

ALKANES MS

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|----|-------|---|---|
| 1. | (i) | species with an unpaired electron (1) | 1 |
| | (ii) | uv (light)/high temperature/min of 400° C/sunlight (1) | 1 |
| | (iii) | homolytic (fission) (1) | 1 |
| | (iv) | $\text{C}_4\text{H}_{10} + \text{Cl}\cdot \text{ (1)} \rightarrow \text{C}_4\text{H}_9\cdot + \text{HCl (1)}$
$\text{C}_4\text{H}_9\cdot + \text{Cl}_2 \text{ (1)} \rightarrow \text{C}_4\text{H}_9\text{Cl} + \text{Cl}\cdot \text{ (1)}$ | 2 |

[5]

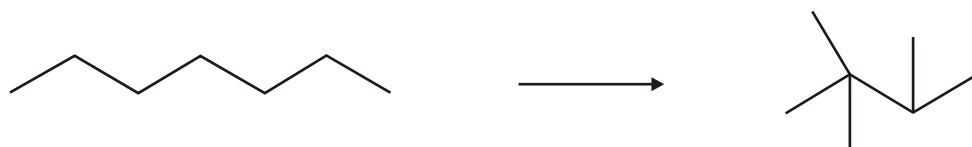
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|----|-------|--|---|
| 2. | (i) | $\text{Cl}_2 \rightarrow 2\text{Cl}\cdot$ | 1 |
| | (ii) | uv (light)/high temperature/min of 400 C/sunlight | 1 |
| | (iii) | $\text{Cl}\cdot + \text{C}_6\text{H}_{12} \rightarrow \text{C}_6\text{H}_{11}\cdot + \text{HCl}$
$\text{C}_6\text{H}_{11}\cdot + \text{Cl}_2 \rightarrow \text{C}_6\text{H}_{11}\text{Cl} + \text{Cl}\cdot$ | 1 |
| | (iv) | react with each other/suitable equation | 1 |

[5]

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|----|-------|--|---|
| 3. | (i) | homolytic ✓ | 1 |
| | (ii) | $\text{Cl}_2 \rightarrow 2\text{Cl}\cdot$ (need • on the Cl... penalise only once in the 3 equations) ✓ | 1 |
| | (iii) | I $(\text{C}_5\text{H}_{10}) + \underline{\text{Cl}\cdot} \rightarrow (\cdot\text{C}_5\text{H}_9) + \underline{\text{HCl}} \checkmark$
II $(\cdot\text{C}_5\text{H}_9) + \underline{\text{Cl}_2} \rightarrow \underline{\text{C}_5\text{H}_9\text{Cl}} + \underline{\text{Cl}\cdot} \checkmark$ | 1 |
| | | | 1 |

[4]

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|----|-----|-------|---|---|
| 4. | (a) | (i) | compound/molecule containing hydrogen and carbon only | 1 |
| | | (ii) | $\text{C}_{10}\text{H}_{22}$ | 1 |
| | | (iii) | C_5H_{11} {ecf from (ii)} | 1 |
| | (b) | (i) | (a particle that) contains/has a single/unpaired electron | 1 |
| | | (ii) | UV (light) /sunlight/high temp | 1 |
| | | (iii) | homolytic (fission)/ homolysis | 1 |
| | | (iv) | $\text{C}_{12}\text{H}_{26} + \text{Cl}\cdot \rightarrow \cdot\text{C}_{12}\text{H}_{25} + \text{HCl}$
(the dot for the free radical does not have to be on the C)
$\cdot\text{C}_{12}\text{H}_{25} + \text{Cl}_2 \rightarrow \text{C}_{12}\text{H}_{25}\text{Cl} + \text{Cl}\cdot$ | 1 |
| | | (v) | six | 1 |
| | (c) | (i) | $\text{C}_{12}\text{H}_{26} \rightarrow 2\text{C}_2\text{H}_4 + 1\text{C}_8\text{H}_{18}$
(1 mark for correct formula of octane or ethene) | 2 |
| | | (ii) | octane/ ecf from (c) (i) | 1 |
| | (d) | (i) | | |



1 mark for correct reagent and 1 mark for correct product.

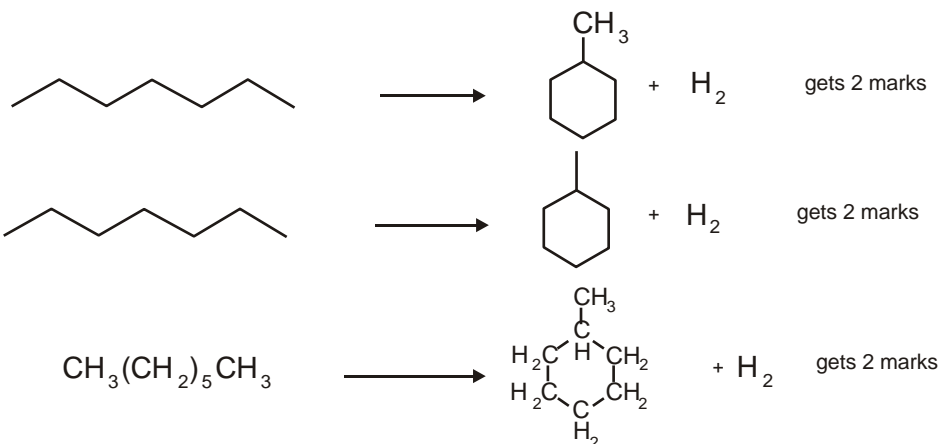
2

(ii) 1 mark for any unambiguous formula of cyclohexane

1

1 mark for H_2 but check that formula of heptane is correct/equation balanced.

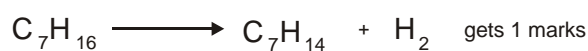
1



gets 2 marks

gets 2 marks

gets 2 marks



gets 1 marks

[16]

5. (i) (free radical) substitution

1

(ii) 1-bromohexane, 2-bromohexane and 3-bromohexane

3

[4]

6. (a) (i) uv/sunlight/high temperature (range 400 – 700 °C)

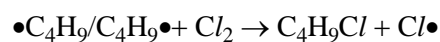
1

(ii) $\text{Cl}_2 \rightarrow 2\text{Cl}\bullet$

1



1



1

(iii) any two free radicals from (a) (ii)

1

(iv) homolytic (fission)

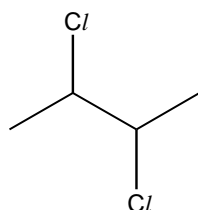
1

(b) (i) 2,3-dichlorobutane

1

(ii)

1



(iii) any dichlorobutane **except** 2,3-dichlorobutane.

1

[9]