InkChemistry

QUESTION WORKBOOK

Alkanes: fractional distillation, cracking and combustion

Alkanes and halogenoalkanes · Unit C17

AQA 3.3.2.1, 3.3.2.2, 3.3.2.3 · OCR A 4.1.2

19 questions · 58 marks

PRINT EDITION

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SECTION A · Short, 1 to 2 marks

A1 AF-Q5

Explain why the residue from the fractionating column is distilled again at reduced pressure. [2]

A2 AF-Q9

Complete the equation for the cracking of tetradecane into octane and propene only: $C_{14}H_{30}(g) \rightarrow C_8H_{18}(g) + \ldots$ [2]

A3 AF-Q20

Suggest an equation for the reforming of heptane, C_7H_{16}, into methylbenzene, C_7H_8, and suggest a use for the other product. [2]

A4 AF-Q22

Suggest why nitrogen and oxygen in the air do not react at room temperature, although they do inside a car engine. [2]

SECTION B · Standard, 3 to 5 marks

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B1 AF-Q1 Explain, using the general formula of the alkanes, what is meant by describing an alkane as saturated, and why cracking a long-chain alkane always produces at least one alkene. [4]

B2 AF-Q4 Describe how crude oil is separated into fractions by fractional distillation. [4]

B3 AF-Q8 Compare thermal cracking with catalytic cracking. [4]

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B4
AF-Q14

Give an equation for the reaction of carbon monoxide with nitrogen monoxide in a catalytic converter, and name a metal used as its catalyst. Give an equation for the removal of sulfur dioxide from flue gases by calcium carbonate, and name the useful product made from it. [4]

B5
AF-Q18

Evaluate the claim that a car fitted with a catalytic converter produces a harmless exhaust. [4]

B6
AF-Q3

Explain why 2,2-dimethylpropane boils at 10 °C while its isomer pentane boils at 36 °C. [3]

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B7 AF-Q11 Calculate the mass of carbon dioxide formed when 500 g of hexane, C_6H_{14}, burns completely. Ar: H 1.0, C 12.0, O 16.0. [3]

B8 AF-Q12 Calculate the volume of oxygen needed for the complete combustion of 2.40 dm^3 of propane, and the volume of carbon dioxide formed, both at room temperature and pressure. [3]

B9 AF-Q13 Explain how nitrogen monoxide is formed in a petrol engine, and give one environmental problem it causes. [3]

B10 AF-Q15 Suggest why the catalyst in a catalytic converter is spread as a thin layer over a ceramic honeycomb, and why a converter removes little pollution during the first few minutes of a journey. [3]

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B11 AF-Q16 Suggest why calcium oxide removes sulfur dioxide from the flue gases of a coal-fired power station, give an equation for the reaction, and suggest why the sulfur is removed after burning rather than from the coal. [3]

B12 AF-Q17 Explain how carbon dioxide in the atmosphere causes the greenhouse effect. [3]

B13 AF-Q19 Explain why refineries reform straight-chain alkanes such as hexane into branched and cyclic hydrocarbons for use in petrol. [3]

B14 AF-Q21 Explain, with equations, how nitrogen dioxide in the air acts as a catalyst in the formation of acid rain from sulfur dioxide. [3]

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B15
AF-Q23

Show that the complete combustion of 1.00 kg of octane, C_8H_{18}, releases about 48 MJ, given that the enthalpy of combustion of octane is -5470 kJ mol^{-1}. Ar: H 1.0, C 12.0. [3]

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