Oxford Cambridge and RSA

A level Chemistry A

H432/02 Synthesis and analytical techniques

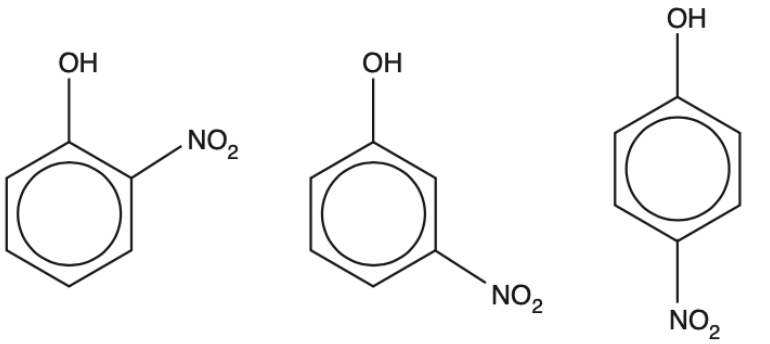
Question Set 16

1. This question is about aromatic compounds.

(a) Phenol undergoes nitration more readily than benzene.

(i) A student carries out the nitration of phenol with dilute nitric acid to produce 2-nitrophenol and 4-nitrophenol.

A small amount of 3-nitrophenol is also produced.



2-nitrophenol **3-nitrophenol** **4-nitrophenol**

The student thought that ^{13}C NMR spectroscopy could be used to distinguish between these three nitrophenols.

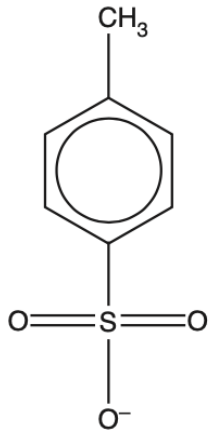
Explain whether the student is correct.

[3]

(ii) Explain why phenol is nitrated more readily than benzene.

[3]

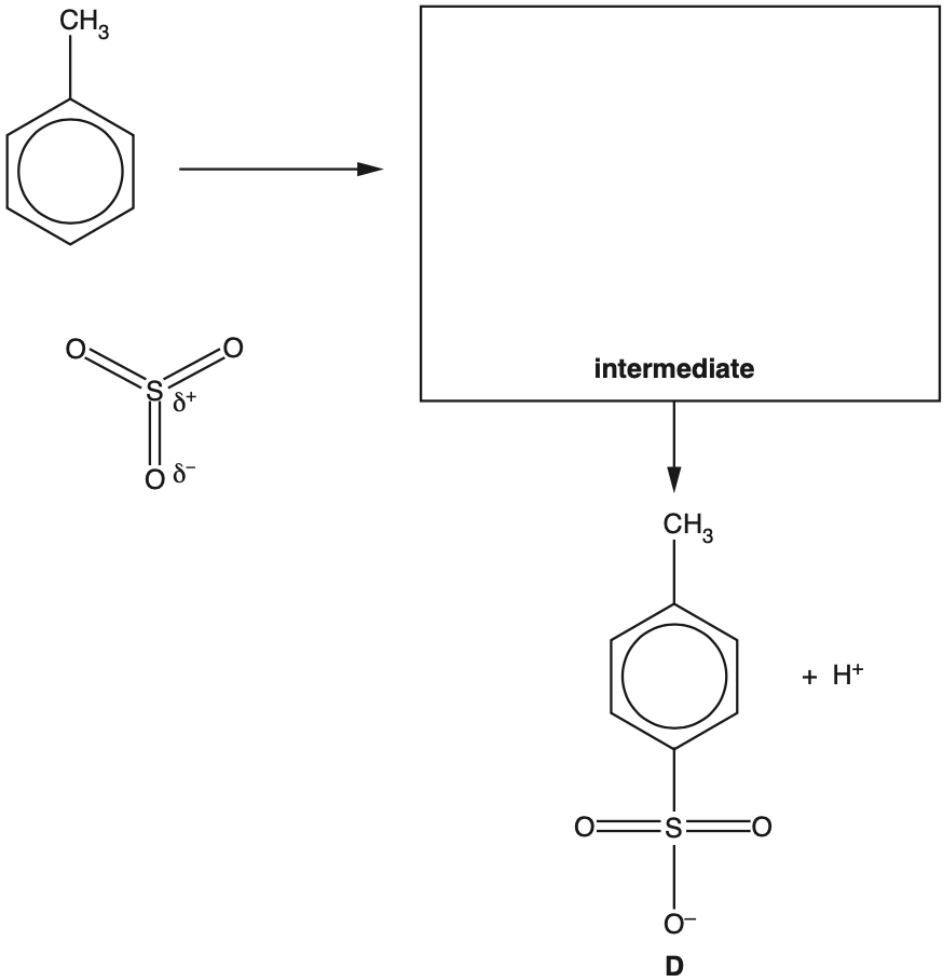
(b) Methylbenzene reacts with sulfur trioxide, SO_3, to form **D**, shown below.



D

The electrophile in this reaction is SO_3.

Complete the mechanism for the formation of **D**.
Show curly arrows and the structure of the intermediate.



D

[3]

Total Marks for Question Set 16: 9