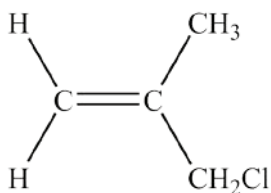


1. Methyl allyl chloride, MAC, is a chemical used in the production of insecticides. The structure of MAC is shown below.



MAC

- (a) (i) Give the **molecular** formula of MAC.

..... [1]

- (ii) Draw the **skeletal** formula of MAC.

[1]

- (iii) MAC has several structural isomers.

State what is meant by *structural isomers*.

.....

..... [1]

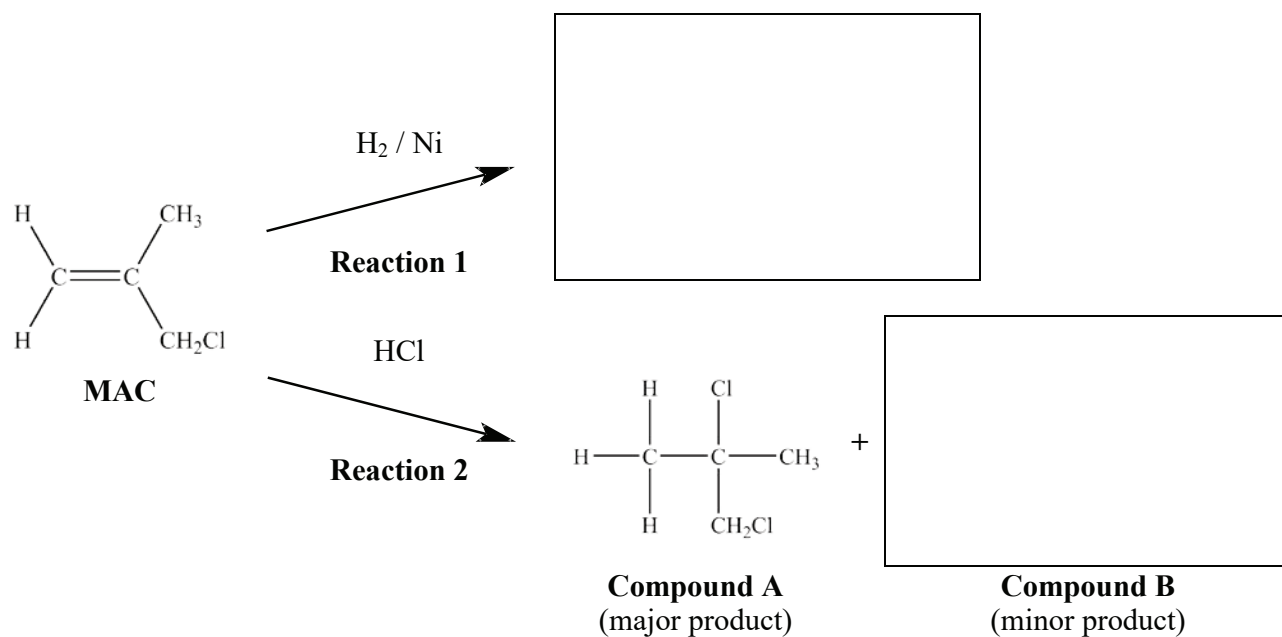
- (b) MAC is highly flammable. When MAC burns, one of the products formed is a toxic gas.

1.321 g of this gas occupies 1.053 dm³ at 100 kPa and 350 K.

Use the information provided to suggest the identity of the gas.

gas = [4]

(c) The flowchart below shows some reactions of MAC.



- (i) Complete the flowchart above.
- Draw the structure of the product of **Reaction 1**.
 - Draw the structure of the minor organic product of **Reaction 2** (Compound B).

[2]

- (ii) **Reaction 2** creates a mixture of compounds. Compound A is the major product.

Draw the mechanism for the formation of compound A.

Use curly arrows and show relevant dipoles.

[3]

(iii) Explain why compound **B** is the minor product of **Reaction 2**.

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

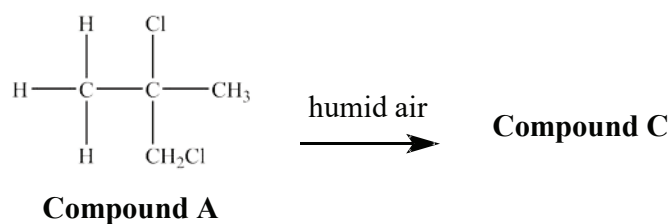
(iv) **MAC** reacts with water in the presence of $\text{AgNO}_3(\text{aq})$ and ethanol.

Draw the structure of the organic product of this reaction.

State what you would **observe** in this reaction and identify the compound responsible for the observation.

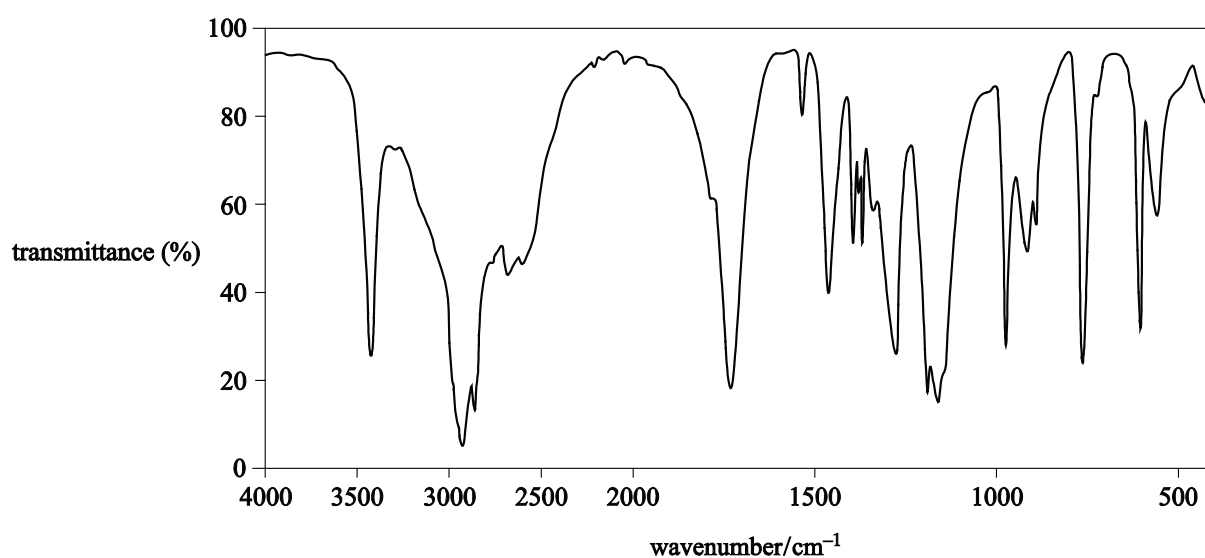
.....
..... [2]

(d) Compound A reacts slowly in humid conditions to form compound C.



Compound C contained the following percentage composition by mass:
 C, 46.1%; H, 7.7%; O, 46.2%

The infrared spectrum of compound C is shown below.



Using the information on the previous page, deduce the structure of compound C.

Give your reasoning.

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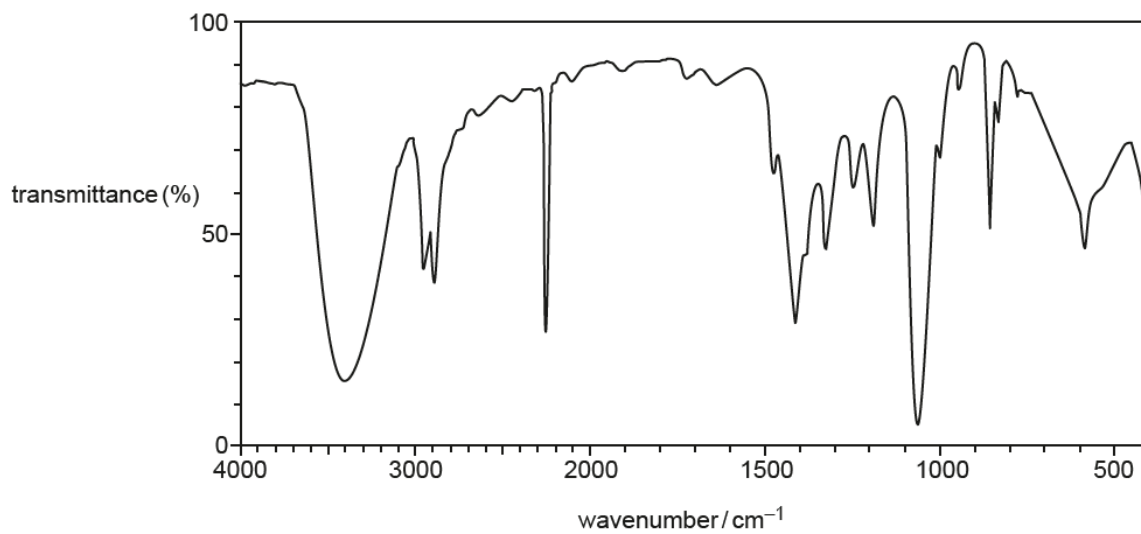
.....

structure =



[5]

2. Which compound could have produced the IR spectrum below?



- A $\text{CH}_3\text{CH}_2\text{OH}$
- B CH_3CHOHCN
- C CH_3COOH
- D CH_3CONH_2

Your answer

[1]