InkChemistry

QUESTION WORKBOOK

Condensation polymers and the disposal of polymers

Carbonyls and carboxylic acids · Unit C20

AQA 3.3.12.1, 3.3.12.2 · OCR A 6.2.3

19 questions · 61 marks

NAVY SCREEN EDITION

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SECTION A · Short, 1 to 2 marks

A1 CPD-Q8 Explain why nylon-6,6 has a much higher melting point than poly(ethene). [2]

A2 CPD-Q13 Suggest why waste PVC is a particular problem for incineration. [2]

A3 CPD-Q15 Suggest why a biodegradable polyester cup may still be found intact after many years in a landfill site. [2]

SECTION B · Standard, 3 to 5 marks

B1 CPD-Q3 Give the names and formulae of the two monomers used to make nylon-6,6, and the products of its complete hydrolysis by hot dilute hydrochloric acid. [4]

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B2 CPD-Q4 Draw the repeating unit of the polymer formed from ethane-1,2-diol and butanedioic acid, and give the type of polymer and the small molecule lost. [4]

B3 CPD-Q11 Compare addition polymerisation with condensation polymerisation. [4]

B4 CPD-Q19 Suggest the type of polymerisation shown by propenamide, $CH_2=CHCONH_2$, and by 4-aminobutanoic acid, $H_2N(CH_2)_3COOH$, and give the repeating unit of each polymer. [4]

B5 CPD-Q2 State what is meant by condensation polymerisation, and state the type of link, with its structure, in a polyester and in a polyamide. [3]

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B6 CPD-Q5 Identify the two monomers that form the polymer with repeating unit $-OC(CH_2)_3COOCH_2CH_2O-$, and the type of polymer. [3]

B7 CPD-Q6 Explain why Kevlar fibres are very strong. [3]

B8 CPD-Q7 Explain why polyesters are biodegradable but poly(ethene) is not. [3]

B9 CPD-Q9 Calculate the mean number of repeating units in a Terylene chain of Mr 38 400. The repeating unit is $-OCC_6H_4COOCH_2CH_2O-$. [3]

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B10 CPD-Q10 Calculate the mass of water released when 2.00 kg of nylon-6,6 is made from hexanedioic acid and hexane-1,6-diamine. The repeating unit has Mr 226.0 and contains two amide links. [3]

B11 CPD-Q14 Suggest the type of polymer formed by 4-hydroxybutanoic acid, $HOCH_2CH_2CH_2COOH$, on its own, its repeating unit, and whether it is biodegradable. [3]

B12 CPD-Q16 Describe the products of heating Terylene with aqueous sodium hydroxide, and how benzene-1,4-dicarboxylic acid is then recovered. [3]

B13 CPD-Q18 Explain how a photodegradable polyalkene breaks down, and why a photodegradable bag buried in landfill does not. [3]

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B14 CPD-Q20 Calculate the maximum mass of ethane-1,2-diol, Mr 62.0, recovered when 2.40 kg of PET, repeating unit $-OCC_6H_4COOCH_2CH_2O-$ of Mr 192.0, is completely hydrolysed by aqueous sodium hydroxide. [3]

B15 CPD-Q21 Justify the description of the polymer whose chain is $-NH(CH_2)_5CO-NH(CH_2)_5CO-NH(CH_2)_5CO-$ as a polyamide made by condensation from a single monomer, and give the monomer. [3]

SECTION C · Long, 6 marks or more

C1 CPD-Q12 Evaluate a supermarket's plan to replace its poly(ethene) carrier bags with bags made from a polyester, with reference to the bonds in each polymer and to how each can be disposed of. [6]

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