Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: AminoAcids, Proteins & DNA

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Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 29 Marks **Time : 29 Minutes**

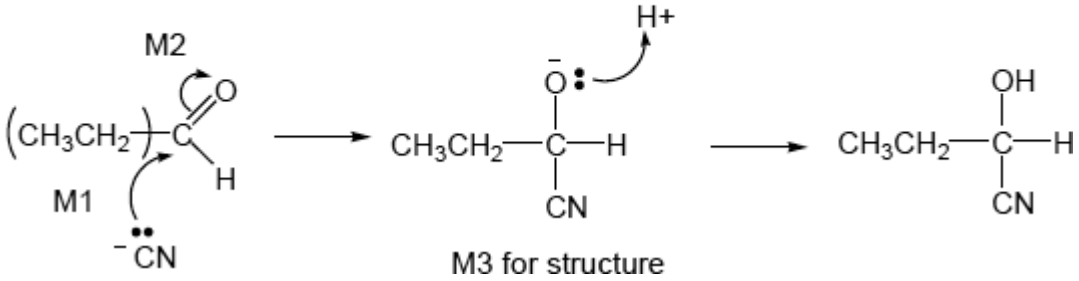
Mark Schemes

Q1.

(a)

nucleophilic addition

M4 for lp and arrow to H^+



M3 for structure

- *allow :CN–*
- *M2 not allowed independent of M1, but*
- *allow M1 for correct attack on C+*
- *+ rather than δ+ on C=O loses M2*
- *M3 is for correct structure including minus sign but lone pair is part of M4*
- *Allow C_{2H5}*
- *M1 and M4 for lp and curly arrow*

1

(b) *2-bromobutanenitrile*

Allow 2-bromobutane-1-nitrile

1

(c) ***M1*** *ammonia or NH_3*

Ignore temp or pressure

1

M2 *excess (ammonia)* *excess tied to NH_3 and may score in M1 unless contradicted*

Ignore concentrated or sealed container, Acid loses conditions mark

1

M3 *nucleophilic substitution*

Allow close spelling

1

(d) *(i)*

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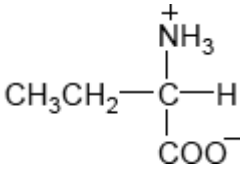


Allow C_2H_5

Allow $-CO_2^-$

Allow $^+NH_3-$

Don't penalize position of + on NH_3

1

(ii) ***M1*** *electrostatic <u>forces between ions</u> in **X*** ***QOL***

Allow ionic bonding.

1

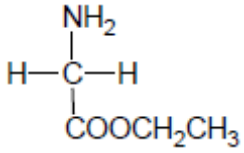
Marks independent

M2 *(stronger than) <u>hydrogen bonding</u> between $CH_3CH_2CH(OH)COOH$*

CE *mention of molecules of **X** or inter molecular forces between **X** loses both marks*

1

(e) (i)



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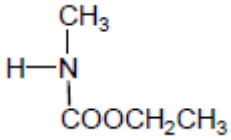
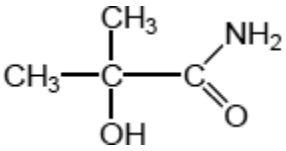


Isomer of $C_4H_9NO_2$

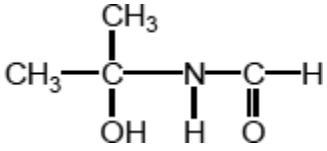
Allow NH_2-

1

(ii)



Isomer of $C4H_9NO_2$ allow NH_2-



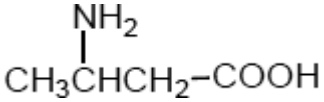
Allow

1

(iii) *$H_2N-CH_2CH_2CH_2-COOH$ or $H_2N-(CH_2)_3-COOH$*

Isomer of $C_4H_9NO_2$ allow NH_2-

OR



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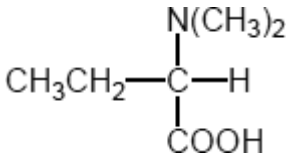
*Do **not** allow –C_3H_6-*
*Beware – do not credit **X** itself*

1

(f)



*Answer has 6 carbons so **NOT** isomer of **X***
Allow C_2H_5
Must have bond from C to N not to methyl group

1

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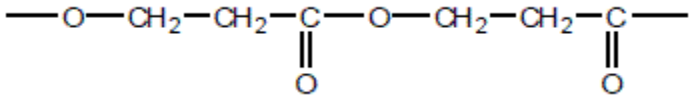
Q2.

(a) *3-hydroxypropanoic acid*

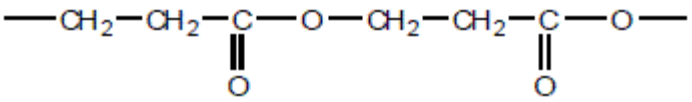
allow 3-hydroxypropionic acid
must be correct spelling

1

(b) *(i)* *must show trailing bonds*



or can start at any point in the sequence, e.g.



not allow dimer
allow –O–$CH_2CH_2COOCH_2CH_2CO$–
or –$CH_2CH_2COOCH_2CH_2COO$–
ignore ( ) or n
NB answer has a total of 6 carbons and 4 oxygens

1

(ii) *condensation (polymerisation)*

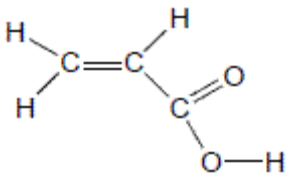
Allow close spelling

1

(c) *(i)* *C=C or carbon-carbon <u>double</u> bond*

1

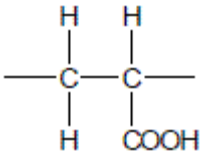
(ii)



*must show **ALL** bonds including O–H*

1

(iii) *must show trailing bonds*



allow polyalkene conseq on their c(ii)
ignore n

1

(d)

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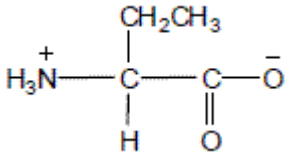
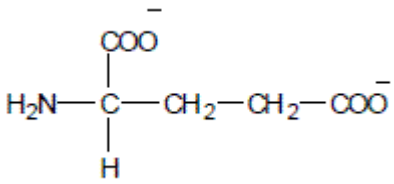


allow NH_3^+—

allow COO^-

1

(e) *(i)*



In (e), do not penalise a slip in the number of carbons in the -CH_2CH_2- chain, but all must be bonded correctly

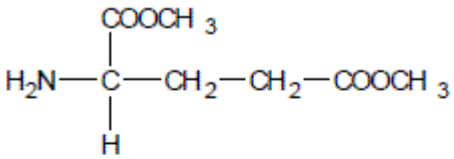
NB two carboxylate groups

Allow COONa or COO^- Na^+ but not covalent bond to Na

allow NH_2–

1

(ii)



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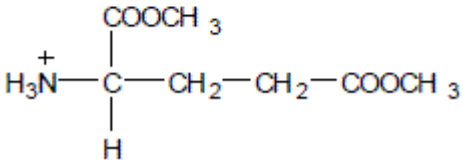


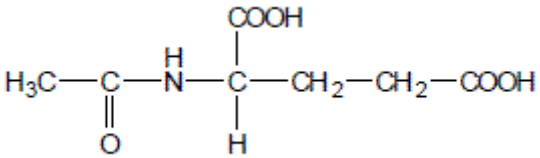
In (e), do not penalise a slip in the number of carbons in the -CH_2CH_2- chain, but all must be bonded correctly

NB two ester groups

allow NH_2– or $^+NH_3$–

1

(iii)



In 4(e), do not penalise a slip in the number of carbons in the -CH_2CH_2- chain, but all must be bonded correctly

allow anhydride formation on either or both COOH groups (see below) with or without amide group formation

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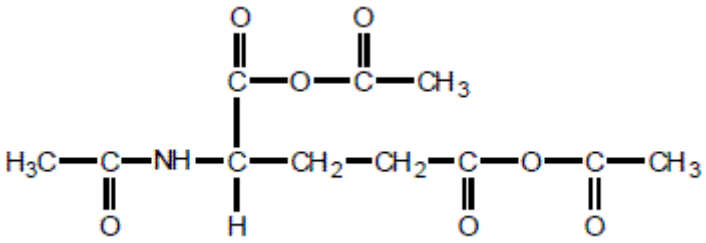

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(f) ***M1*** *phase or eluent or solvent (or named solvent) is <u>moving or mobile</u>*

1

M2 *stationary phase or solid or alumina/silica/resin*

1

M3 *separation depends on balance between solubility or affinity (of compounds) in each phase*
OR
different adsorption or retention
OR
(amino acids have) different R_f values
OR
(amino acids) travel at different speeds or take different times

1

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