TOPIC 20 TEST MS

1. **M1** phase or eluent or solvent (or named solvent) is moving or mobile

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

[3]

2. (a) ***R***: O-H (alcohols) **(1)**
S: C=O or carbonyl **(1)**

2

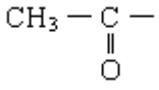
(b) aldehyde **(1)** -CHO or RCHO **(1)**

1

(c) (i) *Reason 1*: TMS inert or non-toxic or volatile / easily removed
Reason 2: single (intense) peak
peak of 12 protons
has 12 equivalent protons
all protons in same environment
OR
peak / signal upfield of others
highly shielded
more shielded
peak away from others or $\delta = 0$ or low
not solvent, not cheap
any 2 reasons × (1)

(ii) *Solvent*: $CDCl_3$ or CCl_4 **(NOT D_2O)**
Reason: proton free **(1)**
allow no hydrogens (atoms)
NOT H^+ / hydrogen ions

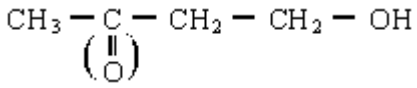
4

(d) (i)  **(1)**

(ii) –OH **(1)**

(iii) $–CH_2–CH_2–$ **(1)**

3

(e)  **(1)**

1

[11]

3. (a) 2-chloropropanoic acid **(1)**

1

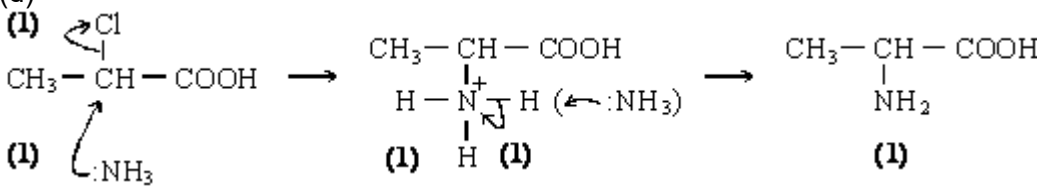
(b) δ 1.72 Doublet ∴ next to CH **(1)**
δ 4.44 Quartet ∴ next to CH_3 **(1)**

2

(c) Two triplets **(1)**

1

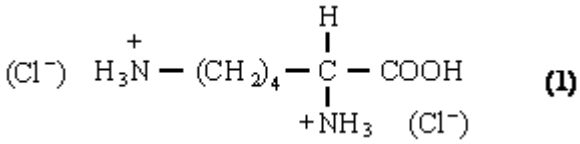
(d)



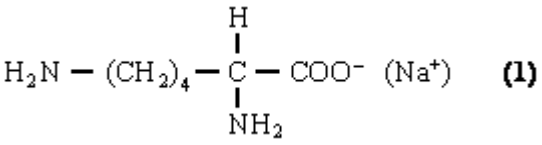
Allow S_N1

5

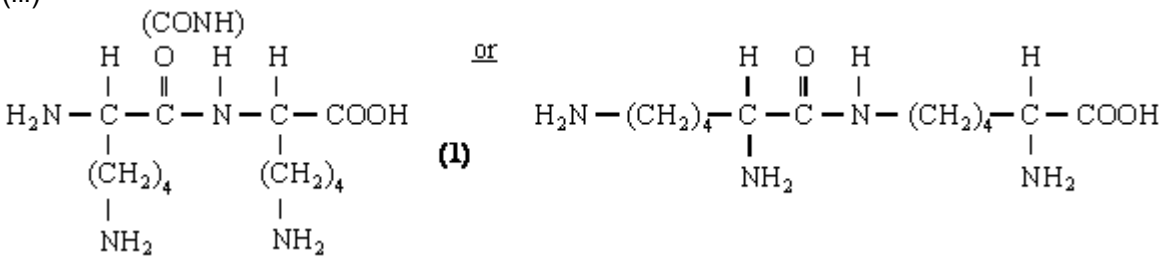
(e) (i)



(ii)



(iii)



Or anhydride

3

[12]

4. (a) 5 **(1)**

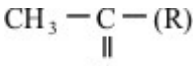
1

(b) 2:2:2:3:3 **(1)**

any order but not multiples

1

(c)



(1)

1

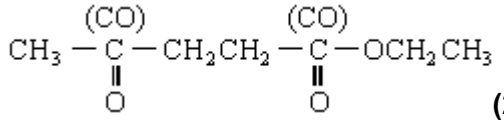
(d) CH_3CH_2 or C_2H_5 or ethyl **(1)**
δ4.13 (quartet) : CH_2 peak <u>split by CH_3</u> / <u>next to CH_3</u> **(1)**
δ1.26 (triplet) : CH_3 peak <u>split by CH_2</u> / <u>next to CH_2</u> **(1)**

3

(e) CH_2CH_2 **(1)**

1

(f)



(2)

*allow **(1)** for $CH_3COCH_2CH_2OCOCH_2CH_3$*
or $CH_3COOCH_2CH_2COCH_2CH_3$
Must be $C_7H_{12}O_3$

2

[9]

5. (a) (i) There are three pairs of equivalent carbon atoms

1

(ii) 75ppm

1

(b) (i) 4

1

(ii) 2

1

(c) Each structure can represent a pair of cis/Z and trans/E isomers
OR
Optical isomers

1

[5]

6. (a) **A** any C_5 alkene

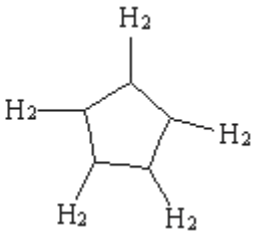
1

B



etc

penalise



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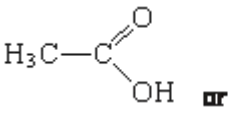
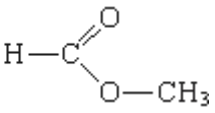
(b) **C**



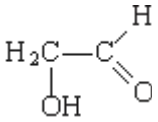
or



or CH_3COOH or $HCOOCH_3$

1

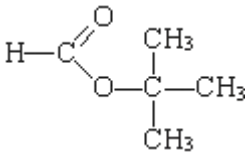
D



or $HOCH_2CHO$

1

(c) **E**



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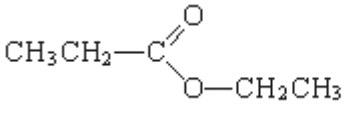
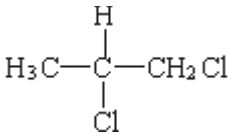
F



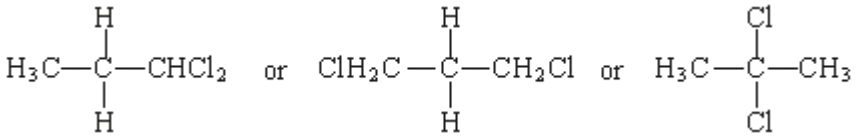
1

(d) **G**



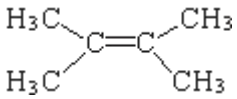
1

H



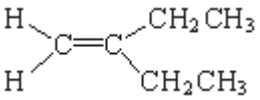
1

(e) **I**



1

J



NOT hex-3-ene

1

[10]