

A2 CHEMISTRY

TOPIC 4.1.1 ARENES

TOPIC 4.1.2 CARBONYL COMPOUNDS

**BOOKLET OF PAST EXAMINATION QUESTIONS
II**

ANSWER ALL QUESTIONS

TOTAL 41 MARKS

Answer all the questions.

1 Benzene can be nitrated to form nitrobenzene, $C_6H_5NO_2$.

(a) Draw the structural formula for **benzene** and give its empirical formula.

structure:

empirical formula [2]

(b) State the reagents needed for the nitration of benzene.

..... [2]

(c) An electrophile is formed during the nitration of benzene.

(i) What is the formula of this electrophile?

..... [1]

(ii) Write an equation for the production of the electrophile.

..... [1]

(iii) Use curly arrows to show the mechanism for the nitration of benzene.

[4]

- (d) 10.0 g of benzene was nitrated to give 13.3 g of nitrobenzene. Calculate the percentage yield, giving your answer to three significant figures.

[4]

[Total : 14]

1 A ketone **A** has the molecular formula C_3H_6O .

(a) Name **A** and draw its structure to show clearly its functional group.

name

structure:

[2]

(b) Ketone **A** can be **reduced** to an alcohol, **B**.

(i) Name **B** and draw its structure.

name

structure:

[2]

(ii) State a suitable reagent for this reduction.

..... [1]

(iii) Write a balanced equation for the reduction of **A** to **B**. You may use the symbol [H] in this redox reaction to represent the reducing agent.

..... [1]

(c) Describe a chemical method to detect the presence of a carbonyl group in a compound such as **A**. Explain how you would use the product from this chemical method to identify **A**.

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..... [4]

[Total : 10]

2 The reaction of benzene with bromine requires a halogen carrier but the reaction of phenol with bromine does not.

(a) (i) Write the equation for the reaction of benzene with bromine.

..... [2]

(ii) State a substance that will act as the halogen carrier for this reaction.

..... [1]

(b) The reaction of phenol with excess bromine gives the organic product **C**.

(i) Draw the structure of **C**.

[2]

(ii) Cold aqueous NaOH is added to compound **C**. Using structural formulae, predict the equation for the reaction that takes place.

[2]

(iii) Explain why the reaction of phenol with bromine does **not** require a halogen carrier.

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..... [3]

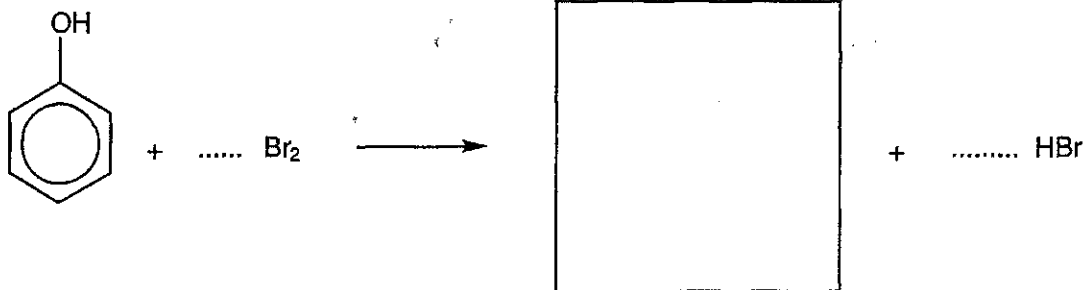
(iv) State a general use for halogenated phenols.

..... [1]

[Total : 11]

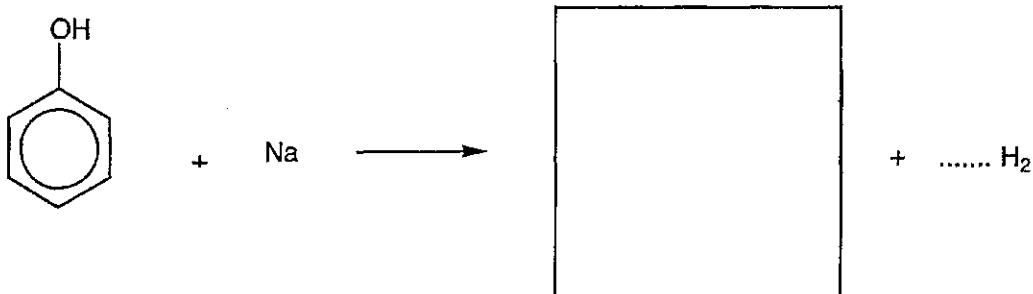
(b) Complete and balance the following equations for the reactions of phenol, giving structural formulae for the organic compounds in the boxes provided.

(i)



[3]

(ii)



[2]

(c) State a general use for phenols.[1]

[Total: 11]