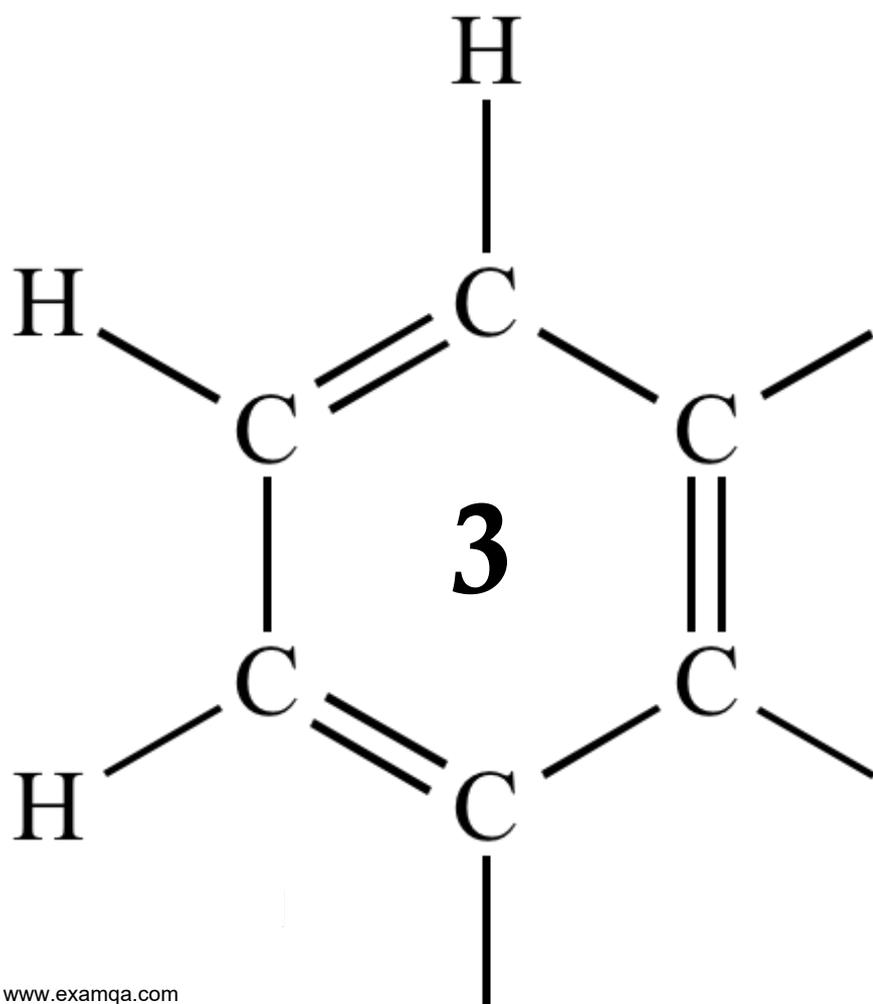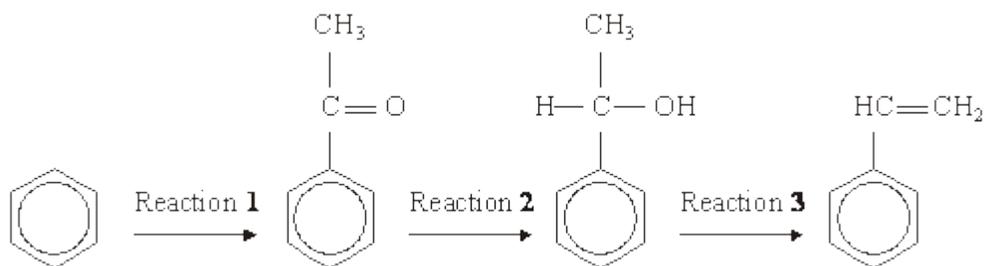# AQA A2 CHEMISTRY
AROMATIC ~ AMINES
## AROMATIC

1 A possible synthesis of phenylethene *(styrene)* is outlined below.

(a) In Reaction **1**, ethanoyl chloride and aluminium chloride are used to form a reactive species which then reacts with benzene.
Write an equation to show the formation of the reactive species.
Name and outline the mechanism by which this reactive species reacts with benzene.

(6)

(b) $NaBH_4$ is a possible reagent for Reaction **2**.
Name and outline the mechanism for the reaction with $NaBH_4$ in Reaction **2**.
Name the product of Reaction **2**.

(6)

(c) Name the type of reaction involved in Reaction **3** and give a reagent for the reaction.

(2)
(Total 14 marks)

2 Ethanoyl chloride reacts with methylbenzene forming compound **X** according to the equation below.
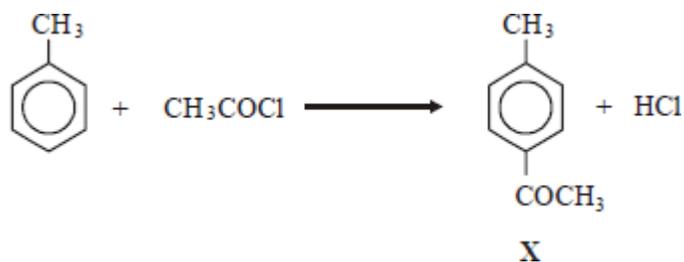
If the experimental yield is 40.0%, the mass in grams of **X** (M_r = 134.0) formed from 18.4 g of methylbenzene (M_r = 92.0) is

A 26.8

B 16.1

C 10.7

D 7.4

(Total 1 mark)

3 (a) Name and outline a mechanism for the reaction between propanoyl chloride, CH_3CH_2COCl, and methylamine, CH_3NH_2

Draw the structure of the organic product.

(6)

(b) Benzene reacts with propanoyl chloride in the presence of aluminium chloride. Write equations to show the role of aluminium chloride as a catalyst in this reaction. Outline a mechanism for this reaction of benzene.

(5)

(c) Write an equation for the reaction of propanoyl chloride with water. An excess of water is added to 1.48 g of propanoyl chloride. Aqueous sodium hydroxide is then added from a burette to the resulting solution.

Calculate the volume of 0.42 mol dm^{-3} aqueous sodium hydroxide needed to react exactly with the mixture formed.
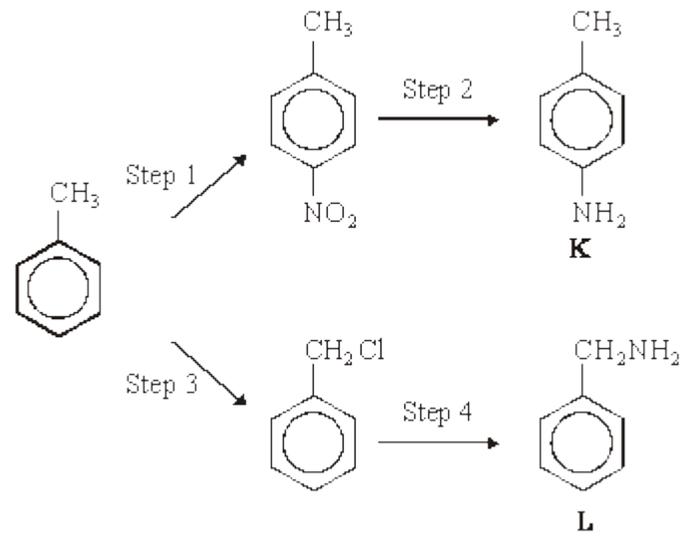
(5)
(Total 16 marks)

4 In a reaction which gave a 27.0% yield, 5.00 g of methylbenzene were converted into the explosive 2,4,6-trinitromethylbenzene (TNT) ($M_r = 227.0$). The mass of TNT formed was

A   1.35 g

B   3.33 g

C   3.65 g

D   12.34 g

(Total 1 mark)

5 The following reaction scheme shows the formation of two amines, **K** and **L**, from methylbenzene.

(a) (i) Give the reagents needed to carry out Step 1. Write an equation for the formation from these reagents of the inorganic species which reacts with methylbenzene.

Reagents ....

Equation ....…...

(ii) Name and outline a mechanism for the reaction between this inorganic species and methylbenzene.

Name of mechanism ....

Mechanism

(7)

(b) Give a suitable reagent or combination of reagents for Step 2.

....

(1)

(c) (i) Give the reagent for Step 4 and state a condition to ensure that the primary amine is the major product.

Reagent ....

Condition ....

(ii)   Name and outline a mechanism for Step 4.

Name of mechanism ....

Mechanism

(7)
(Total 15 marks)