

Name of the Student: _____

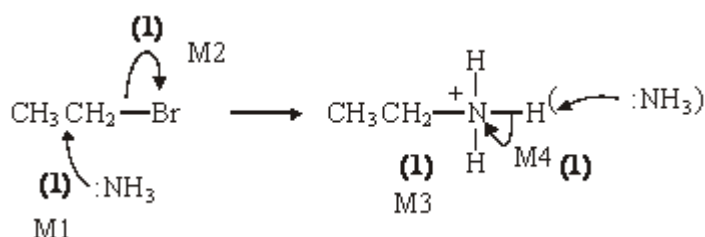
Max. Marks : 28 Marks

Time : 28 Minutes

Mark Schemes

Q1.

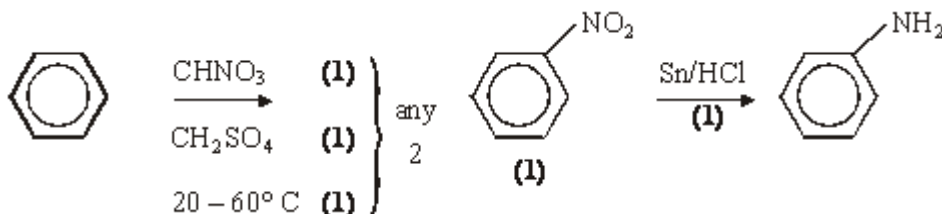
(a)



Further reaction / substitution / formation of 2° / 3° amines etc (1)
 use an excess of NH₃ (1)

6

(b)

repels nucleophiles (such as NH₃) (1)

5

Notes

(a) allow S_N1penalise: Br⁻ instead of NH₃ removing H⁺ for M4not contamination with *other amines* (this is in the question) not diamines

(b) allow because NH₃ is a nucleophile or benzene is (only) attacked by electrophiles
 or C-Br bond (in bromobenzene) is stronger / less polar or Br lp delocalized

HNO₃ / H₂SO₄ without either conc scores (1) allow 20 – 60° for (1) (any 2 ex 3)

allow name or structure of nitrobenzene

other reducing agents: Fe or Sn with HCl (conc or dil or neither)

not conc H₂SO₄ or conc HNO₃allow Ni/H₂Not NaBH₄ or LiAlH₄

ignore wrong descriptions for reduction step e.g. hydrolysis or hydration

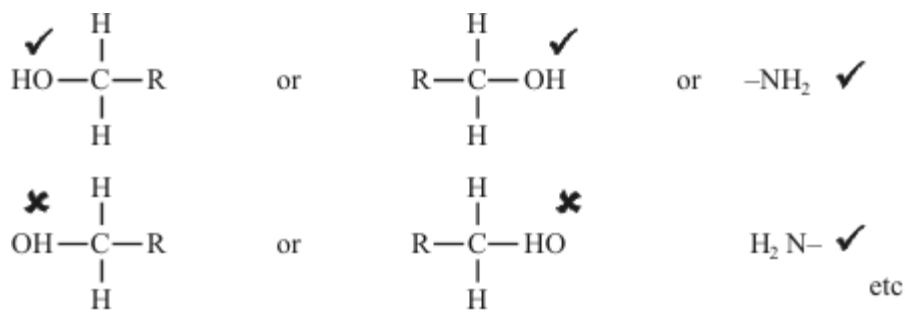
Organic points

- (1) Curly arrows: must show movement of a pair of electrons, i.e. from bond to atom or from lp to atom / space
e.g.



- (2) Structures

penalise sticks (i.e. ) once per paper



Penalise once per paper

allow CH₃- or -CH₃ or  or CH₃
or H₃C-

Q2.

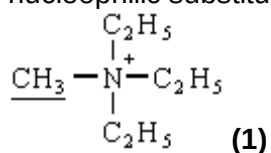
- (a) (i) H^+ or proton acceptor **(1)**
 $\text{CH}_3\text{NH}_2 + \text{H}_2\text{O} (\rightleftharpoons) \text{CH}_3^+\text{NH}_3 (+) \text{OH}^-$ **(1)**
- (ii) $\text{CH}_3\text{NH}_3\text{Cl}$ or HCl **(1)**
*Or any ammonium compound or strong acid
name or formula*
- (iii) extra OH^- reacts with CH_3^+NH_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)**

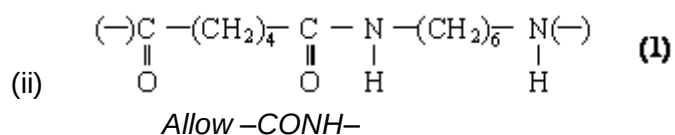


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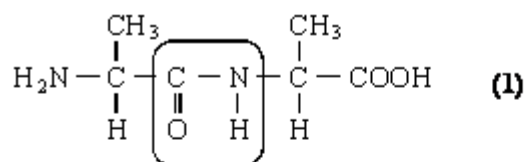
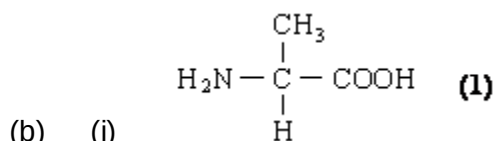
[9]

Q3.

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

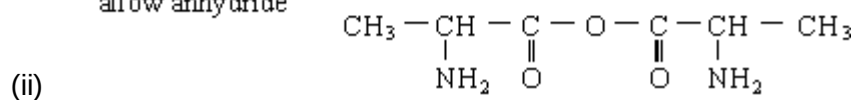


2



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 quaternery

- (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]