

M1. (a) (i) H⁺ or proton acceptor **(1)**
 $\text{CH}_3\text{NH}_2 + \text{H}_2\text{O} \rightleftharpoons \text{CH}_3\text{NH}_3^+ + \text{OH}^-$ **(1)**

(ii) $\text{CH}_3\text{NH}_3\text{Cl}$ or HCl **(1)**
*Or any ammonium compound or strong acid
name or formula*

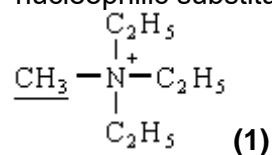
(iii) extra OH^- reacts with CH_3NH_3^+
or reaction / equilibrium moves to left
or ratio salt / base remains almost constant **(1)**
Any 2

5

(b) lone pair (on N accepts H^+) **(1)**
 CH_3 increases electron density (on N)
donates / pushes electrons
has positive inductive effect **(1)**

2

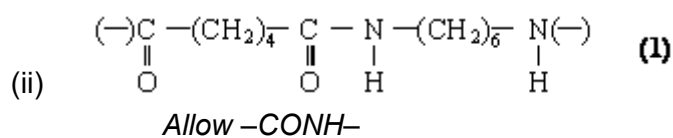
(c) nucleophilic substitution **(1)**



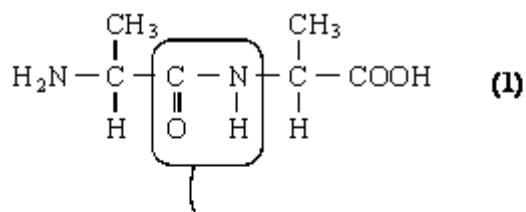
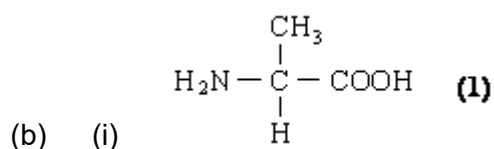
2

[9]

M2. (a) (i) hexane-1,6-diamine or 1,6-diaminohexane (**allow ammine**)
or 1,6 hexan(e)diamine **(1)**

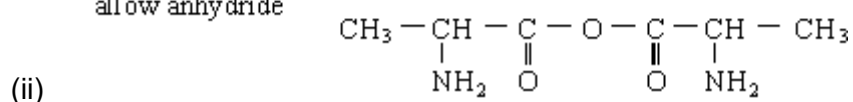


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peptide link essential : the rest is consequential on b(i)
 (allow CONH)

allow anhydride



2

(c) (i) quaternary ammonium bromide salt (1)
 (not ion, not compound)
 Allow quaternary

(ii) Reagent: CH_3Br or bromomethane (1)
 penalise CH_3Cl but allow excess for any halomethane

Condition: excess (CH_3Br) (1)

(iii) nucleophilic substitution (1)

4

[8]

