Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Amines

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Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

Mark Schemes

Q1.

C

[1]

Q2.

(a) (Strength depends on availability of) <u>lone pair on N</u> (atom)

M1

E N (next to ring): (lp) <u>delocalised</u> into ring

M2

(lp) less available (to donate to or to accept a H^+)

M3

F or **G**: N (next to alkyl): (positive) inductive effect/electrons pushed to N

M4

(lp) more available (to donate to or to accept a H^+)

M5

order of increasing base strength **E**<**G**<**F**

*Or **F** is most basic **and E** is least basic*

M6

(b) Intermediate compounds

Product of step 1 $C_6H_5CH_1Cl$

Allow $C_6H_5CH_2Br$

Product of step 2 $C_6H_5CH_2CN$

In steps 2 and 3, only allow marks for reagents/conditions if intermediate compounds are correct or close.

Reagents/conditions

Step 1

Cl_2 & UV

Allow Br_2 & UV

Step 2

KCN alcoholic & aq (both reqd)

Ignore temperature

Step 3

H_2 / Ni or Pt or Pd

Allow $LiAlH_4$ in (dry) ether – (with acid CE, followed by acid allow)

Not $NaBH_4$ and not Sn/HCl or Fe/HCl

2

[11]

Q3.

D

[1]

Q4.

(a) Electrophilic substitution

Both words needed

Ignore minor misspellings

1

(b) (i) Sn / HCl

OR H_2 / Ni **OR** H_2 / Pt **OR** Fe / HCl **OR** Zn / HCl **OR** $SnCl_2$ / HCl

Ignore conc or dil with HCl,

Allow (dil) H_2SO_4 but not conc H_2SO_4

Not allow HNO_3 or H^+

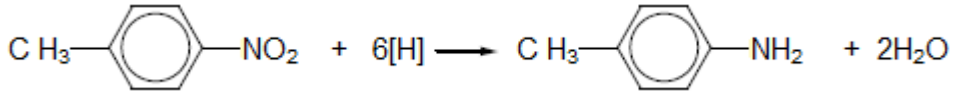
Ignore NaOH after Sn / HCl

Ignore catalyst

1

(ii) $CH_3C_6H_4NO_2 + 6[H] \rightarrow CH_3C_6H_4NH_2 + 2H_2O$

OR



Allow molecular formulae as structures given

$C_7H_7NO_2 + 6[H] \rightarrow C_7H_9N + 2H_2O$

Qu states use [H], so penalised $3H_2$

1

(iii) making dyes

OR making quaternary ammonium salts

OR making (cationic) surfactants

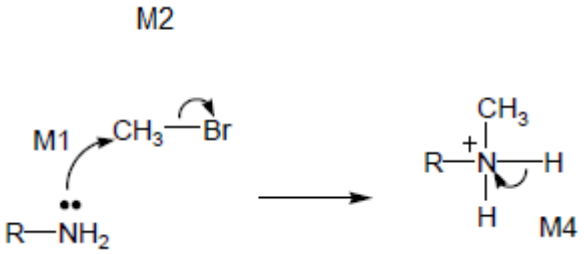
OR making hair conditioner

OR making fabric softener

OR making detergents

1

(c)



M3

NO Mark for name of mechanism

Allow SN1

M1 for lone pair on N and arrow to C or mid point of space between N and C

M2 for arrow from bond to Br

M3 for structure of protonated secondary amine
M4 for arrow from bond to N or + on N
For M4: ignore RNH_2 or NH_3 removing H^+ but penalise Br^-

4

(d) <u>lone or electron pair on N</u>

If no mention of lone pair CE = 0
If lone pair mentioned but not on N then lose M1 and mark on

M1
1

in **J** spread / delocalised into ring (or not delocalised in K)

Ignore negative inductive effect of benzene
*Allow interacts with **Π** cloud for M2*

M2
1

less available (for protonation or donation in **J**)

M3

OR

in **K** there is a positive inductive effect / electron releasing)

M2

more available (for protonation or donation in **K**)

M3
1

[11]