

Edexcel IAL Chemistry A-Level

Topic 18 - Organic Chemistry: Arenes

Flashcards

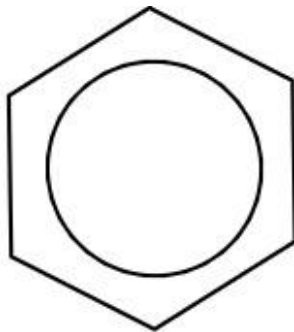
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How can the structure of benzene be represented? Which model is more suitable?



How can the structure of benzene be represented?
Which model is more suitable?



The first model is more suitable because the second diagram does not demonstrate the delocalised electron system.



Explain the delocalised electron system of benzene in terms of the types of bonds involved



Explain the delocalised electron system of benzene in terms of the types of bonds involved

The p orbital on each carbon atom in benzene overlaps with the p orbitals either side of them. This series of overlaps produces a pi bond system. These electrons are spread out over the whole carbon ring and therefore are described as being delocalised.



What thermochemical evidence is there for the delocalised model of benzene?



What thermochemical evidence is there for the delocalised model of benzene?

If the Kekulé model of benzene were right, the enthalpy change of hydration of benzene would be three times that of cyclohexene. The enthalpy change of hydration of benzene is higher (less exothermic) than this due to the enthalpy of delocalisation. Benzene is more stable than the Kekulé model suggests.



What is the x-ray diffraction evidence for the delocalised model of benzene?



What is the x-ray diffraction evidence for the delocalised model of benzene?

If the Kekulé model of benzene were correct, benzene would have two different bond lengths for double and single bonds, x-ray diffraction of benzene shows that only one bond length is present that is somewhere between double and single bond length.



Explain why benzene is resistant to bromination



Explain why benzene is resistant to bromination

Alkenes undergo bromination but benzene does not. Benzene's delocalised electron system is very stable. The electrons are distributed evenly throughout the delocalised electron system and therefore benzene is unable to polarise a nonpolar molecule like bromine.



What is the shape of benzene? What is the bond angle?



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Benzene is a planar, regular hexagon and the shape around each carbon atom is trigonal planar. The bond angle is 120° .



What is the equation for the combustion of benzene?



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The combustion of benzene produces a smoky flame.

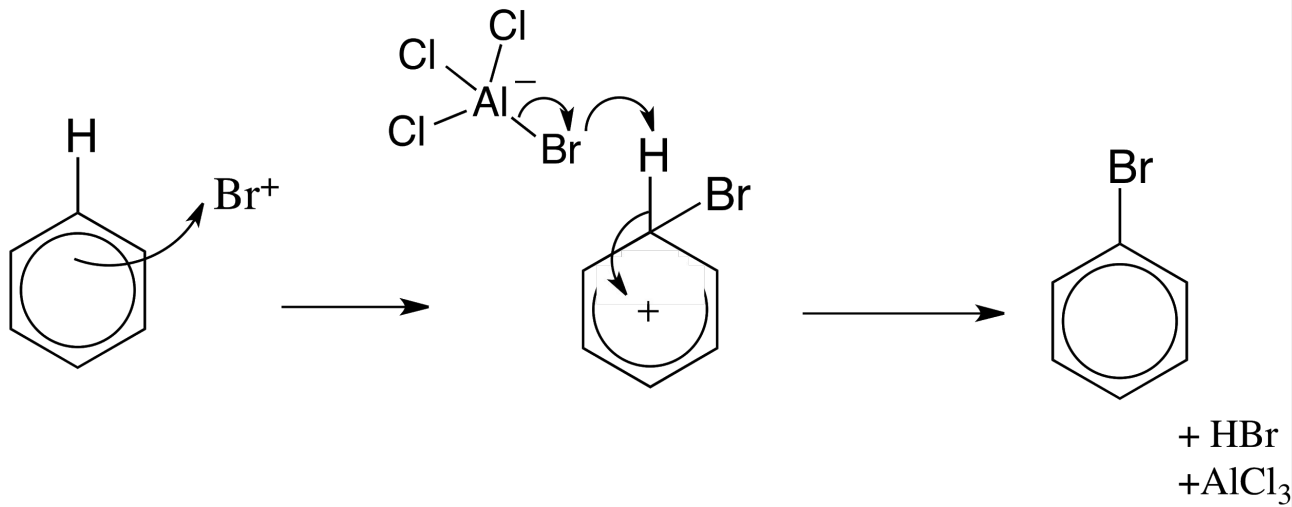
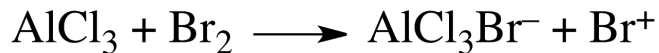


What is the mechanism and the catalyst for the reaction between benzene and bromine?



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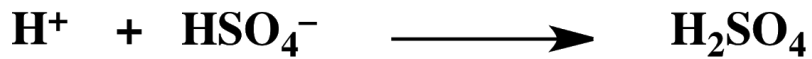
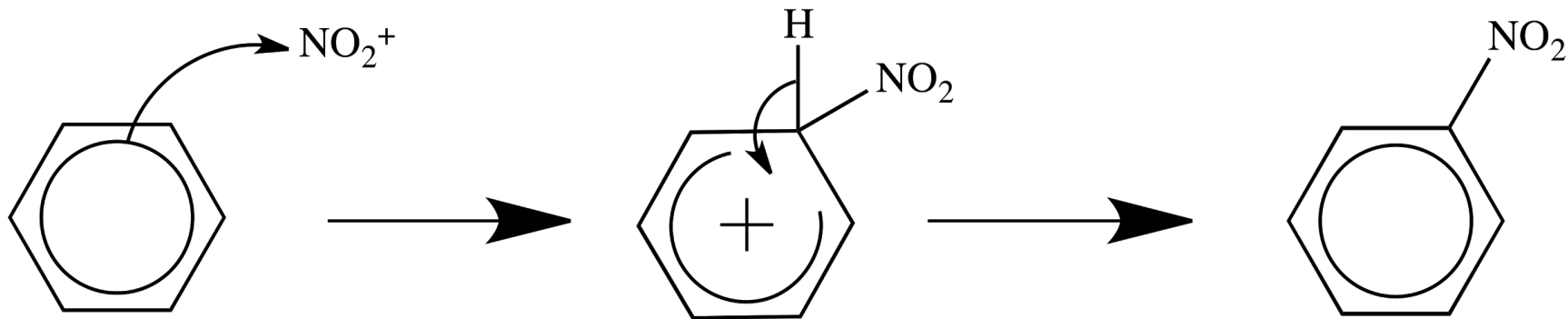
Benzene will react with bromine in the presence of a AlCl_3 catalyst:



What is the mechanism for the nitration of benzene?



What is the mechanism for the nitration of benzene?

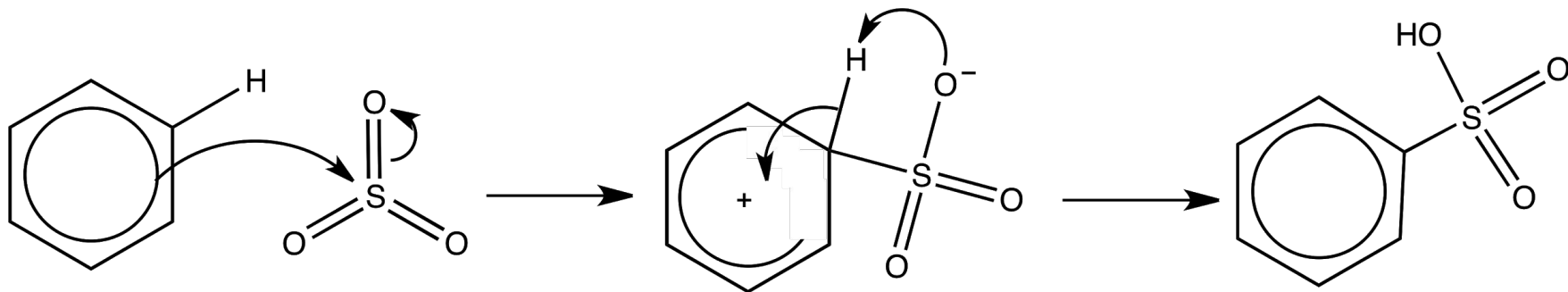


What is the mechanism for the sulfonation of benzene?



What is the mechanism for the sulfonation of benzene?

Fuming sulfuric acid is added to the benzene as it contains SO_3 molecules:



How is the hydration of benzene carried out?



How is the hydration of benzene carried out?

Benzene is reacted with hydrogen gas and a nickel catalyst at 150° .

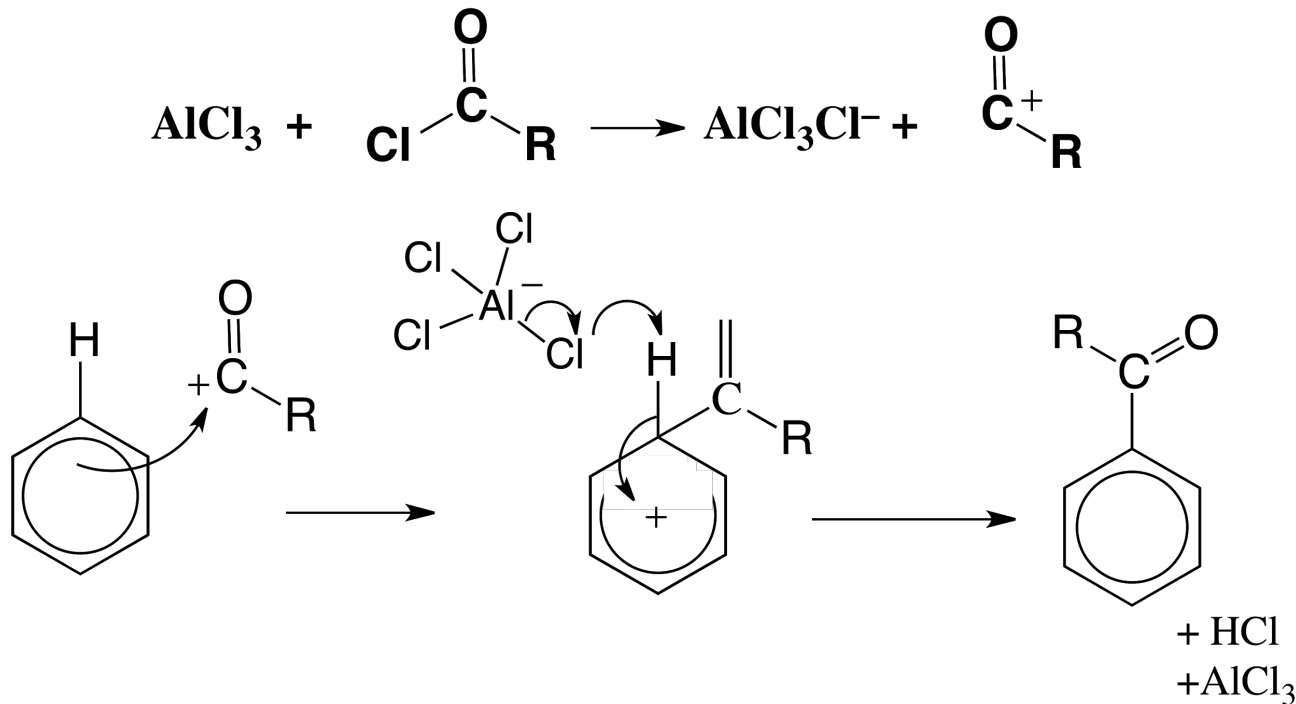


How is an acyl chloride added to a benzene ring?



How is an acyl chloride added to a benzene ring?

Benzene is reacted with an acyl chloride in the presence of an AlCl_3 catalyst:



Explain why phenol will react with bromine water much more easily than benzene



Explain why phenol will react with bromine water much more easily than benzene

Phenol has an alcohol group attached to the carbon ring. The lone pair of electrons on the oxygen atom is delocalised into the benzene ring, activating the ring. This causes an increase in the electron density and therefore induces a dipole in bromine molecules.

