1. Bacterial and viral infections require different types of medication.

(a) Outline **two** differences between bacteria and viruses.

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(2)

(b) Antiviral drugs are used for the treatment of HIV and other viral infections. Describe **two** ways in which antiviral drugs work.

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(2)

(c) Discuss why viral infections are generally harder to treat than bacterial infections.

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(3)

(Total 7 marks)

2. Describe and explain difficulties associated with solving the AIDS problem.

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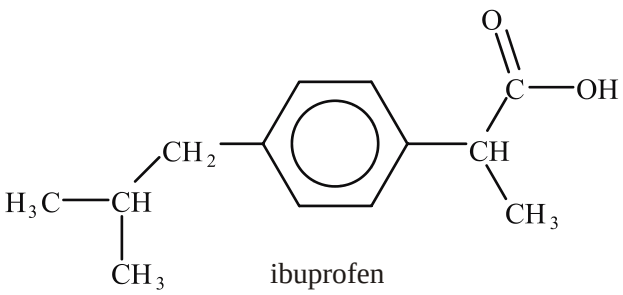
(Total 4 marks)

3. Ibuprofen is an analgesic with the following structure:



ibuprofen

(a) Identify the chiral carbon atom in the structure of ibuprofen using an asterisk (*).

(1)

(b) Describe how chiral auxiliaries can be used to synthesize only the desired enantiomeric form of a drug from a non-chiral starting compound. Explain why it is important to use only the desired enantiomeric form of a drug and state an example of what can happen if a racemic mixture is used.

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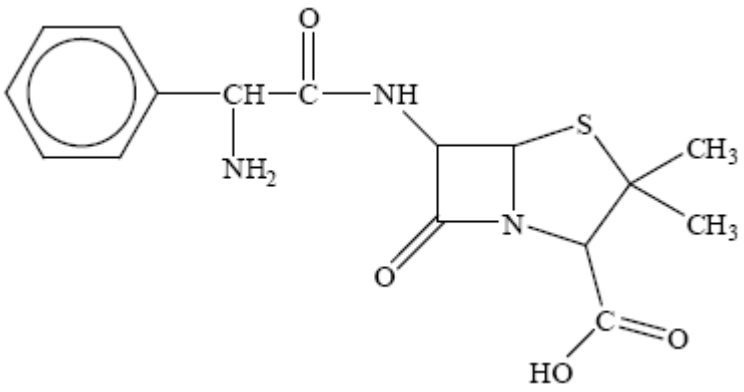
(5)
(Total 6 marks)

4. Ampicillin is a semi-synthetic penicillin used to treat lung infections. The structure of the antibiotic is shown below.



(i) Identify **two** functional groups present in the side chain (R) of ampicillin by comparing its structure to that of penicillin in Table 20 in the Data Booklet.

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(2)

(ii) Explain why it is important to continue to develop semi-synthetic penicillins.

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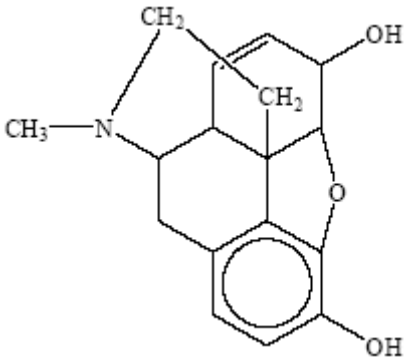
(2)
(Total 4 marks)

5. The structures of the strong analgesics morphine and heroin (diamorphine) can be found in Table 20 of the Data Booklet.

(i) Identify the amine functional group in the morphine molecule below by drawing a ring around it.



(1)

(ii) Classify the type of amine present in morphine.

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(1)

(iii) State the name of the functional group found in heroin but not in morphine.

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(1)

(Total 3 marks)