InkChemistry

QUESTION WORKBOOK

Alcohols: hydration, fermentation and classification

Alkenes and alcohols · Unit C18

AQA 3.3.5.1, 3.3.5.2 · OCR A 4.2.1

21 questions · 61 marks

NAVY SCREEN EDITION

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SECTION A · Short, 1 to 2 marks

A1 AHF-Q1
State what is meant by a secondary alcohol, and give the name of a secondary alcohol with three carbon atoms. [2]

A2 AHF-Q5
Explain why air is kept out of a fermentation vessel. [2]

A3 AHF-Q13
Explain why the solubility of alcohols in water decreases as the carbon chain gets longer. [2]

A4 AHF-Q14
Suggest why Brazil makes most of its fuel ethanol by fermentation rather than by the hydration of ethene. [2]

A5 AHF-Q20
Suggest why small scraps of waste sodium are destroyed in the laboratory by adding them to ethanol rather than to water. [2]

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A6 AHF-Q17 State what is meant by the term biofuel. [1]

SECTION B · Standard, 3 to 5 marks

B1 AHF-Q10 Compare the production of ethanol by fermentation with its production by the hydration of ethene. [4]

B2 AHF-Q16 Outline the mechanism for the acid-catalysed hydration of ethene to ethanol. [4]

B3 AHF-Q2 Identify each of these alcohols as primary, secondary or tertiary: 2-methylpropan-1-ol, pentan-3-ol and 2-methylbutan-2-ol. [3]

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B4 AHF-Q3 Give the conditions used to make ethanol by fermentation. [3]

B5 AHF-Q4 Explain why fermentation is carried out at about 35 °C rather than at 20 °C or at 60 °C. [3]

B6 AHF-Q6 Give an equation, with state symbols, for the industrial hydration of ethene, and give the temperature and the catalyst used. [3]

B7 AHF-Q8 Calculate the volume of carbon dioxide, at room temperature and pressure, released when 90.0 g of glucose is fully fermented. Mr of glucose is 180.0, and one mole of gas occupies 24.0 dm^3 at room temperature and pressure. [3]

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B8 AHF-Q9 Explain why a temperature of about 300 °C is used for the hydration of ethene, although the forward reaction is exothermic. [3]

B9 AHF-Q12 Explain why ethanol (Mr 46.0) boils at 78 °C while propane (Mr 44.0) boils at -42 °C. [3]

B10 AHF-Q15 Suggest the major product formed when propene reacts with steam in the presence of an acid catalyst, and explain your answer. [3]

B11 AHF-Q18 Explain why sodium reacts less vigorously with ethanol than with water. [3]

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B12 AHF-Q19 Calculate the volume of hydrogen, at room temperature and pressure, given off when 0.230 g of sodium reacts with excess ethanol. Ar of Na is 23.0, and one mole of gas occupies 24.0 dm^3 at room temperature and pressure. [3]

B13 AHF-Q21 Calculate the mass of glucose that must be fermented to make 2.30 tonnes of ethanol, assuming all the glucose is fermented. Mr: glucose 180.0, ethanol 46.0. [3]

B14 AHF-Q22 Show that the percentage atom economy for making ethanol by the fermentation of glucose is 51.1%. Mr: glucose 180.0, ethanol 46.0, carbon dioxide 44.0. [3]

SECTION C · Long, 6 marks or more

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C1 AHF-Q11 Evaluate the claim that ethanol produced by fermentation is a carbon neutral fuel. Include equations in your answer. [6]

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