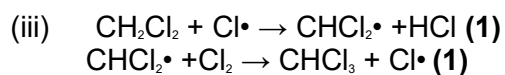
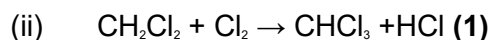
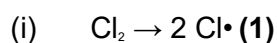


M1. Penalise missing • once only



Can reverse order

(iv) Effect on rate: increases (1) **If decrease given C.E zero marks**

Explanation: more Cl• radicals formed (1)

More Cl atoms, more Cl—Cl or Cl₂ bonds broken, more Cl₂ have

E_a, increased rate of Cl• production

[6]

M2.D

[1]

M3.B

[1]

M4.B

[1]

M5. (a) *Condition:* U.V. light or sunlight or 450°C or high temp (1)

Explanation: U.V. light etc. provides energy to break(Cl- Cl) bond (1)

Do not accept reference to E_a or wrong bond or 'to make Cl

(b) (i) (Free) radical substitution (1)

(ii) Step 1: initiation (1)

Step 2: propagation (1)

Step 3: termination (1)

Any order

Don't be too harsh on spelling

4

(c) (i) Equation 1: $\text{CH}_3 + \text{Cl}\cdot \rightarrow \text{CH}_2\text{Cl}\cdot + \text{HCl}$ (1)
Equation 2: $\text{CH}_2\text{Cl}\cdot + \text{Cl}_2 \rightarrow \text{CH}_2\text{Cl}_2 + \text{Cl}\cdot$ (1)

or $\text{CH}_2\text{Cl}\cdot + \text{Cl}\cdot \rightarrow \text{CH}_2\text{Cl}_2$

Mark equ independently

any order

(ii) $\text{CH}_2\text{Cl}\cdot + \text{CH}_3\cdot \rightarrow \text{CH}_3\text{CH}_2\text{Cl}$ (1)

or $\text{CH}_3\text{CH}_2\cdot + \text{Cl}_2 \rightarrow \text{CH}_3\text{CH}_2\text{Cl} + \text{Cl}\cdot$

or $\text{CH}_3\text{CH}_2\cdot + \text{Cl}\cdot \rightarrow \text{CH}_3\text{CH}_2\text{Cl}$

Equ must have $\text{CH}_3\text{CH}_2\text{Cl}$ as product

Accept $\text{C}_2\text{H}_5\text{Cl}$

Penalise absence of \cdot once only

3

[9]