

Antibiotics

A Level



The structure of Lankacidin C is shown below

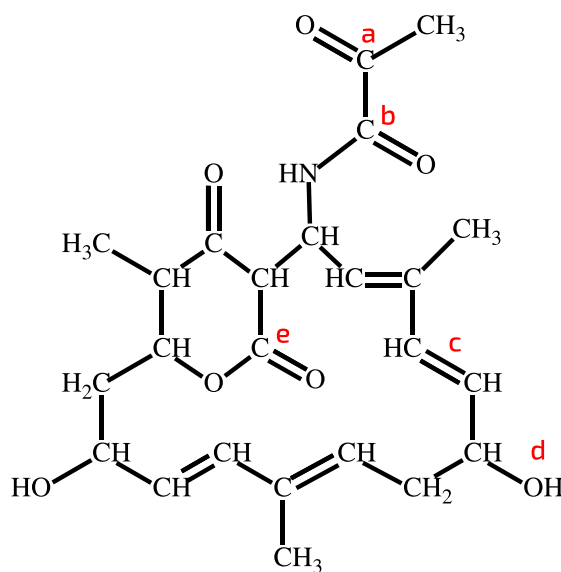


Figure 1: Structure of Lankacidin C

Identify the functional groups **a-e** present in Lankacidin C.

Part A **a**

Functional group **a**

Part B **b**

Functional group **b**

Part C **c**

Functional group **c**

Part D **d**

Functional group **d**

Part E **e**

Functional group **e**

Part F **Chemical tests 1**

Which of the functional groups **a-e** will react with acidified potassium dichromate (VI)?

- ☐ **a**
 - ☐ **b**
 - ☐ **c**
 - ☐ **d**
 - ☐ **e**
 - ☐ none of the above
-

Part G Chemical tests 2

Which of the functional groups **a-e** will give a silver mirror on addition of Tollens' reagent?

- ☐ **a**
 - ☐ **b**
 - ☐ **c**
 - ☐ **d**
 - ☐ **e**
 - ☐ none of the above
-

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Aspirin

A Level



The drug aspirin, shown below, is a powerful painkiller.

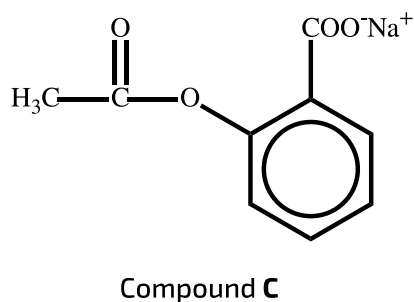
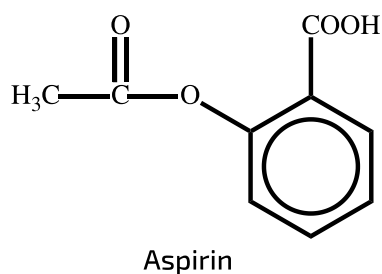


Figure 1: Aspirin and compound C

Aspirin contains a benzene ring with two functional groups, one of which reacts with dilute sodium hydroxide solution to give compound C.

Part A Type of reaction

What type of reaction is this?

Part B Reacting functional group

What type of functional group does this reaction show aspirin to contain?

Part C Other functional group

Name the other functional group present in aspirin.

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Change of colour

A Level



Part A Jasmine

Jasmone is the active ingredient of jasmine. It is extracted from jasmine flowers for perfume.

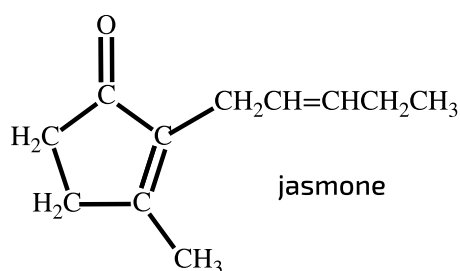


Figure 1: Structure of jasmone

Which of the following reagents, when added to jasmone, would show a change of colour?

1. Potassium dichromate (VI)
2. Tollens' reagent
3. Bromine

- ☐ 3 only is correct
- ☐ 1 only is correct
- ☐ 1 and 2 only are correct
- ☐ 2 and 3 only are correct
- ☐ 1, 2 and 3 are correct

Part B Aq. bromine test

When aqueous bromine is added to an organic compound, **Y**, the colour of bromine is discharged.

To which classes of compound could **Y** belong?

1 Alkenes

2 Carboxylic acids

3 Alcohols

- ☐ **2** and **3** only are correct
- ☐ **1** only is correct
- ☐ **1** and **2** only are correct
- ☐ **1**, **2** and **3** are correct
- ☐ **3** only is correct
-

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Part B adapted with permission from UCLES, A-Level Chemistry, November 1992, Paper 4, Question 40

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Common functional groups

A Level



Familiarity with different functional groups is important in organic chemistry. Name the following common functional groups.

Part A Functional group A

What is the name of the functional group present in the following compound?



Figure 1: A common functional group

Part B Homologous series B

What is the name of the class of compounds that have a general formula of C_nH_{2n} and include a $C=C$ double bond?

Part C Homologous series C

What is the name of the class of compounds that have a general formula of C_nH_{2n} and include a ring?

Part D Functional group D

What is the name of the following functional group?

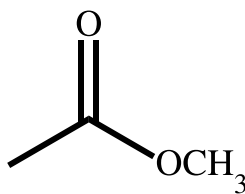


Figure 2: A common functional group

Part E Functional group E

What is the name of the following functional group?

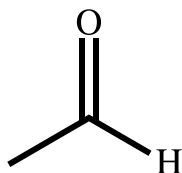


Figure 3: A common functional group

Part F Functional group F

What is the name of the following functional group?

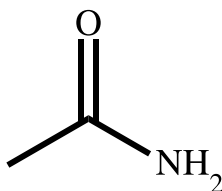


Figure 4: A common functional group

Part G Functional group G

What is the name of the following functional group?

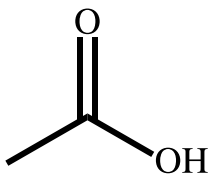


Figure 5: A common functional group

Part H Functional group H

What is the name of the following functional group?

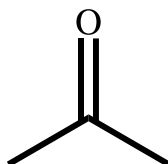


Figure 6: A common functional group

Part I Functional group I

What is the name of the following functional group?

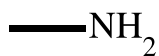


Figure 7: A common functional group



Fructose functional groups

The structure of the monosaccharide fructose is shown below.

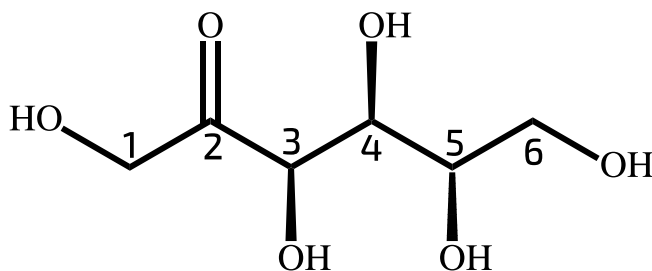


Figure 1: Fructose structure

Part A Carbon 2

Name the functional group at the position labelled 2.

Part B Carbon 6

Name the functional group at the position labelled 6.

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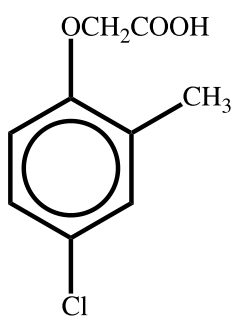
Functional group tests

A Level

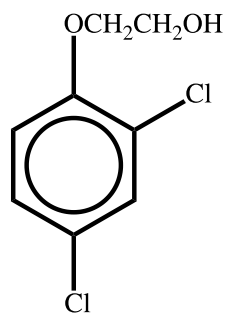


Part A Weedkillers

MCPA and 2,4-D are two widely-used selective weedkillers.



MCPA



2,4-D

Figure 1: MCPA and 2,4-D

Which of the following reagents will distinguish MCPA from 2,4-D?

- ☐ Na_2CO_3 (aq)
- ☐ Bromine water
- ☐ None of the above
- ☐ Tollens' reagent

Part B **MIBK**

4-Methylpentan-2-one, MIBK, is a solvent used in a glue.



MIBK

When the glue is tested, which test would give a positive result?

- ☐ A silver mirror on addition of Tollens' reagent
 - ☐ It is oxidised and gives a green colouration on warming with aqueous potassium dichromate(VI).
 - ☐ It gives a sweet-smelling liquid on warming with benzoic acid.
 - ☐ None of the above
-

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Part B adapted with permission from UCLES, A-Level Chemistry, November 1995, Paper 4, Question 24

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Glucose to lactic acid

A Level



When oxygen is in short supply, human muscle cells can break down glucose by a process which involves the following molecules among others:

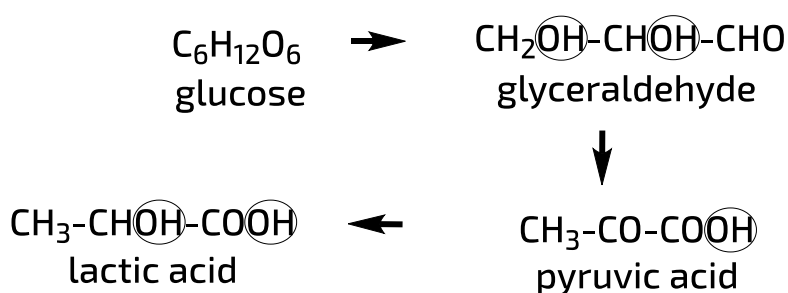


Figure 1: The metabolic pathway from glucose to lactic acid.

This process enables energy to be released from glucose without overall oxidation being necessary.

Part A Secondary alcohol

Which of these circled groups contains a secondary alcohol?

- ☐ Left group circled in glyceraldehyde.
- ☐ Right group circled in glyceraldehyde.
- ☐ Group circled in pyruvic acid.

Part B Pyruvic acid

State the type of functional group present on the middle carbon of pyruvic acid.

Part C **Lactic acid**

Give the systematic name for lactic acid.

Part D **Glyceraldehyde**

Draw a full structural formula for glyceraldehyde.

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Hops

A Level



Hops are used to give beers their bitter flavour. Traditionally the hop flavours are extracted by heating with water. The bitterness develops during this process when humulone in the hops is converted into a bitter-tasting isomer, iso-humulone.

Part A Functional groups

The structures of humulone and iso-humulone are shown below.

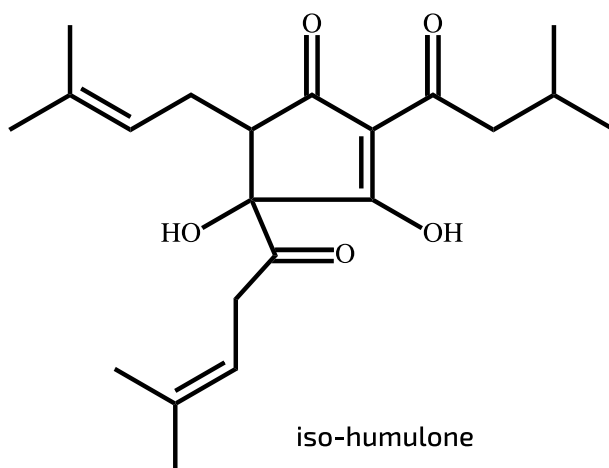
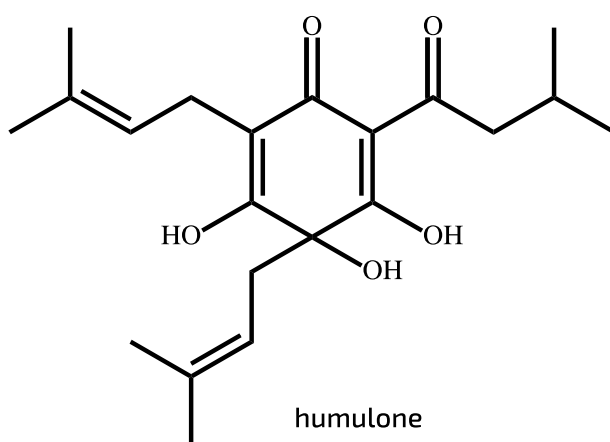


Figure 1: humulone and iso-humulone

Name three functional groups which are present in both humulone and iso-humulone. Give your answer in the format "A, B, C"

Part B Isomers

Why are humulone and iso-humulone considered to be isomers?

They share the same formula, but have different arrangements of within their , resulting in different properties.

Items:

structural

molecular

skeletal

molecules

atoms

isotopes

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Methyl ester

A Level



Combine the components below to create the condensed formula of methyl ethanoate.

Items:



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Nitrogen-containing compounds

Consider the three compounds **P** and **Q** and **R**.

**P****Q****R****Part A** **P**

To what class of organic compounds does compound **P** belong?

Part B **Q**

To what class of organic compounds does compound **Q** belong?

Part C **R**

To what class of organic compounds does compound **R** belong?

Part D **Structure of P**

Draw the structure of **P** in the [structure editor](#) and enter your answer as a SMILES string.

In the editor, after drawing your structure, click on the round, yellow smiley face to generate a SMILES string. Copy the SMILES string and paste it in the answer box.

[Using the structure editor](#)

Part E Structure of R

Draw the structure of **R** in the [structure editor](#) and enter your answer as a SMILES string.

In the editor, after drawing your structure, click on the round, yellow smiley face to generate a SMILES string. Copy the SMILES string and paste it in the answer box.

[Using the structure editor](#)

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