

14. Hydrocarbons

14.1 Alkanes

Paper 2

Marking Scheme

Q1.

(b)(i)	a species with one or more unpaired electrons	1
(b)(ii)	ultraviolet	1
(b)(iii)	$C_2H_6 + Cl^\bullet \rightarrow C_2H_5^\bullet + HCl$	1
	$C_2H_5^\bullet + Cl_2 \rightarrow C_2H_5Cl + Cl^\bullet$	1

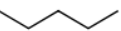
Q2.

(d)(i)	ultraviolet light	1												
(d)(ii)	<table border="1"> <thead> <tr> <th>name of stage</th> <th>equation</th> <th></th> </tr> </thead> <tbody> <tr> <td>initiation</td> <td>$Cl_2 \rightarrow 2Cl^\bullet$</td> <td>[1]</td> </tr> <tr> <td>propagation</td> <td>$CH_2Cl_2 + Cl^\bullet \rightarrow CHCl_2^\bullet + HCl$</td> <td>[1]</td> </tr> <tr> <td>termination</td> <td>$CHCl_2^\bullet + Cl^\bullet \rightarrow CHCl_3$</td> <td>[1]</td> </tr> </tbody> </table>	name of stage	equation		initiation	$Cl_2 \rightarrow 2Cl^\bullet$	[1]	propagation	$CH_2Cl_2 + Cl^\bullet \rightarrow CHCl_2^\bullet + HCl$	[1]	termination	$CHCl_2^\bullet + Cl^\bullet \rightarrow CHCl_3$	[1]	3
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Q3.

(a)(i)	$C_8H_{18} + 12\frac{1}{2} O_2 \rightarrow 8CO_2 + 9H_2O$ M1 correct formula of M C_8H_{18} M2 balanced equation showing complete combustion of M	2
(a)(ii)	<ul style="list-style-type: none"> • C • CO • unburnt hydrocarbons • less/no CO_2 Two correct for one mark, three correct for two marks.	2

Q4.

(a)(i)	(compounds / molecules) containing only / entirely carbon and hydrogen (atoms)	1
(a)(ii)	crude oil	1
(b)(i)	(thermal) cracking	1
(b)(ii)	<i>structure of W</i> $\begin{array}{c} CH_3 \\ \\ H_2C-CH_2 \\ \\ H_2C-CH_3 \end{array}$ OR $CH_3(CH_2)_3CH_3$ OR 	1

Q5.

(a)(i)	Cl	1
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Q6.

(a)	name of source crude oil / petroleum	1
	outline of separation of hydrocarbons (separation of molecules according to) different boiling points	1
(b)(i)	cracking	1
(b)(ii)	$2C_7H_{16} \rightarrow C_4H_{10} + C_6H_{14} + 2C_2H_4$	1

Q7.

(d)(iii)	propagation	1
(d)(iv)	$CH_4 + (\bullet)Cl \rightarrow (\bullet)CH_3 + HCl$ OR $CH_4 + (\bullet)Cl \rightarrow HCl + CH_3(\bullet)$	1

Q8.

(e)(i)	ultra-violet (light) / sunlight	1
(e)(ii)	$C_2H_6 + Cl_2 \rightarrow C_2H_5Cl + HCl$	1

Q9.

(a)(i)	cracking	1
(a)(ii)	enthalpy change of combustion / ΔH_c is high / large energy release (per mole / per unit mass) OR combust / burn easily	1

Q10.

(b)	Produces more useful / more valuable / higher demand substances / alkanes / alkenes	1
(c)(i)	$C_{12}H_{26} \rightarrow 2C_2H_4 + C_8H_{18}$	1