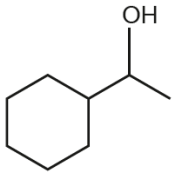
1. How can the molecule below be described?



A Aromatic and alicyclic

B Aliphatic and unsaturated

C Aromatic and unsaturated

D Alicyclic and saturated

Your answer ☐

[1]

2. Which type of reaction has the greatest atom economy?

A Substitution

B Hydrolysis

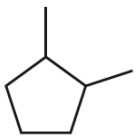
C Elimination

D Addition

Your answer ☐

[1]

3. What is the molecular formula of the compound below?



A C_7H_{10}

B C_7H_{12}

C C_7H_{14}

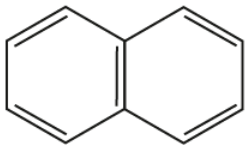
D C_7H_{16}

Your answer ☐

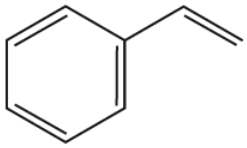
[1]

4 Which structure represents an alicyclic compound?

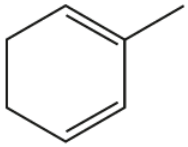
A



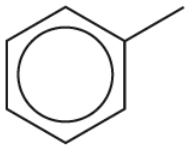
B



C



D



Your answer ☐

[1]

5 Which molecule is **not** planar?

A C_2H_4

B C_2H_6

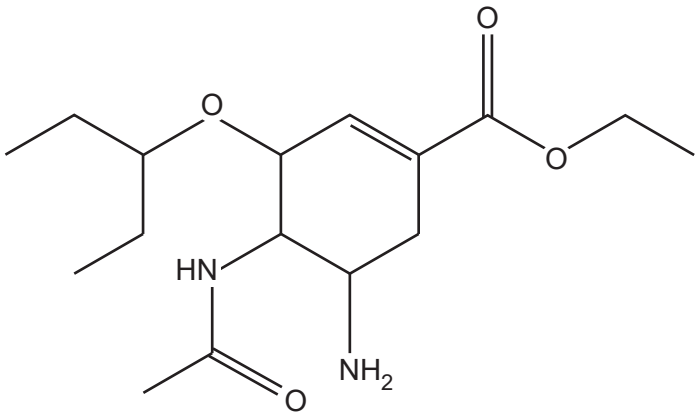
C H_2CO

D HCN

Your answer ☐

[1]

6. The structure of a compound used to treat influenza is shown below.



Which functional group(s) is/are in a molecule of the compound?

1 Ester

2 Secondary amide

3 Ketone

A 1, 2 and 3

B Only 1 and 2

C Only 2 and 3

D Only 1

Your answer ☐

[1]

7. This question is about reaction mechanisms.

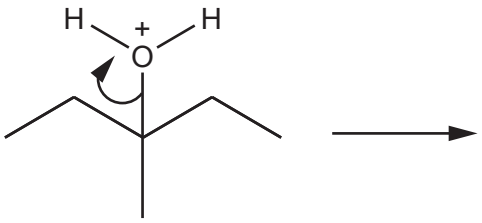
(a) Chemists use curly arrows in reaction mechanisms.

(i) What does a curly arrow show in a reaction mechanism?

.....

..... **[1]**

(ii) Draw structures to show the products in the reaction mechanism below.



[2]

(iii) Use the mechanism in **(ii)** to explain what is meant by **heterolytic fission**.

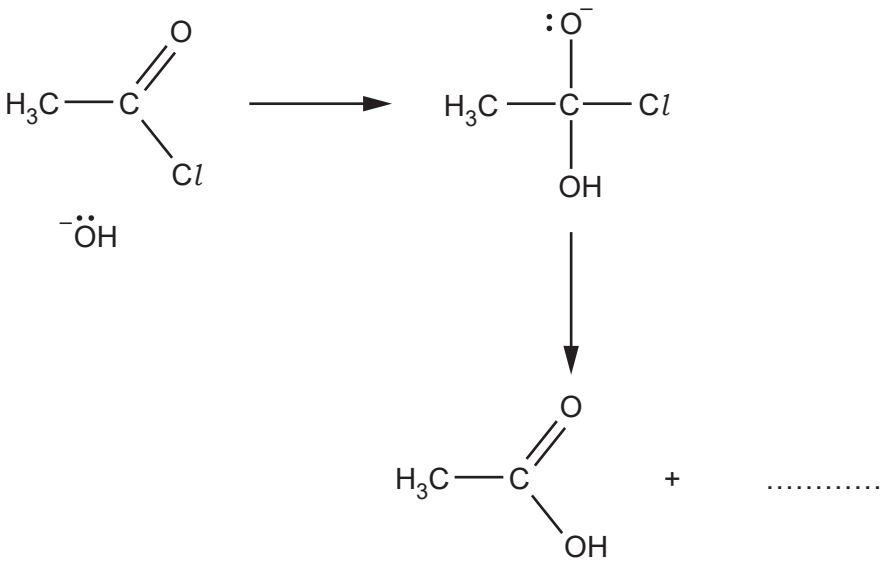
.....

.....

..... **[2]**

(b) An incomplete reaction mechanism is shown below.

(i) Complete the mechanism by adding curly arrows and any missing species.



[4]

(ii) What is the role of OH^- in this mechanism?

..... **[1]**

8. What is the number of alicyclic structural isomers of C_5H_{10}?

A 3

B 4

C 5

D 6

Your answer ☐

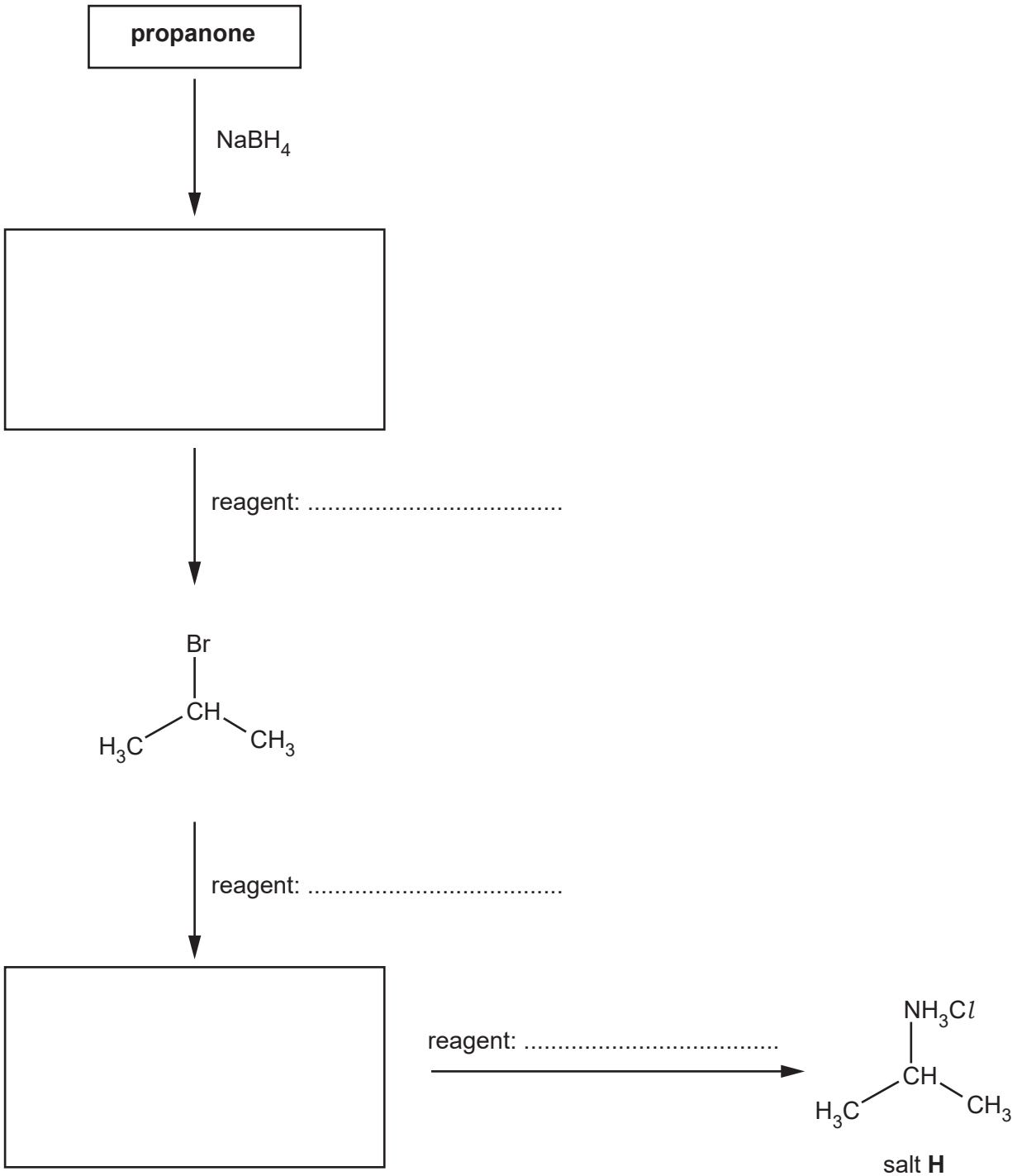
[1]

9. This question is about organic compounds containing nitrogen.

(a) Salt **H**, $(CH_3)_2CHNH_3Cl$, is used in the manufacture of garden weedkillers.

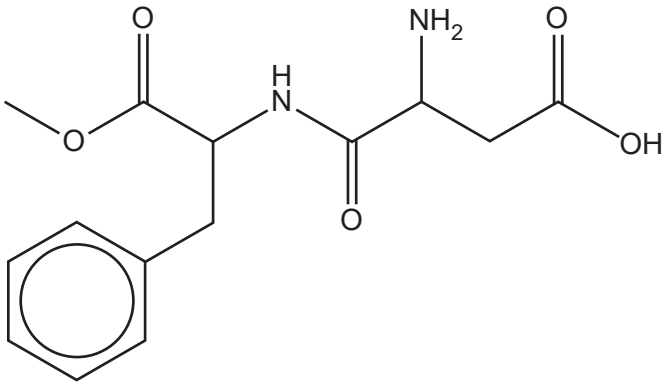
The flowchart shows the synthesis of the salt **H** from propanone.

Complete the flowchart.
Show structures for organic compounds.



[5]

(b) Aspartame, shown below, is an artificial sweetener commonly used as a sugar substitute.



aspartame

(i) Aspartame contains several functional groups.

Apart from the benzene ring, name the functional groups in aspartame.

.....

.....

.....

..... **[3]**

(ii) A sample of aspartame is hydrolysed with aqueous acid.

Draw the structures of the **three** organic products of the complete **acid hydrolysis** of aspartame.

[4]

(iii) Some people are concerned that aspartame, $C_{14}H_{18}N_2O_5$, may have adverse health effects.
Research shows that the safe maximum daily intake of aspartame is 1.7×10^{-4} mol kg^{-1}.

- A typical UK adult has a mass of 75 kg.
- A can of a diet drink contains 167 mg of aspartame.

How many cans of this diet drink is it safe for a typical adult to drink in one day?

Number of cans = ... **[3]**