

F324 Module 1: HW1

1. Benzene reacts with chlorine in the presence of a halogen carrier, such as $AlCl_3$.

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

[1]

(ii) How does the halogen carrier allow the reaction to take place?

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[1]

(iii) Outline a mechanism for this reaction.

Include curly arrows and relevant dipoles.

[4]

(iv) State the name of this mechanism.

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[1]

- (b) In contrast to benzene, the reaction of an alkene with bromine does **not** need a halogen carrier.

Compare the different reactivities of benzene and alkenes towards chlorine.

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[3]

[Total 10 marks]

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2. In this question, one mark is available for the quality of spelling, punctuation and grammar.

Describe with the aid of suitable diagrams the bonding and structure of a benzene molecule.

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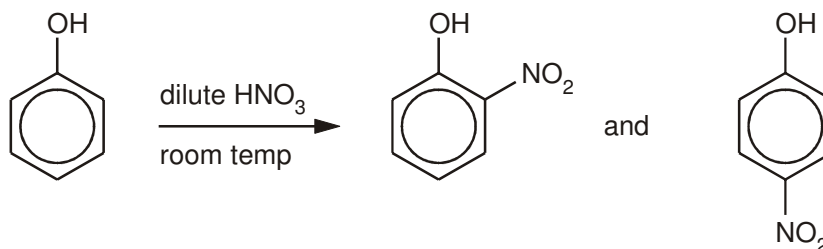
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[6]

Quality of Written Communication [1]

[Total 7 marks]

3. Phenol reacts readily with dilute nitric acid at room temperature in a nitration reaction to produce a mixture of products as shown below.



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- (a) Suggest the structure of another organic product that is likely to be formed in the nitration of phenol.

[1]

- (b) Assuming a yield by mass of 27% for 4-nitrophenol, calculate the mass of 4-nitrophenol that would be produced from 100 g of phenol. Show your working.

Give your answer to an appropriate number of significant figures.

mass of 4-nitrophenol = g

[4]

