

Name of the Student: \_\_\_\_\_

Max. Marks : 25 Marks

Time : 25 Minutes

## Mark Schemes

Q1.

- (a) (i) Moles NaOH =  $mv/1000 = 1.50 \times 72.5/1000 = 0.108$  to  $0.11$  **(1)**  
 Moles of ethanoic acid at equilibrium = moles sodium hydroxide **(1)**  
 Moles ester = moles water (=moles acid reacted) **(1)**  
 $= 0.200 - 0.108 = 0.090$  to  $0.092$  **(1)**  
 Moles ethanol =  $0.110 - 0.091 = 0.018$  to  $0.020$  **(1)**  
 $K_c = [\text{Ester}] [\text{Water}] / [\text{Acid}] [\text{Alcohol}]$  **(1)**

*Allow if used correctly*

$$= (0.091)^2 / 0.109 \times 0.019 = 3.7 \text{ to } 4.9 \text{ (1)}$$

*Ignore units**NB Allow the answer 4 one mark as correct knowledge*

7

- (ii) Similar (types) of bond broken and made **(1)**  
Same number of the bonds broken and made **(1)**

*any number if equal**NB If a list given then the total number of each type of bond broken and made must be the same*

2

- (b) (i) (Weak) dipole-dipole attraction between HCl molecules **(1)**  
 (Strong) **hydrogen bonds** between  $\text{CH}_3\text{COOH}$  molecules **(1)**

*NB Ignore van der Waals forces*

2

- (ii) Ethanoic anhydride is

cheap compared to ethanoyl chloride **(1)**less corrosive than ethanoyl chloride or HCl evolved **(1)**reaction less violent or vigorous or exothermic or dangerous  
or safer to use **(1)**less vulnerable to hydrolysis **(1)**reaction more easily controlled **(1)**

Max 2

**[13]**

Q2.

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

**1**

- (b)  $\delta$  1.72 Doublet  $\therefore$  next to CH (1)

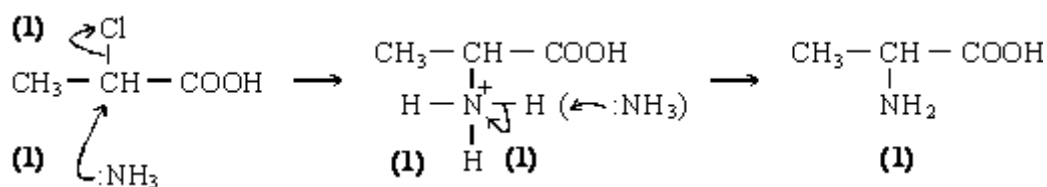
$\delta$  4.44 Quartet  $\therefore$  next to CH<sub>3</sub> (**1**)

2

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

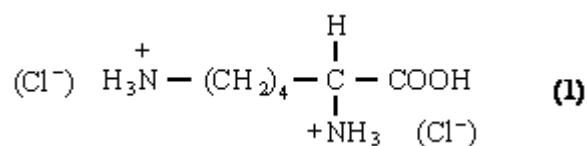
**1**

- (d)

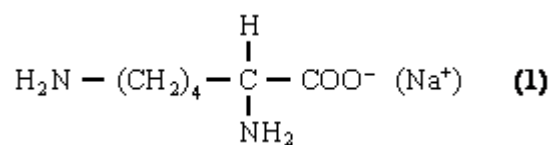


Allow  $S_N1$

5

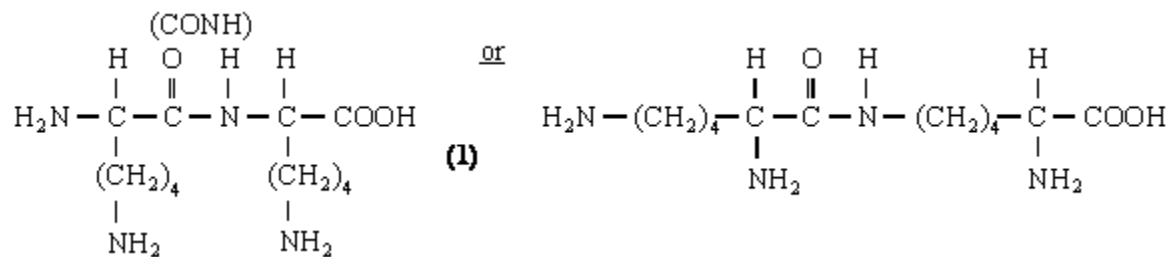


- (e) (i)



- (ii)

- (iii)



Or anhydride

3

[12]