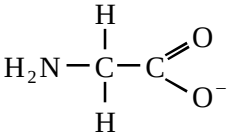
4.8, 4.9 TEST ms

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

(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

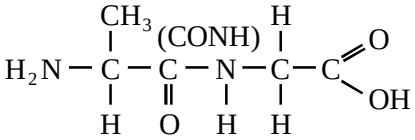
(c) **(1)**



allow $H_2NCH_2COO^-$

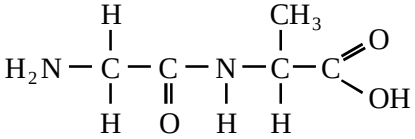
Penalise NH_2- and OH- once per paper
but CH_3– is allowed

1



(1)

(d)

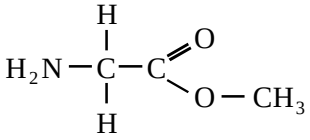


(1)

Not anhydrides; not repeating units

2

(e)



(1)

or $H_2NCH_2COOCH_3$

1

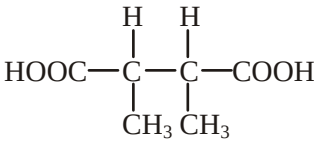
[9]

2. (a) (i) $CH_3CH=CHCH_3$ 1

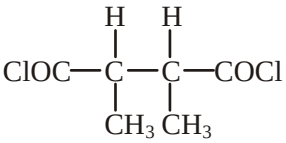
Addition or radical (**QoL**) 1

(ii) $CH_3CH(OH)CH(OH)CH_3$ or with no brackets 1

butan(e)–2,3–diol or 2,3–butan(e)diol 1



allow



2,3–dimethylbutan(e)dioic acid 1

ignore –1,4–

condensation (**QoL**) 1

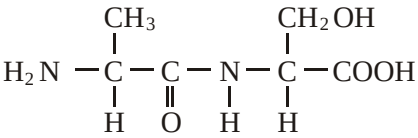
2,3–dimethylbutan(e)dioyl chloride 1

(iii) NaOH or HCl etc or Na_2CO_3 1

Allow conc sulphuric/nitric

***NOT** water nor acidified water nor weak acids*

(b) Structure 1 1

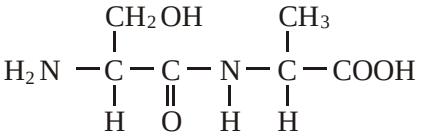


Allow –CONH– and –COHN–

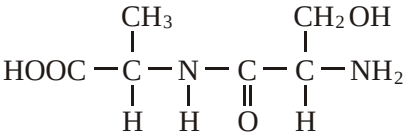
Allow zwitterions

NOT polypeptides/repeating units

Structure 2 either of



or



1

(c) (i) $CH_3CH_2CH_2Br$ 1

allow –Cl, –I

(ii) CH_3CH_2CN 1

(iii) (nucleophilic) substitution or from $CH_3CH_2CH_2Br$ 1

further substitution/reaction occurs or other products are formed 1

if reduction written here, no further marks

Allow reduction forms only one product

one of

$(CH_3CH_2CH_2)_2NH$

$(CH_3CH_2CH_2)_3N$

$(CH_3CH_2CH_2)_4N^+ Br^-$ 1

Allow salts including NH_4Br

Allow HBr

[15]

3. (a) polyamide or nylon (2,4) 1

(allow nylon without numbers but if numbers are present they must be correct)

condensation 1

(b) $H_3\overset{+}{N}-CH_2-\overset{-}{COO}$ 1

(c) ionic bonding in aminoethanoic acid 1

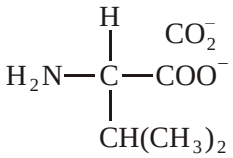
(can only score if includes that aminoethanoic is ionic)

stronger attractions than Hydrogen bonding in hydroxyethanoic

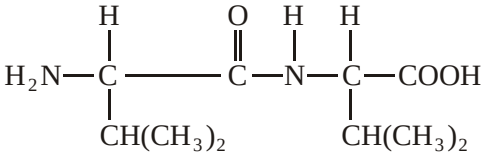
(e.g. stronger Hydrogen bonding in aminoethanoic acid scores 0) 1

(mention of electrostatic forces between molecules scores 0)

[5]

4. (a) (i)  **(1)**

ignore Na^+ unless covalently bonded

(ii)  **(1)**

must be dipeptide, not polymer nor anhydride

allow –CONH– or –COHN–

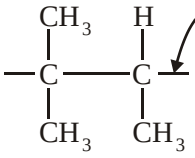
allow zwitterion

(iii) <u>hydrogen bonding</u> **(1)** 3

QL

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

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

Repeating unit:  must show linking bonds **(1)**

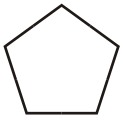
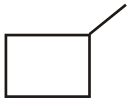
not multiples

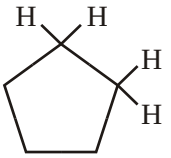
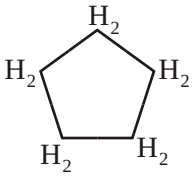
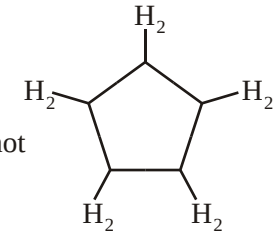
allow n

(ii) $CH_3CH{=}CHCH_2CH_3$ **(1)**

C_2H_5

(iii) 4

 **(1)** or  etc

allow  etc or  but not 

[7]

5. (a) 1, 4-diaminobutane or butane -1, 4-diamine **(1)**

A: $BrCH_2CH_2Br$ **or** $ClCH_2CH_2Cl$ **(1)**

B: $NC\ CH_2CH_2CN$

Step 1: Br_2 or Cl_2 **(1) (ignore aq)**

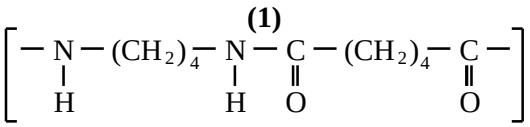
Step 2: KCN **(1) (NOT HCN)**

Step 3: H_2 / Ni **or** $LiAlH_4$ **or** Na / C_2H_5OH **(1) (NOT $NaBH_4$)**

Hydrogenation only for H_2 / Ni, **or** nucleophilic addition only for $LiAlH_4$**(1)**

OR reduction or addition

7

(b) 

(1)

(1)

QL hydrogen bonding **(1)**

Polarity of H-bonding shown or discussed **(1)** 4

(c) Polyamides / peptide link can be hydrolysed **(1)**

OR polyalkenes cannot be hydrolysed

QL OH^- attacks peptide link or $C^{\delta+}$ **(1)**

poly(ethene) non-polar **(1)** 3

[14]