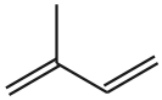
A level Chemistry A

H432/02 Synthesis and analytical techniques

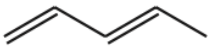
Question Set 8

1. This question is about unsaturated hydrocarbons.

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



compound A



compound B

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

(b) Compound **C**, $CH_3CH_2CH{=}CHCH_2CH_2OH$, exists as *cis* and *trans* stereoisomers.

(i) Name compound **C**.

[1]

(ii) Define the term *stereoisomers*.

[1]

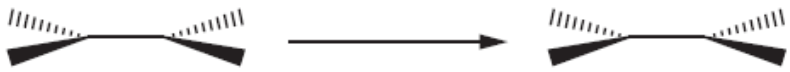
(iii) Draw the structures of the *cis* and *trans* stereoisomers of compound **C**.

cis	*trans*

[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.

compound D

(i) Suggest how an HBr molecule can act as an electrophile.

[1]

(ii) Draw the structures of the two organic compounds **E** and **F**.

E	**F**

[2]

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

Include curly arrows and relevant dipoles.

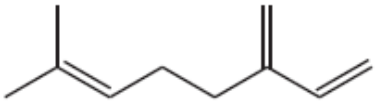
[3]

(iv) Which of **E** or **F** is the major organic product?

Explain your answer.

[1]

(e) Myrcene, $C_{10}H_{16}$, is a naturally occurring hydrocarbon containing more than one carbon-carbon double bond.



myrcene

[2]

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

Calculate the volume of hydrogen gas, in cm^3 and measured at RTP, needed for this reaction.

Show your working.

[2]

(ii) 0.0200 mol of β-carotene reacts with 5.28 dm^3 of hydrogen gas to form a saturated hydrocarbon.

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

Include relevant calculations and reasoning.

[4]

Total Marks for Question Set 8: 20