

# Practice Paper 2

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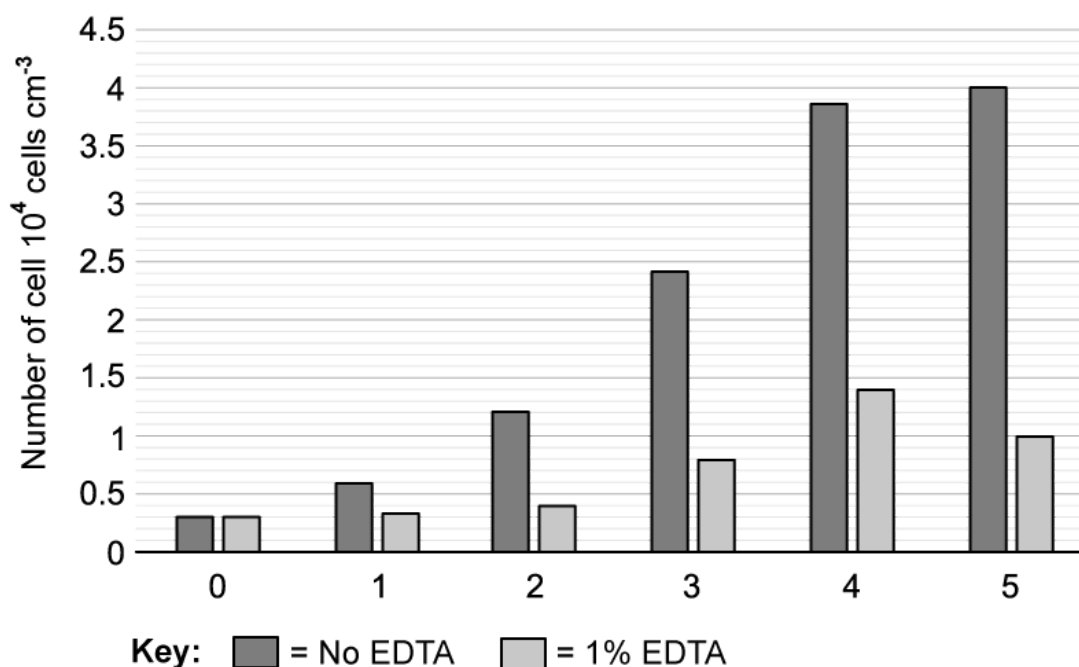
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Total Marks

/50

1 (a) EDTA is a compound that reacts with metal ions to form a stable harmless compound. It is commonly used to reduce levels of calcium in many medical procedures including dental work. EDTA has also been shown to have antimicrobial properties effective in the treatment of *Staphylococcus aureus* bacteria.

Scientists wanted to establish how effective EDTA could be in the treatment of infections from *Escherichia coli* bacteria. The growth of *E.coli* bacteria was monitored in response to treatment with EDTA over a period of 5 days. The chart below shows the results.



State the reason for the group treated with no EDTA.

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(1 mark)

(b) Calculate the percentage difference between the number of bacteria in the sample treated with EDTA and the number of bacteria in the untreated sample after 5 days.

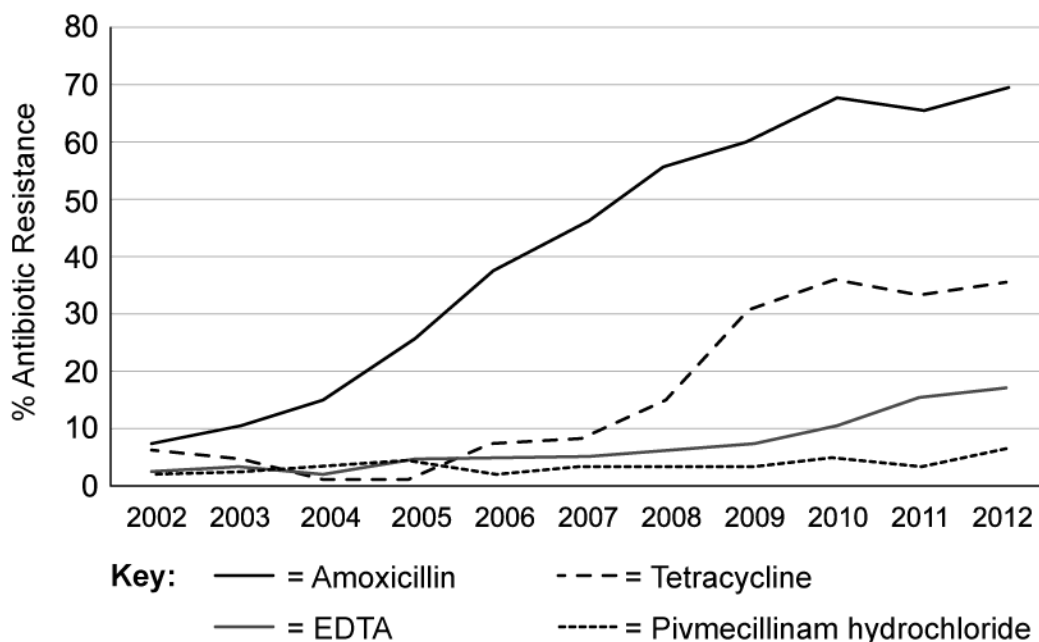
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(1 mark)

(c) Outline the effect of EDTA on the growth of bacteria.

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(2 marks)

(d) The presence of antibiotic resistance within *E.coli* populations was studied and presented in the graph below.



Identify which antibiotic has been shown to be the least effective against *E.coli*.

(1 mark)

(e) Compare the levels of antibiotic resistance shown in *E.coli* to the antibiotics studied.

(2 marks)

(f) The table below shows some of the side effects associated with the antibiotics studied.

Antibiotic	Side effects
EDTA	Abdominal cramps, nausea, vomiting, diarrhoea, headache, low blood pressure, skin problems and fever.
Amoxicillin	Abdominal cramps, back and leg pains, bloating, blood in urine, chest pains
Tetracycline	Nausea, vomiting, diarrhoea, loss of appetite, mouth sores, black hairy tongue, sore throat, headache
Pivmecillinam hydrochloride	Diarrhoea, feeling sick, thrush

Using all the information provided, evaluate whether EDTA is the best candidate antibiotic to treat *E.coli*.

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**(3 marks)**

(g) Suggest a different method that could be used to help reduce the development of antibiotic resistance.

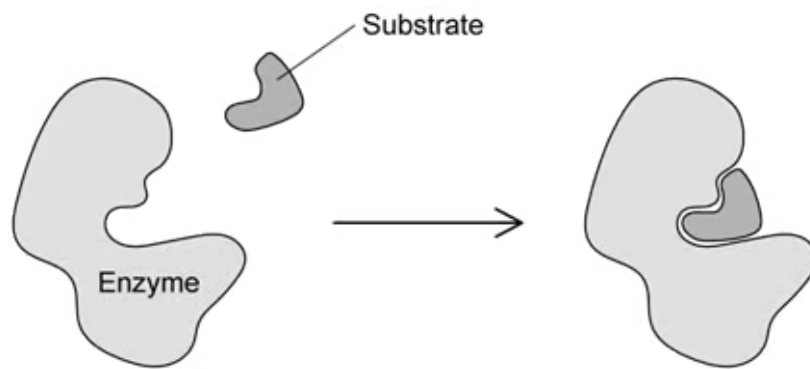
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**(1 mark)**

2 (a) State the reason why enzymes are referred to as biological catalysts.

(1 mark)

The image below shows a representation of an enzyme-controlled reaction.



(b) Describe the events taking place in the image.

(3 marks)

(c) State what is meant by the term 'enzyme specificity'?

(2 marks)

3 (a) The ends of a DNA strand are referred to as the 3' end and the 5' end.

Describe the aspects of DNA structure that give rise to this naming system.

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**(3 marks)**

(b) Adenine/thymine and guanine/cytosine form hydrogen-bonds with each other in complementary base-pairing within the DNA double helix. These bases can also form bonds with other molecules in order to carry out their function.

i) Suggest **one** other molecule that might form bonds with the bases in a DNA molecule.

**[1 mark]**

ii) State the role of the molecule identified in part i).

**[1 mark]**

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**(2 marks)**

(c) The structure of DNA has many characteristics that enable it to carry out its function.

i) Identify **two** structural features that help DNA to carry out its function.

**[2 marks]**

ii) For each feature identified at part i), explain how it assists with DNA function.

**[2 marks]**

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(4 marks)

4 (a) Compare and contrast the terms **adhesion** and **cohesion** in the context of water molecules in biological tissues.

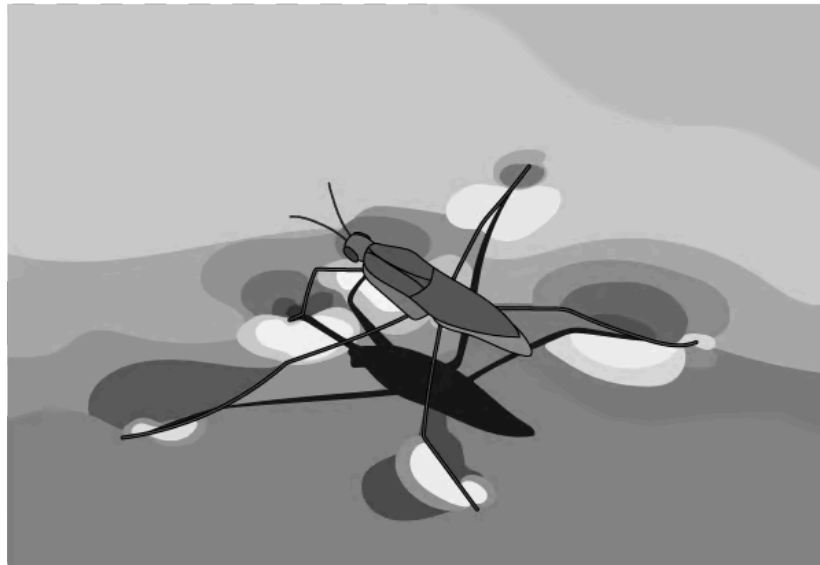
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(3 marks)

(b) The diagram shows a pond skater (or water strider).



Certain small animals such as pond skaters and fisher spiders can walk across bodies of water without breaking the surface.

Use your knowledge of water's properties to suggest how detergent pollution contaminating ponds and lakes can have a detrimental effect on these small animals.

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(3 marks)

(c) Outline how vasodilation affects the volume of water lost as sweat in humans.



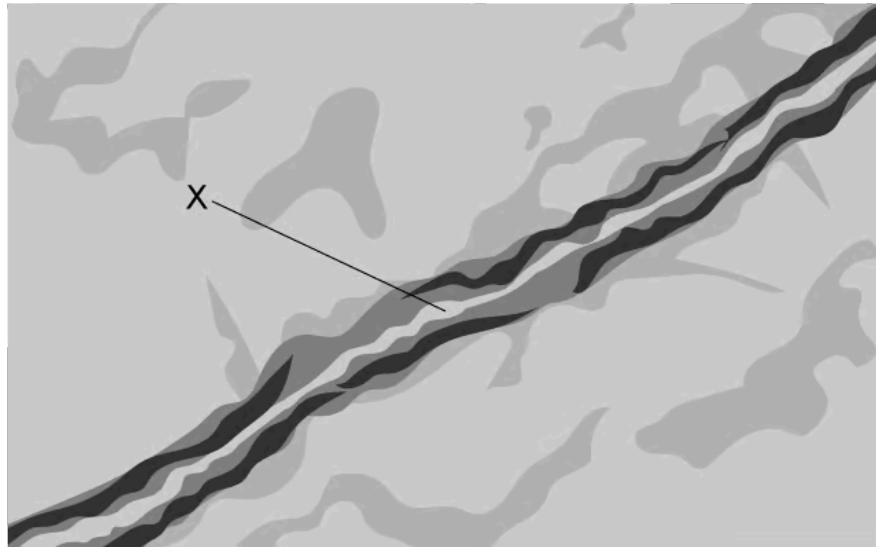
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**(2 marks)**

5 (a) One mark is available for clarity of communication throughout this question.

The drawing below shows an electron micrograph of a neuron. Similar images helped support the Davson and Danielli model of membrane structure.



- (i) Describe the Davson and Danielli model of membrane structure.
- (ii) Explain how the structure labeled X was misinterpreted.

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**(4 marks)**

- (b) Outline the evidence that led to the Davson and Danielli model being rejected.

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**(4 marks)**

(c) Draw an annotated diagram of the cell membrane based on the fluid mosaic model including all the relevant structures.

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**(8 marks)**