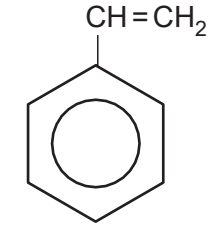
AS Level Chemistry B

H033/02 Chemistry in depth

Question Set 2

2 Poly(phenylethene), commonly known as 'polystyrene', can be used to make packaging.The monomer phenylethene is shown below.

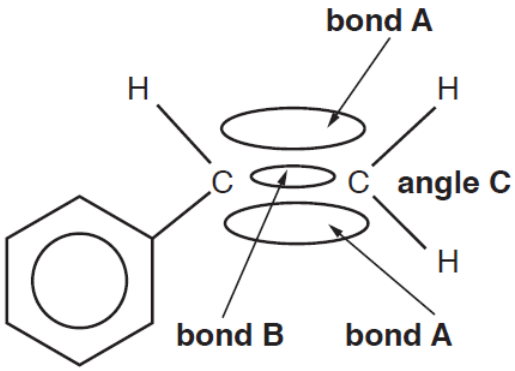


phenylethene

(a) Draw the structure of the repeating unit of poly(phenylethene).

[1]

(b) The bonding between the carbon atoms in phenylethene can be represented as shown below.



(i) Name the **types** of bond represented by **A** and **B**.

Bond **A** .....

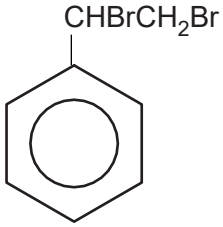
Bond **B** ..... **[1]**

(ii) State and explain the bond angle **C**.

Bond angle **C** = ...°

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

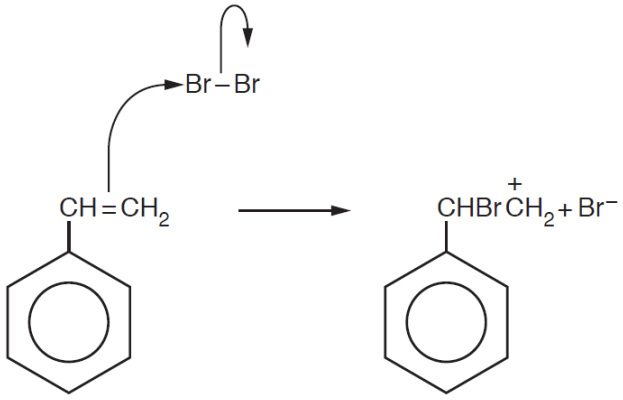
(c) Phenylethene is polymerised in the laboratory. Any unreacted phenylethene can be detected by adding aqueous bromine to the reaction mixture. Bromine reacts to produce **compound A**.



compound A

(i) What colour **change** would be observed when phenylethene reacts with aqueous bromine? **[1]**

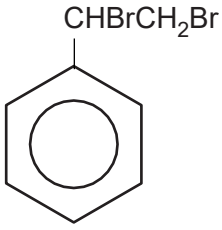
(ii) The first step in the mechanism for the reaction of phenylethene with bromine is shown below.



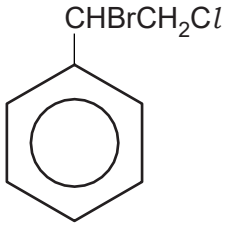
intermediate 1

What name is given to the **type** of organic intermediate, such as **intermediate 1**, formed in the reaction? **[1]**

(iii) If an aqueous mixture of bromine and potassium chloride is added to phenylethane some of **compound B** is produced, as well as **compound A**.



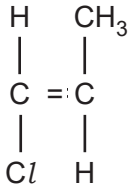
compound A



compound B

Use the mechanism shown in **(c)(ii)** to explain why both **compound A** and **compound B** are formed. **[1]**

(d) Another substituted alkene is 1-chloroprop-1-ene, shown below

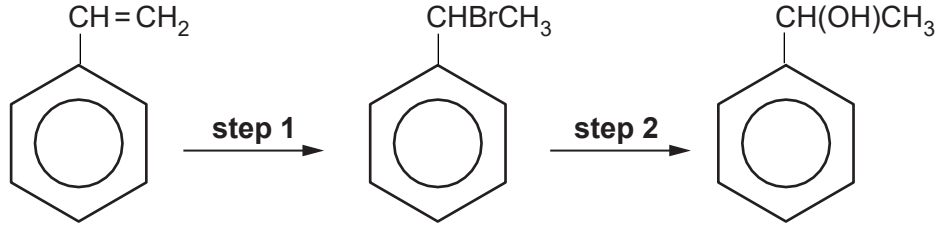


1-chloroprop-1-ene

Unlike phenylethene, 1-chloroprop-1-ene shows *E/Z* stereoisomerism.

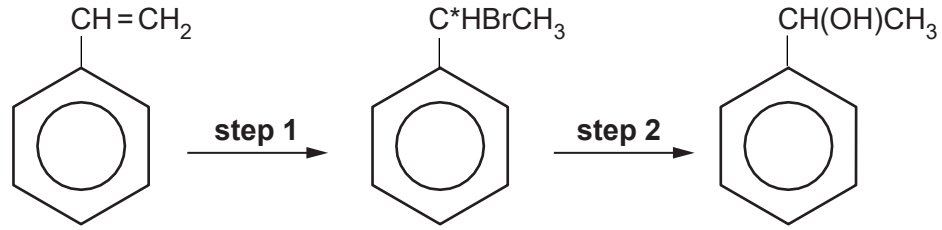
Describe how this *E/Z* isomerism arises. **[2]**

(e) 1-phenylethanol is a compound that is used when making perfumes.
1-phenylethanol can be prepared in the laboratory from phenylethene in two steps.



phenylethene **1-phenyl-1-bromoethane** **1-phenylethanol**

(i) Give the reagent that you would use for **step 1**. **[1]**



phenylethene **1-phenyl-1-bromoethane** **1-phenylethanol**

(ii) Draw a diagram to show the three-dimensional arrangement of the atoms around thecarbon atom C* in 1-phenyl-1-bromoethane.

[1]

(iii) 1-phenylethanol is an example of a secondary alcohol.

Explain why the alcohol is classified as *secondary*. **[1]**

(iv) 1-phenylethanol is reacted with potassium dichromate(VI) in sulfuric acid.

Draw the structural formula of the product of this reaction.

[1]

Total Marks for Question Set 2: 14