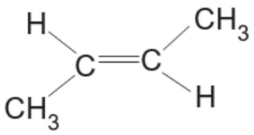
Oxford Cambridge and RSA

GCSE Chemistry A (Gateway Science)

J248/04 Chemistry A C4-C6 and C7 (Higher Tier)

Question Set 17

1 Look at the displayed formula of the monomer butene.



(a) What feature of butene molecules allows them to act as monomers? **[1]**

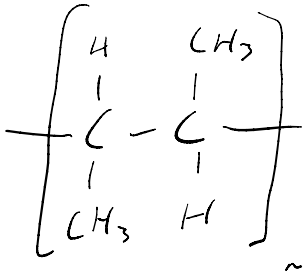
C = C group is present

(b) Butene is an alkene.

What is the **general formula** for an alkene? C_nH_{2n} **[1]**

(c) Butene undergoes **addition polymerisation** to form poly(butene).

Write the **displayed formulae**, for poly(butene). **[2]**



(d) DNA molecules are polymers made from four different monomers.

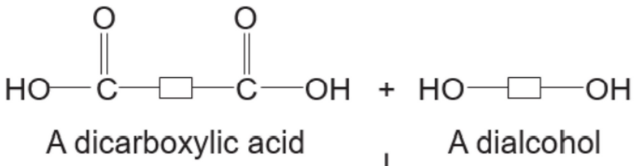
What are the monomers in DNA called? Nucleotides **[1]**

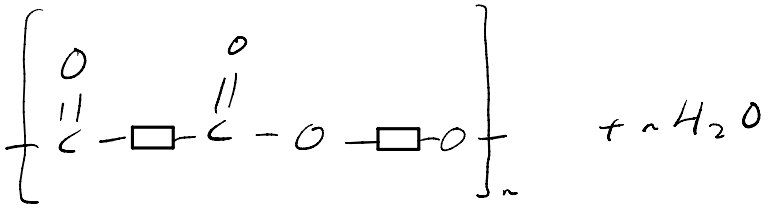
(e) Polyesters are polymers made by **condensation polymerisation**.

(i) What is the minimum number of **functional groups** that a monomer must have to form a condensation polymer? 2 **[1]**

(ii) Polyesters are made from a carboxylic acid and an alcohol.

Complete the block diagram to show the formation of a polyester. **[2]**





(iii) What is the **formula** of the molecule that is eliminated in the reaction to form a polyester? **[1]**

H_2O

(f) Nylon is another polymer formed in a condensation polymerisation reaction.

Nylon can be made from hexanedioyl dichloride and hexane-1,6-diamine. Both chemicals are highly corrosive.

A solvent is needed which is highly flammable.

(i) Describe how to make nylon in a laboratory. **[3]**

- Use 2 solutions, one containing hexanedioyl dichloride and one containing hexane-1,6-diamine.
- Add the diamine solution to a conical flask.
- Carefully pour the second solution over the first, in order to form a layer of the first solution.
- Nylon forms between these layers, which can then be carefully pulled out using forceps and wound around a glass rod

(ii) Describe and explain **three** precautions needed to control the hazards in this experiment. **[3]**

- HCl fumes are formed → experiment should be carried out in a fume cupboard.

- Corrosive acids → skin and eye protection should be used in order to prevent injury from splashing.

- & flammable solvent → eliminate all ignition sources such as flames, sparks and hot surfaces.

Total Marks for Question Set 17: 15