

Name of the Student: _____

Max. Marks : 19 Marks

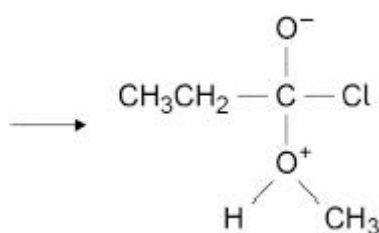
Time : 19 Minutes

Q1.

This question is about intermediates in reaction mechanisms.

- (a) **Figure 1** shows an intermediate formed in the first step of a nucleophilic addition–elimination mechanism.

Figure 1



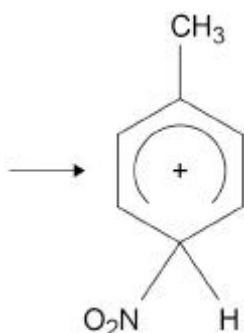
Complete **Figure 1** to show the structures of the two reactant species with curly arrows and relevant lone pairs of electrons involved in the formation of the intermediate.

Draw curly arrows and relevant lone pairs of electrons on the intermediate to show how the final products are formed.

(4)

- (b) **Figure 2** shows an intermediate formed in the first step of a reaction mechanism of methylbenzene.

Figure 2



Complete **Figure 2** to show the reactant species and any curly arrows involved in the formation of the intermediate.

Draw a curly arrow on the intermediate to show how the product is formed.

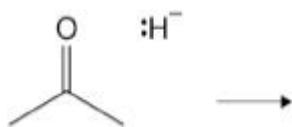
Give the name of the reaction mechanism.

Name of mechanism _____

(4)

- (c) **Figure 3** shows the reactant species involved in the first step of a mechanism.

Figure 3



Complete **Figure 3** to show the structure of the intermediate formed with curly arrows involved in its formation.

Give the name of the reaction mechanism.

Name of mechanism _____

(4)

(Total 12 marks)

Q2.

Benzene reacts with methanoyl chloride (HCOCl) in the presence of a catalyst.

- (a) Give an equation for the overall reaction when benzene reacts with methanoyl chloride.

Name the organic product.

Equation _____

Name _____

(2)

- (b) Identify the catalyst needed in this reaction.

Give an equation to show how the catalyst is used to form the electrophile, $[\text{HCO}]^+$

Catalyst _____

Equation _____

(2)

- (c) Outline the mechanism for the reaction of benzene with the electrophile, $[\text{HCO}]^+$

(3)

(Total 7 marks)