

M1.B

[1]

M2.A

[1]

M3. (a) *Electrophile*: e<sup>-</sup> pair / lone pair acceptor or e<sup>-</sup> deficient species or e<sup>-</sup> seeking species (1)

*For 'species' accept atom, molecule, ion*

*NOT '+' ion*

*NOT 'attracted to '-' charge'*

*Addition*: reaction which increases number of substituents or convert double bond to single bond or where two molecules form one molecule (1)

2

(b) (High) e<sup>-</sup> dense or e<sup>-</sup> rich C=C or e<sup>-</sup> rich π bond or 4 e<sup>-</sup> between the C's (1)  
*NOT just 'C=C'*

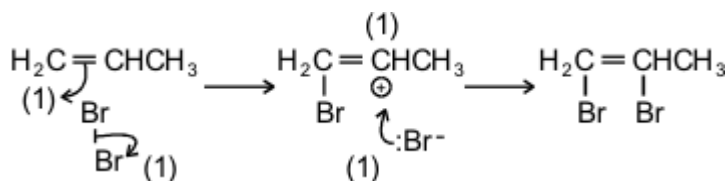
causes induced dipole in Br<sub>2</sub> (1)

*Ignore refs to 'temporary'*

*can score M2 from δ<sup>+</sup> / δ<sup>-</sup> on Br<sub>2</sub> in (c) unless a contradicting error in (b)*

2

(c) *Mechanism*:



*If incorrect alkene, lose M3 (wrong cation)*

*Mark M4 conseq on M3*

*If M1 curly*

*arrow C=C*

*allow*

*Name of product*: 1,2-dibromopropane (1)

5

(d) addition (1)  
*Not additional* 1

[10]

**M4.** (a) M1 fermentation 1

M2 dehydration or elimination 1

(b) (i) yeast OR zymase OR an enzyme 1

(ii) concentrated sulphuric or phosphoric acid  
*(penalise aqueous or dilute as a contradiction)* 1

(c) (i) primary or 1° 1

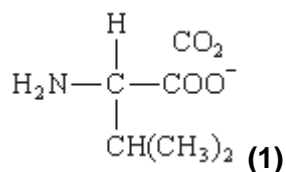
(ii) sugar or glucose or ethanol is renewable  
OR ethanol does not contain sulphur-containing impurities  
OR ethanol produces less pollution or is less smoky or less CO/C  
*(the objective is a positive statement about ethanol)*  
*(penalise the idea that ethanol is an infinite source or vague statements that ethanol has less impurities) (penalise the idea that ethanol produces no pollution)* 1

(d)  $C_2H_6 \rightarrow C_2H_4 + H_2$  1

(e) Addition  
*(ignore self or chain as a preface to "addition")*

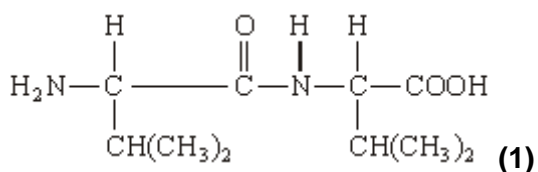
M5.

(a) (i)



ignore Na<sup>+</sup> unless covalently bonded

(ii)



must be dipeptide, not polymer nor anhydride  
allow -CONH- or -COHN-  
allow zwitterion

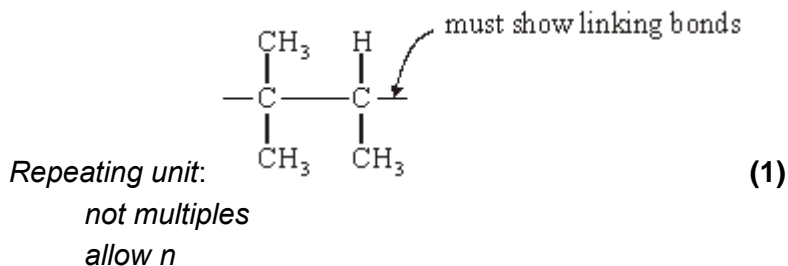
(iii) hydrogen bonding **(1)**

QL

Allow with dipole-dipole or v derWaals, but not dipole-dipole etc alone

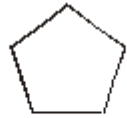
3

(b) (i) Type of polymerisation: addition(al) **(1)**



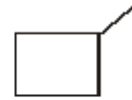
(ii) CH<sub>3</sub>CH=CHCH<sub>2</sub>CH<sub>3</sub> **(1)** C<sub>2</sub>H<sub>5</sub>

(iii)

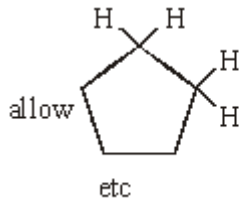


(1)

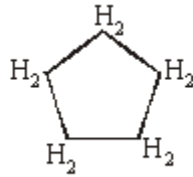
or



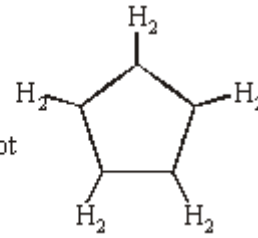
etc



or



but not



4

[7]

**M6.A**

[1]

**M7.** (a) (i) moles of  $C_2F_2 = 0.40$  mark independently from  $HC1$

1

moles of  $HC1 = 0.80$  **not** consequential

1

(ii)

$$K_c = \frac{[C_2F_4][HCl]^2}{[CHClF_2]^2}$$

wrong  $K_c$  means they can only

score for units in (iii) consequ

on their  $K_c$ .

1

(iii)

$$K_c = \frac{(0.40/18.5)(0.8/18.5)^2}{(0.20/18.5)^2}$$

1

$$= 0.35$$

1

mol dm<sup>-3</sup>

1

(b) (i) increase

1

(ii) decrease

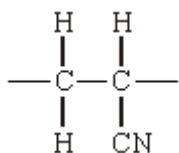
1

(c) addition or radical

1

[9]

**M8.** (a) (i)



*(Ignore n or brackets, but trailing bonds are essential)*

1

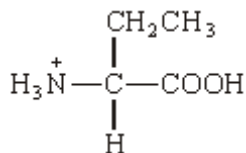
(ii) Addition or radical

1

(b) (i) 2-aminobutanoic (acid)

1

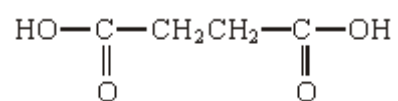
(ii)



1

(c) (i)  $C_3H_4O_2$  1

(ii)



1

(1,4-)butan(e)dioic (acid)

*(allow succinic, but not dibutanoic nor butanedicarboxylic acid)*

1

(iii) Can be hydrolysed / can react with acid or base or water /  
can react with nucleophiles

1

**[8]**