

A level Chemistry A

H432/02 Synthesis and analytical techniques

Question Set 8

1. This question is about unsaturated hydrocarbons.

(a) Compound **A** and compound **B** are isomers.



Compound **A** has a lower melting point than compound **B**. Suggest why.

(b) Compound **C**, $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_2\text{CH}_2\text{OH}$, exists as *cis* and *trans* stereoisomers.

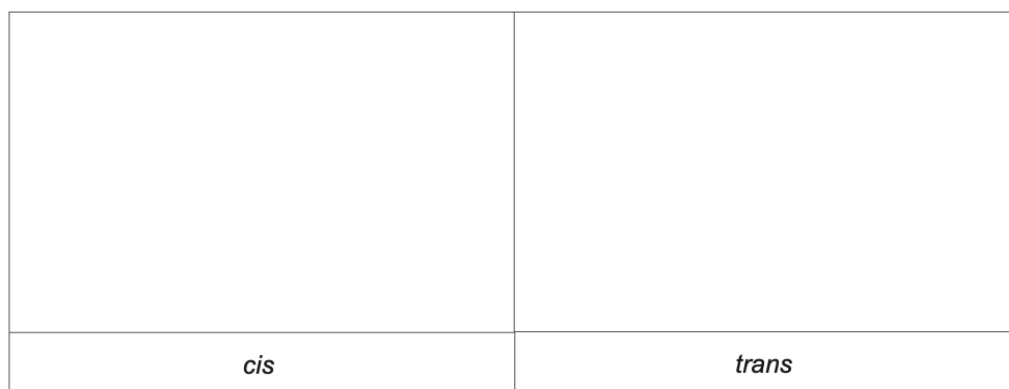
(i) Name compound **C**.

[1]

(ii) Define the term *stereoisomers*.

[1]

(iii) Draw the structures of the *cis* and *trans* stereoisomers of compound **C**.



[2]

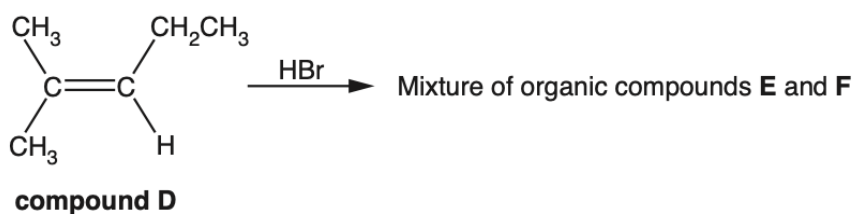
(c) The C=C group in an alkene contains a π -bond.

Complete the diagram below to show how p-orbitals are involved in the formation of a π -bond.



[1]

(d) Compound **D**, shown below, reacts with hydrogen bromide by electrophilic addition. A mixture of two organic compounds, **E** and **F**, is formed.



- (i) Suggest how an HBr molecule can act as an electrophile. [1]
- (ii) Draw the structures of the two organic compounds **E** and **F**. [1]

E	F

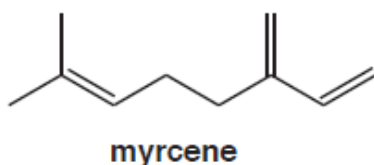
- (iii) Outline the mechanism of the reaction between compound **D** and hydrogen bromide to form **either** compound **E** **or** compound **F**. [2]

Include curly arrows and relevant dipoles.

- (iv) Which of **E** or **F** is the major organic product? [3]

Explain your answer.

- (e) Myrcene, C₁₀H₁₆, is a naturally occurring hydrocarbon containing more than one carbon-carbon double bond. [1]



- (i) Reaction of 204 mg of myrcene with hydrogen gas produces a saturated alkane. [2]

Calculate the volume of hydrogen gas, in cm³ and measured at RTP, needed for this reaction.

Show your working.

- (ii) 0.0200 mol of β-carotene reacts with 5.28 dm³ of hydrogen gas to form a saturated hydrocarbon. [2]

Using molecular formulae, construct a balanced equation for this reaction.

Include relevant calculations and reasoning.

[4]

Total Marks for Question Set 8: 20

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