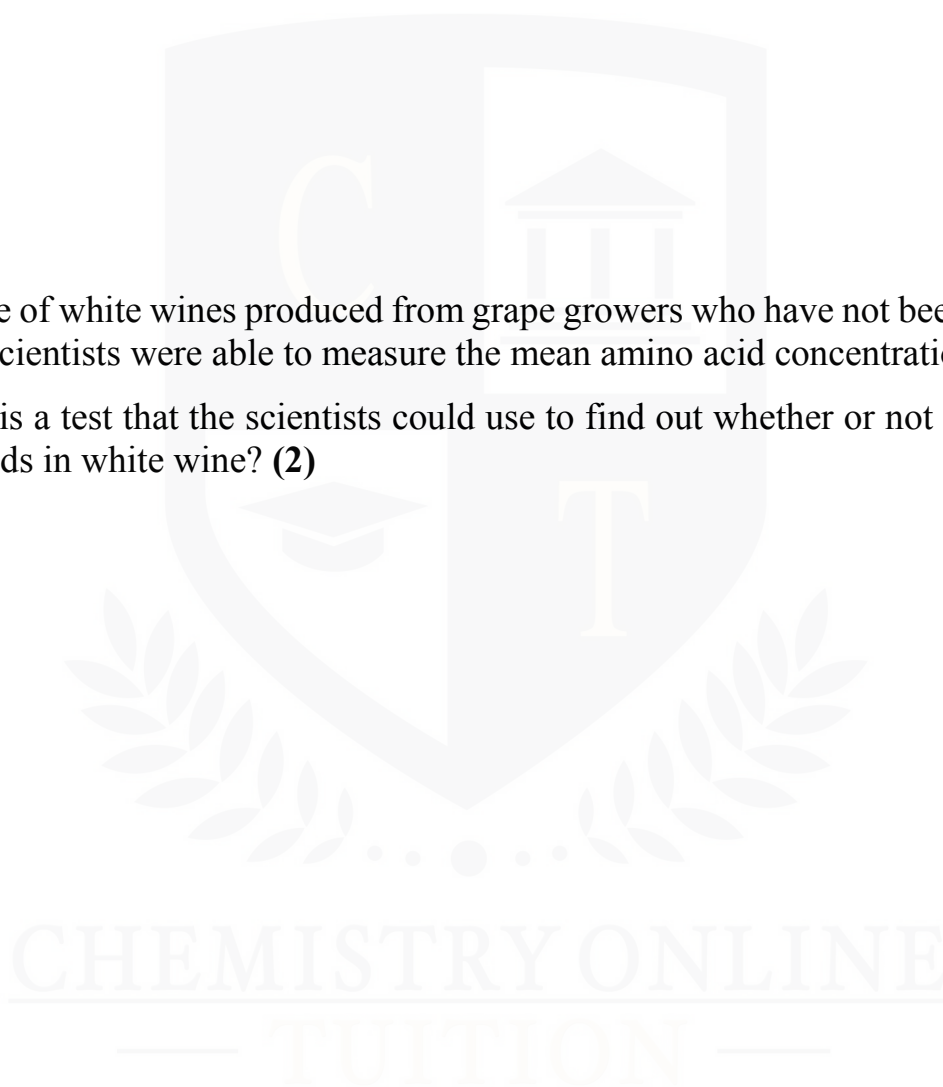
Explain how lymphoedema could occur if the lymphatic system is blocked. **(1)**

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5.

In the case of white wines produced from grape growers who have not been growing organic, scientists were able to measure the mean amino acid concentration.

**(a)** What is a test that the scientists could use to find out whether or not there were amino acids in white wine? **(2)**

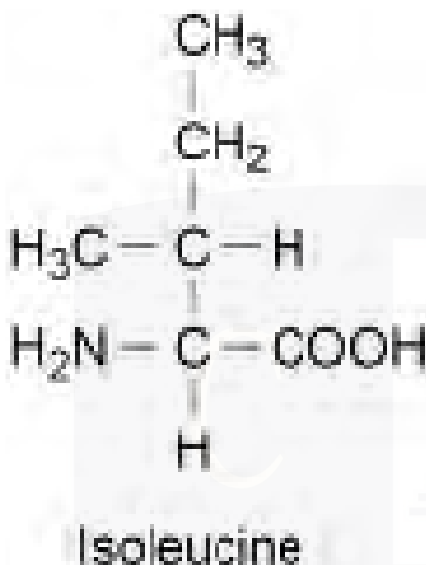


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**(b)** The basic structure of all amino acids is the same. The structure of the amino acid isoleucine is shown in Figure 4.

Put a box around the part of the molecule that's the same in all amino acids. (1)

Figure 4



(c) For each amino acid and for triglycerides, identify a compound element that is not present in triglyceride. (1)

(d) In order to determine whether there was a significant difference in the amino acid concentration between these two types of white wine, scientists performed an analysis by statistical means. They obtained a value of 0.04 for P.

Name and explain why you replied to the scientific test that was applied by the scientists.

Is this a difference worth noting? Explain why you're answering. (3)

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