

Mark schemes

1

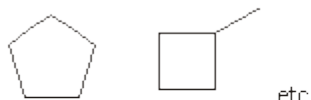
[1]

2

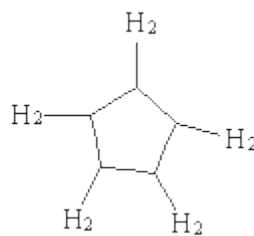
(a) **A** any C₅ alkene

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B

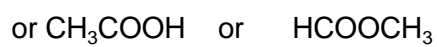
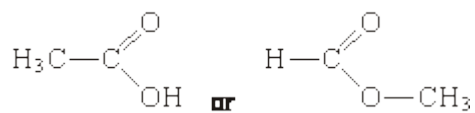


penalise



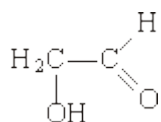
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(b) **C**



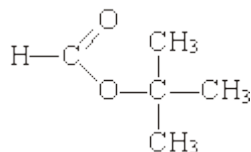
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D



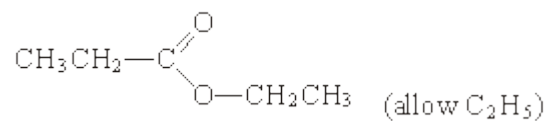
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(c) **E**



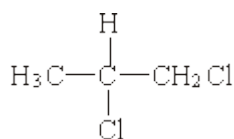
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F



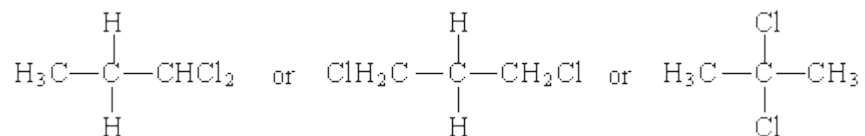
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(d) **G**



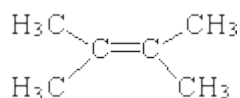
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H



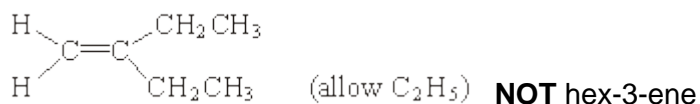
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(e) **I**



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J



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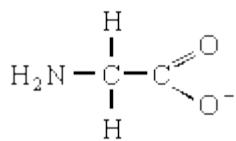
(a) 2-amino(e) propanoic acid (1)

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(b) (i) molecules with same structure / structural formula (1)
but with bonds (**atoms or groups**) arranged differently in
space (3D) (1)

(ii) Plane polarised light (1)
Rotated (equally) in opposite directions (1)

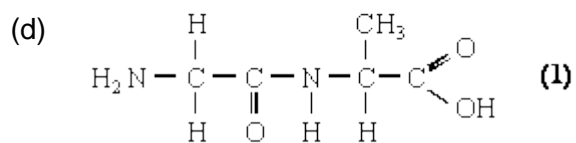
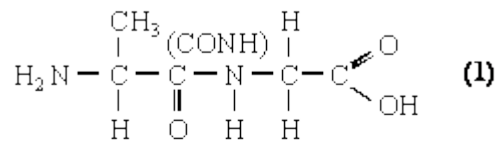
4



allow $\text{H}_2\text{NCH}_2\text{COO}^-$

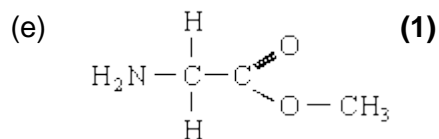
Penalise NH_2^- and OH^- once per paper
but CH_3^- is allowed

1



Not anhydrides; not repeating units

2



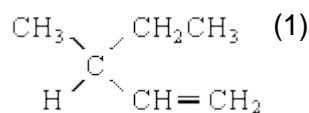
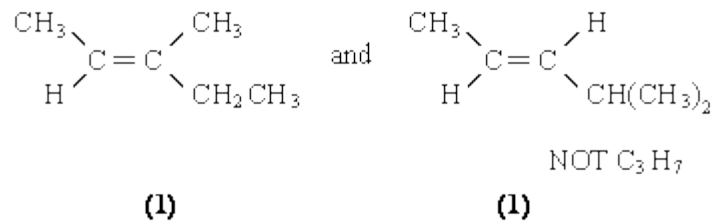
or $\text{H}_2\text{NCH}_2\text{COOCH}_3$

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[9]

5

[1]

6(a) **Structure of P:****Structures of Q and R:***Q and R in any order*

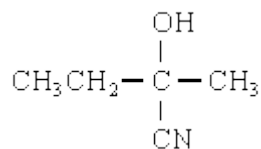
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- (b) (i) **Racemic mixture:** equal mixture of optical isomers / enantiomers
OR in explanation

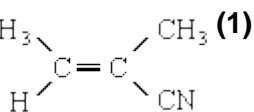
Explanation: planar (>C=O) (1)
attack from either side is equally likely (1)

- (ii) **Reagent S:** HCN or (KCN / HCl or H₂SO₄) (1)

Compound T:



Compound U:



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[9]**7**

- (a) (i) 0.86 (1)
(ii) total moles = 0.86 + 0.43 + 0.085 = 1.375 (1)

$$\therefore \text{mole fraction of H}_2 = \frac{0.86}{1.375} = 0.625 \quad (1)$$

(0.62 - 0.63)

Conseq on (i)

(iii) $pp = \text{mole fract}^n \times \text{total P (1)}$
 $= 0.625 \times 1.75 \times 10^4$
 $= 1.09 \times 10^4 \text{ (kPa) (1)}$
or 1.1(0)
Ignore units
Conseq on (ii)

5

(b) (i) $K_p = \frac{P_{\text{CH}_3\text{OH}}}{P_{\text{H}_2}^2 \times P_{\text{CO}}} \text{ (1)}$

Penalise []

(ii) $K_p = \frac{2710}{(12300)^2 \times (7550)} = 2.37 \text{ (2.4)} \times 10^{-9} \text{ (1)}$

OR 2.37×10^{-15}

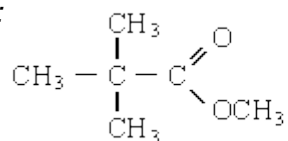
Units: kPa⁻² (1)

or Pa⁻²

not conseq to wrong K_p expression

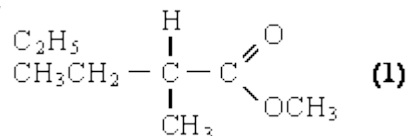
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(c) *Isomer E:*



allow
(1) $(\text{CH}_3)_3\text{CCOOCH}_3$
or
 $(\text{CH}_3)_3\text{CCO}_2\text{CH}_3$

Isomer F:



2

[10]

8

[1]

9

[1]