

Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Mark Schemes

Q1.

(a) Hydrogen bond(ing)

Allow H bonding.

Penalise mention of any other type of bond.

1

(b) (i) Ammonia is a nucleophile

Allow ammonia has a lone pair.

1

Benzene repels nucleophiles

Allow (benzene) attracts / reacts with electrophiles.

OR benzene repels electron rich species or lone pairs.

OR C-Cl bond is short / strong / weakly polar.

1

(ii) H_2 / Ni **OR** H_2 / Pt **OR** Sn / HCl **OR** Fe / HCl

Ignore dil / conc of HCl.

Ignore the term 'catalyst'.

Allow H_2SO_4 with Sn and Fe but not conc.

Ignore NaOH following correct answer.

Not $NaBH_4$ nor $LiAlH_4$.

1

(iii) conc HNO_3

conc H_2SO_4

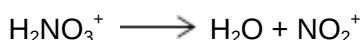
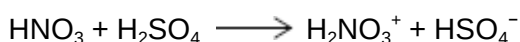
1

If either or both conc missed can score 1 for both acids.

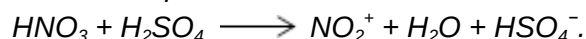
1



OR using two equations

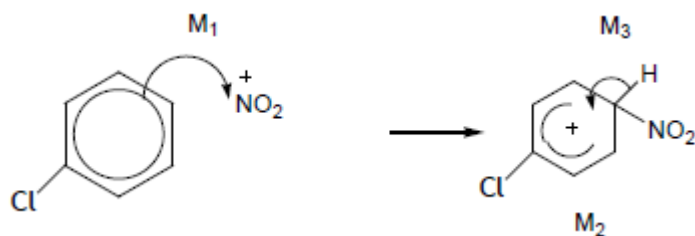


Allow 1:1 equation.

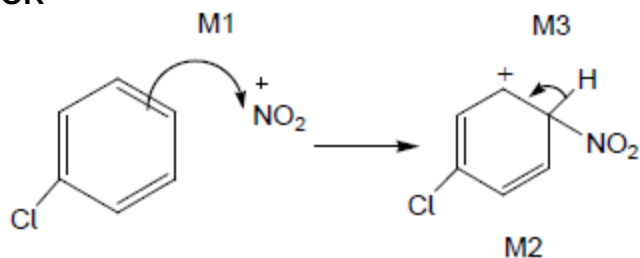


1

(iv) Electrophilic substitution

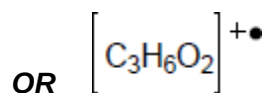
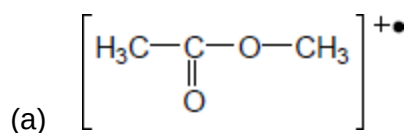


OR



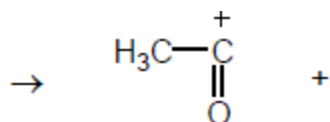
- Ignore position or absence of Cl in M1 but must be in correct position for M2.
- M1 arrow from within hexagon to N or + on N.
- Allow NO_2^+ in mechanism.
- Bond to NO_2 must be to N for structure mark M2.
- Gap in horseshoe must be centered around correct carbon (C1).
- + in intermediate not too close to C1 (allow on or "below" a line from C2 to C6).
- M3 arrow into hexagon unless Kekule.
- Allow M3 arrow independent of M2 structure.
- Ignore base removing H in M3.
- + on H in intermediate loses M2 not M3.

Q2.

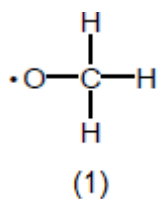


NOT penalise missing brackets.
If wrong ester, no further mark.

1



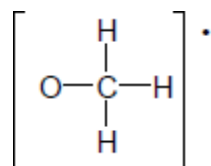
Must be displayed formula



Radical dot must be on O

Ignore lone pair(s) on O in addition to single electron

Allow radical with brackets as



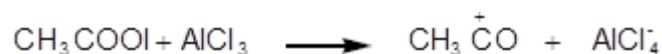
Ignore errors in acylium ion.

1



If wrong no further marks.

1



Correct equation scores 2 - contrast with (b)(iii)

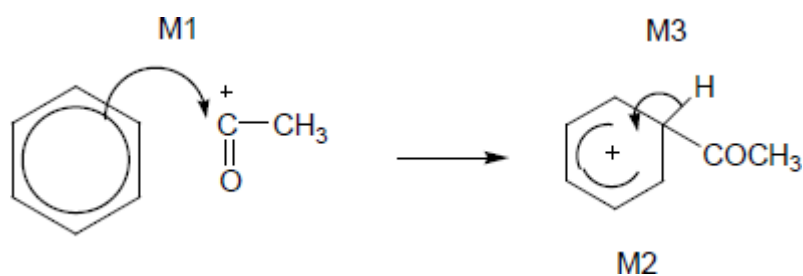
Allow + on C or O in equation.

1

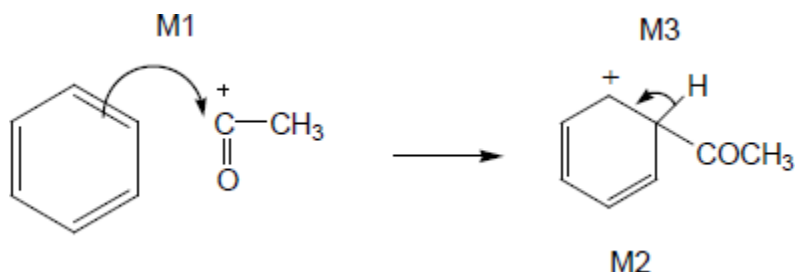


Ignore Friedel crafts.

1



OR

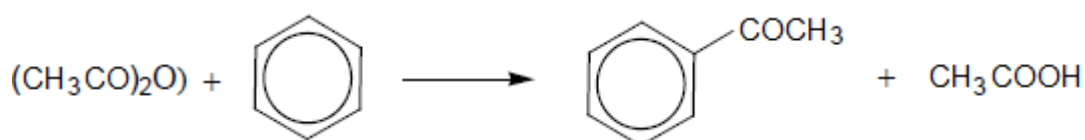


- + must be on C of RCO here
- M1 arrow from within hexagon to C or to + on C
- Gap in horseshoe must approximately be centred around C1 and not extend towards C1 beyond C2 and C6
- + not too close to C1
- M3 arrow into hexagon unless Kekule
- allow M3 arrow independent of M2 structure, i.e. + on H in intermediate loses M2 not M3
- ignore base removing H for M3

3



OR



Correct equation scores 1 – contrast with (b)(i)

Not allow molecular formula for ethanoic anhydride or ethanoic acid.

1

[9]