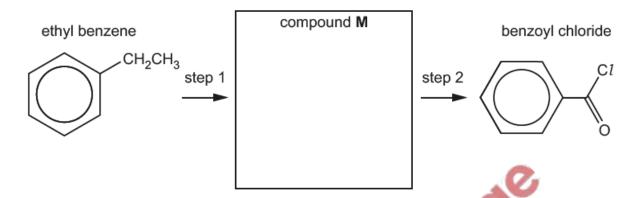
Carboxylic acids and derivatives - 2023 A2 Chemistry 9701

1. Nov/2023/Paper_9701/41/No.9

(ii)

(a) Benzoyl chloride, C₆H₅COC*l*, can be made from ethyl benzene in a two-step process.

A reaction scheme is shown.



(i) Draw the intermediate organic compound M in the box.

Suggest suitable reagents and conditions for step 1 and step 2.

step 1

step 2[2]

(iii) Identify the type of reaction in step 1 and step 2.

step 1

step 2[2]

[1]

(b) C₆H₅COC1 reacts with phenol, C₆H₅OH, to give the ester phenyl benzoate, C₆H₅COOC₆H₅.
An incomplete description of the mechanism of this reaction is shown in Fig. 9.1.

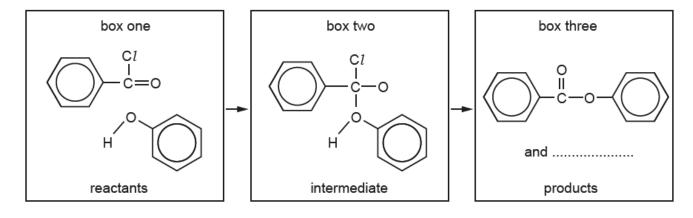


Fig. 9.1

- (i) Complete the mechanism in Fig. 9.1 and include:
 - all relevant dipoles (δ+ and δ-) and full electric charges (+ and -) on the species in box one and in box two
 - all relevant lone pairs on the species in box one and in box two
 - all relevant curly arrows to show the movement of electron pairs in box one and in box two
 - the formula of the second product in box three.

		[4]
	(ii) Name this mechanism.	F41
		[1]
(c)	Benzoyl chloride, chlorobenzene and chloroethane differ in their rates of hydrolysis we each compound is added separately to water at 25 °C.	hen
	Suggest the relative ease of hydrolysis of these three compounds.	
	Explain your answer. hardest to hydrolyse easiest to hydrolyse	
	explanation	
		[3]

[Total: 13]

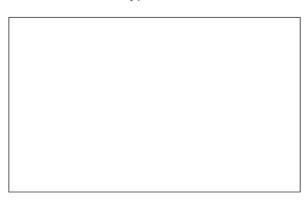
2. June/2023/Paper_9701/41/No.6(a, b)

- (a) Compound H has the structural formula CH₂=CHCH(NH₂)COOH.
 - (i) Name all the functional groups in H.



(ii) Compound H exhibits stereoisomerism.

Draw three-dimensional structures for the two stereoisomers of ${\bf H}.$ Name this type of stereoisomerism.





(b) Compound H can be prepared from the reaction of J with an excess of hot aqueous acid.

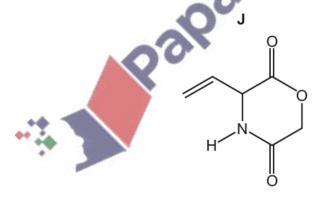


Fig. 6.1

3. June/2023/Paper_9701/42/No.5(d) (d) Acyl bromides, RCOBr, can be synthesised by the reaction of a carboxylic acid and SOBr₂. This is a similar reaction to the synthesis of acyl chlorides using $SOCl_2$. Give an equation for the reaction between ethanoic acid and SOBr₂.[1] Suggest the relative ease of hydrolysis of acyl bromides, RCOBr, acyl chlorides, RCOCl, and alkyl chlorides, RC1 Explain your answer easiest to hydrolyse hardest to hydrolyse [3]

[1]