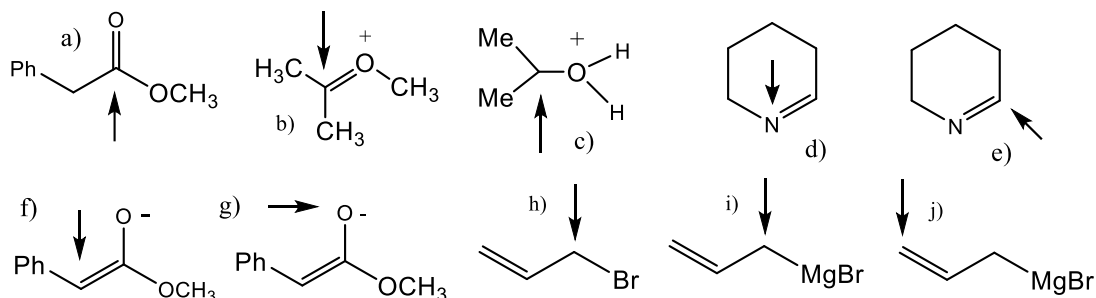


AIEMPIA TENTTIKYSYMYKSIÄ 1 (VASTAUKSET 29.11)

Kysymys 1 :

Onko molekyylissä nuolella osoitettu atomi nukleofiilinen vai elektrofiilinen ?



Kysymys 2 :

Mistä alkeesta valmistetaan yleensä HBr addition avulla seuraavat alkylibromidit ? Miksi ?

- a) 3-Bromihexaani
- b) 2-Bromipentaani
- c) (2-Bromipropyli)sykloheksaani
- d) 1-Bromi-1-etyylisykloheksaani

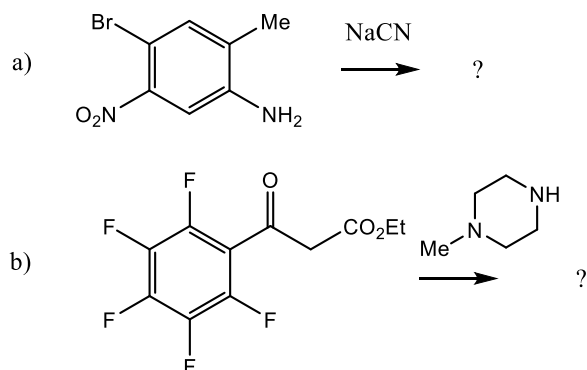
Kysymys 3 :

Miten valmistaisit kahden synteesivaiheen kautta seuraavat molekyylit bentseenistä ? Miksi b) kohdan molekyyli on vaikea valmistaa hyvällä saannolla ?

- a) m-bromi bentseenisulfonihappoa
- b) p-bromi bentseenisulfonihappoa
- c) m-kloori nitrobentseeniä

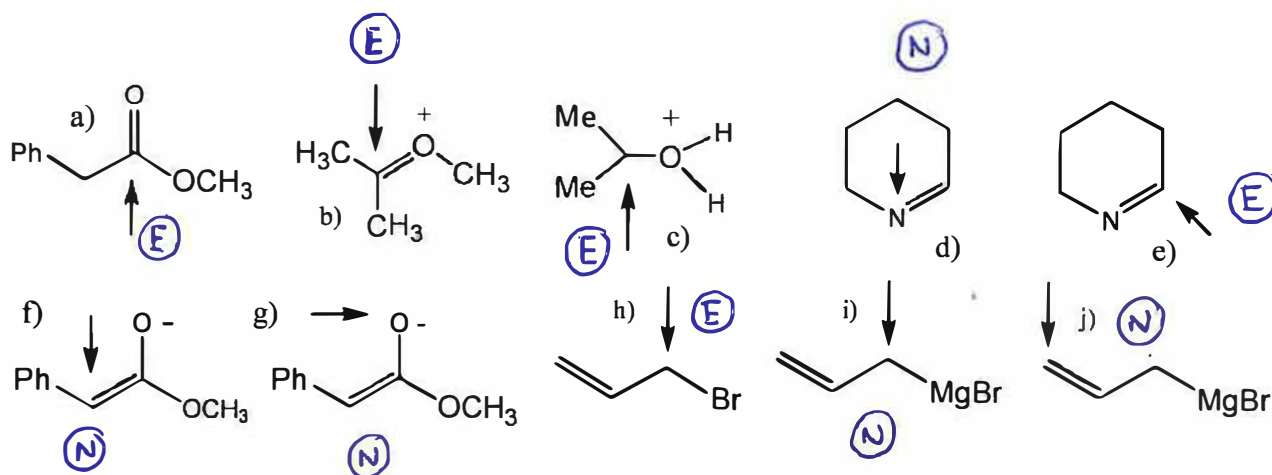
Kysymys 4 :

Seuraavat kaksi reaktiota tuottavat molemmat yhden päätuotteen. Mikä tuote muodostuu, ja mikä on reaktiotyyppi ? Esitä tai selitä mekanismi molemmissa tapauksissa ?



Vastaukset Tenttikysymyksiin 1

Kysymys 1



a) Karbonyyliryhmän hiili on elektrofiilinen. Hiilelle jää positiivinen osittaisvaraus, jonka takia se ottaa vastaan elektroniparin.

b) Hiili on elektrofiilinen, sillä siihen kiinnittyneellä hapella on positiivinen varaus. Nukleofiili hyökkää hiileen, jolloin piisidos katkeaa.

c) Hiili on elektrofiilinen, koska siihen kiinnittyneellä hapella on positiivinen varaus.

d) Typpi on nukleofiilinen, koska sillä on vapaa elektronipari.

e) Hiili on elektrofiilinen, koska siinä on kaksoissidos tyyppeen, joka on elektronegatiivinen.

f) Hiili on nukleofiilinen, koska siinä on kaksoissidos ja fenoli.

g) Happi on nukleofiilinen, koska sillä on negatiivinen varaus.

h) Hiilestä on sigmasidos elektronegatiiviseen bromiin, joten hiili on elektrofiili.

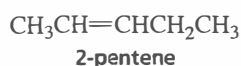
i) Hiilestä on sigmasidos elektropositiiviseen magnesiumiin, joten hiili on nukleofiili.

j) Hiilestä on pii-sidos toiseen hiileen, joten hiili on nukleofiilinen.

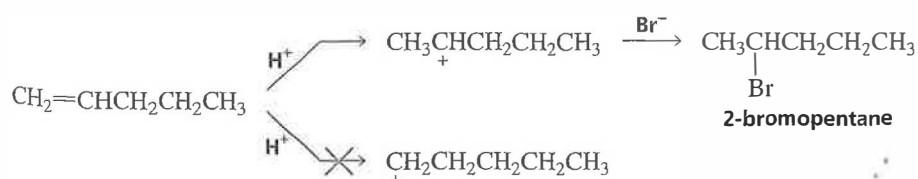
2.3 alk.

b.) What alkene should be used to synthesize 2-bromopentane?

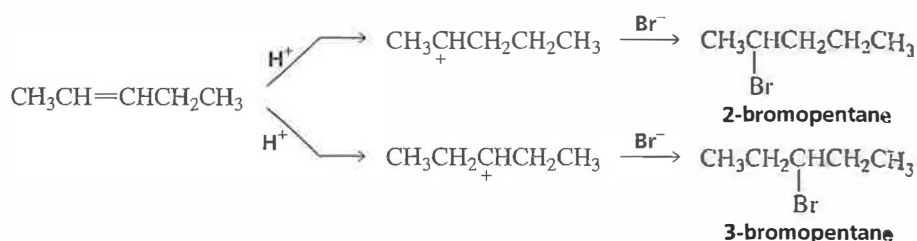
Either 1-pentene or 2-pentene could be used because both have an sp^2 carbon at the C-2 position.



When H^+ adds to 1-pentene, one of the carbocations that could be formed is secondary and the other is primary. A secondary carbocation is more stable than a primary carbocation, which is so unstable that little, if any, will be formed. Thus, 2-bromopentane will be the only product of the reaction.

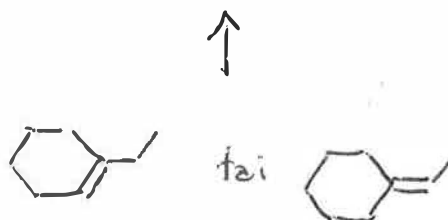
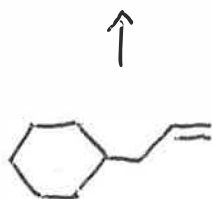
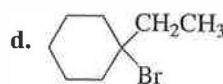
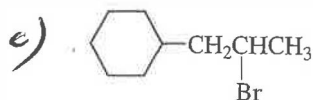


When H^+ adds to 2-pentene, on the other hand, the two carbocations that can be formed are both secondary. Both are equally stable, so they will be formed in approximately equal amounts. Thus, only about half of the product of the reaction will be 2-bromopentane. The other half will be 3-bromopentane.



Because all the alkyl halide formed from 1-pentene is 2-bromopentane, but only half the alkyl halide formed from 2-pentene is 2-bromopentane, 1-pentene is the best alkene to use to prepare 2-bromopentane.

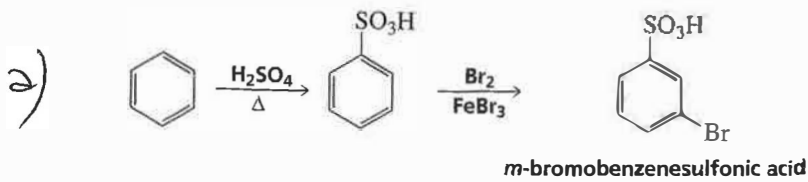
~~Now continue on to answer the questions in Problem 27.~~



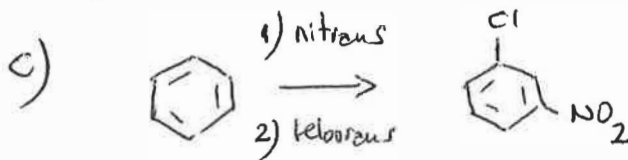
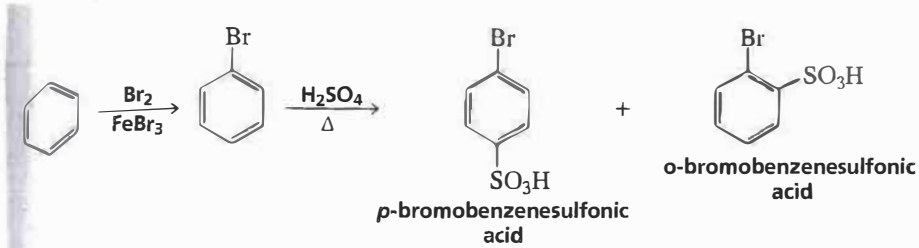
Kysymys 3 (4p) :

Miten valmistaisit kahden synteesisivaiheen kautta seuraavat molekyylit bentseenistä ? Miksi b) kohdan molekyyli on vaikea valmistaa hyvällä saannolla ?

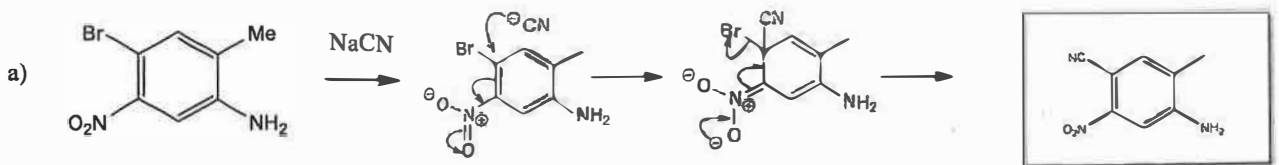
- a) m-bromi bentseenisulfonihappoa
- b) p-bromi bentseenisulfonihappoa
- c) m-kloori nitrobentseeniä



b) On the other hand, if the desired product is *para*-bromobenzenesulfonic acid, the order of the two reactions must be reversed because only the bromo substituent is an ortho/para director.

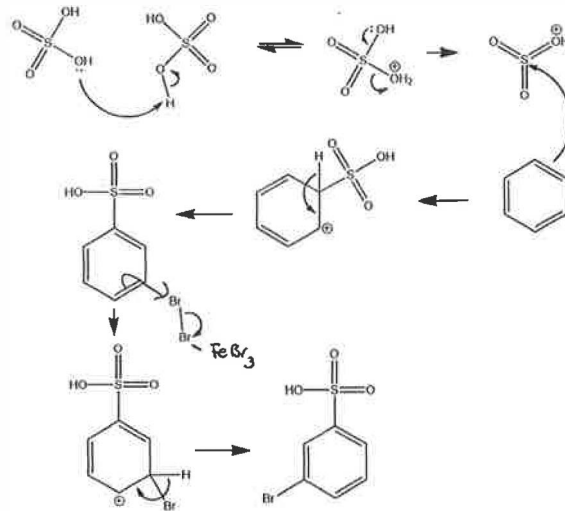


4) Seuraavat kaksi reaktiota tuottavat molemmat yhden päätuotteen. Mikä tuote muodostuu, ja mikä on reaktiotyyppi ? Esitä tai selitä mekanismi molemmissa tapauksissa ?

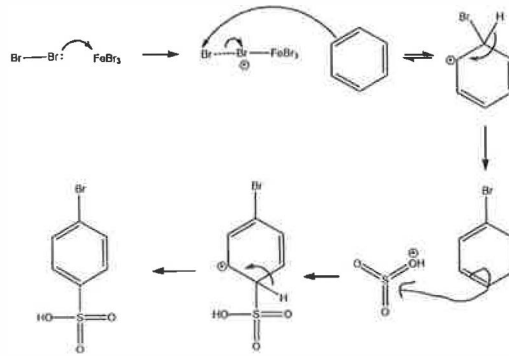


(Mechanism)

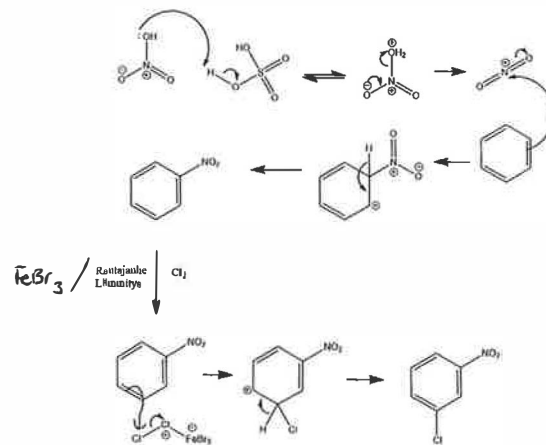
3 a)



3 b)



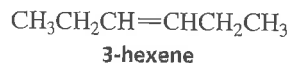
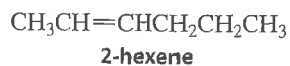
3 c)



2

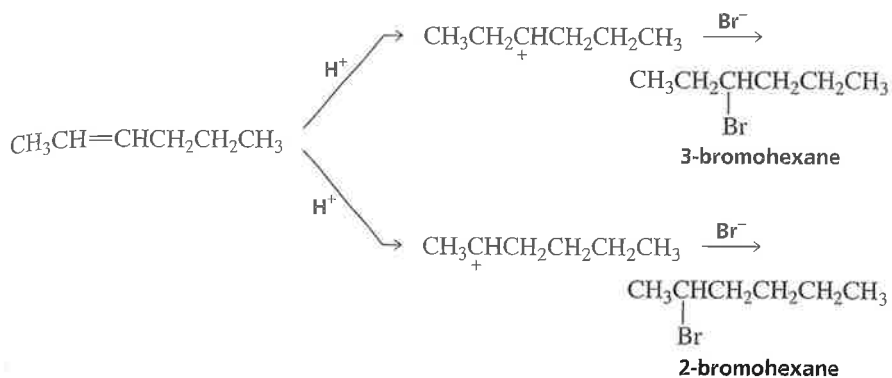
Mistä alkeenista valmistetaan yleensä HBr addition avulla seuraavat alkylibromidit? Miksi?

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- 2-Bromipentaani
- (2-Bromipropyyli)sykloheksaani
- 1-Bromi-1-etyylisykloheksaani

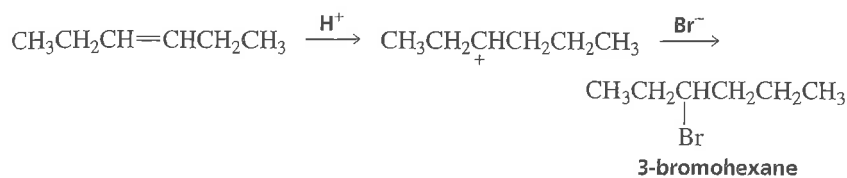


a)

Because there are two possibilities, determine whether or not there is any advantage to using one over the other. The addition of H^+ to 2-hexene, for instance, can form two different carbocations. Because they are both secondary carbocations, they have the same stability and, therefore, approximately equal amounts of each will be formed. As a result, half of the product will be 3-bromohexane and half will be 2-bromohexane.



The addition of H^+ to either of the sp^2 carbons of 3-hexene, on the other hand, forms the same carbocation because the alkene is symmetrical. Therefore, all of the product will be the desired 3-bromohexane.

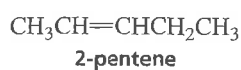
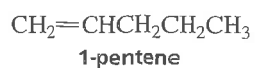


Because all the alkyl halide formed from 3-hexene is 3-bromohexane, but only half the alkyl halide formed from 2-hexene is 3-bromohexane, 3-hexene is the best alkene to use to prepare 3-bromohexane.

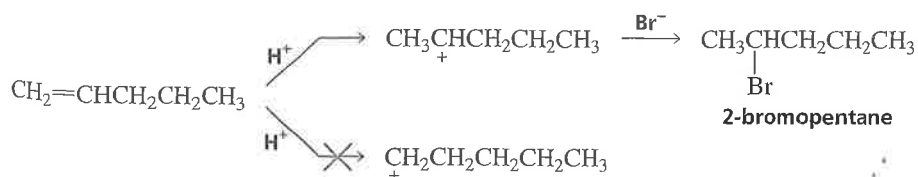
2. part k.

b.) What alkene should be used to synthesize 2-bromopentane?

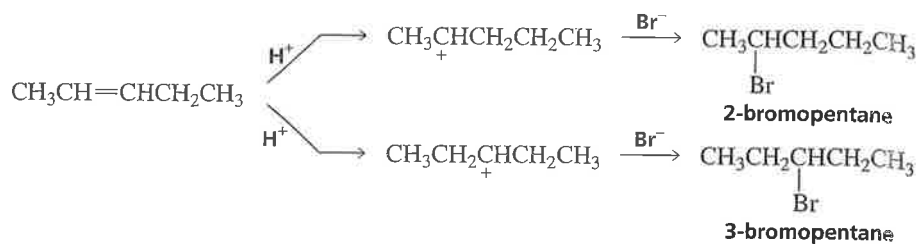
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When H^+ adds to 1-pentene, one of the carbocations that could be formed is secondary and the other is primary. A secondary carbocation is more stable than a primary carbocation, which is so unstable that little, if any, will be formed. Thus, 2-bromopentane will be the only product of the reaction.

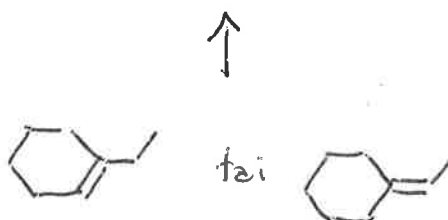
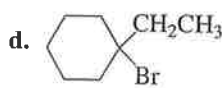
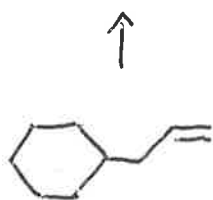
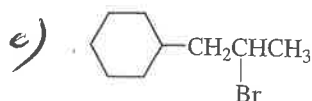


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Because all the alkyl halide formed from 1-pentene is 2-bromopentane, but only half the alkyl halide formed from 2-pentene is 2-bromopentane, 1-pentene is the best alkene to use to prepare 2-bromopentane.

Now continue on to answer the questions in Problem 27.



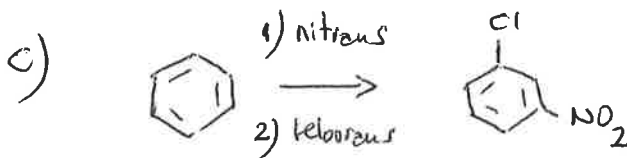
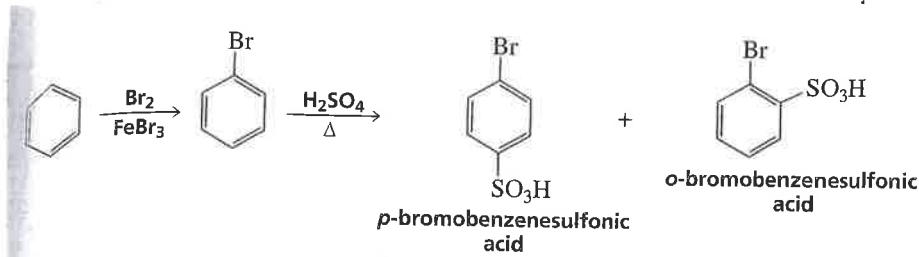
Kysymys 3 (10p) :

Miten valmistaisit kahden synteisivaiheen kautta seuraavat molekyylit bentseenistä ? Miksi b) kohdan molekyyli on vaikea valmistaa hyvällä saannolla ?

- a) m-bromi bentseenisulfonihappoa
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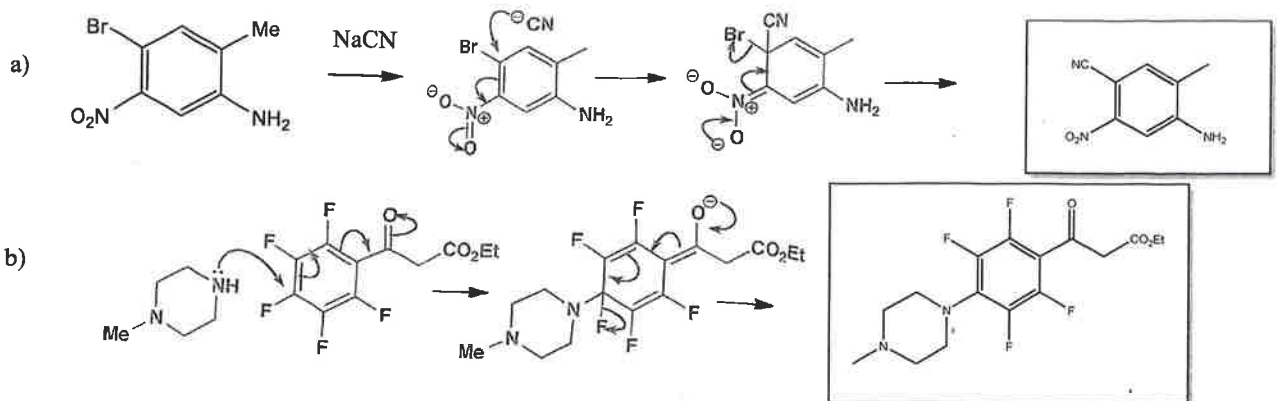


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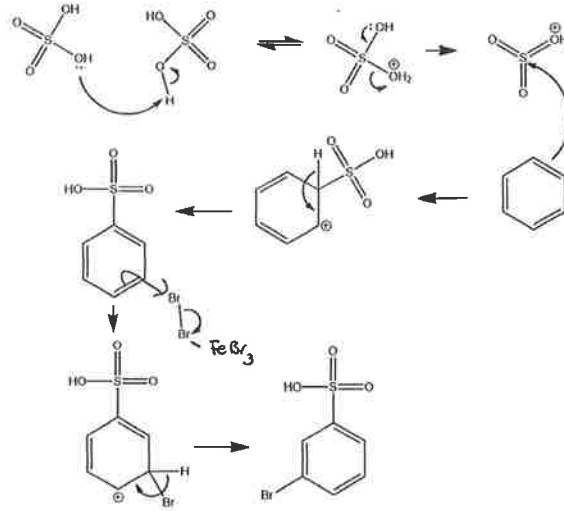
4)

Seuraavat kaksi reaktiota tuottavat molemmat yhden päätuotteen. Mikä tuote muodostuu, ja mikä on reaktiotyyppi ? Esitä tai selitä mekanismi molemmissa tapauksissa ?

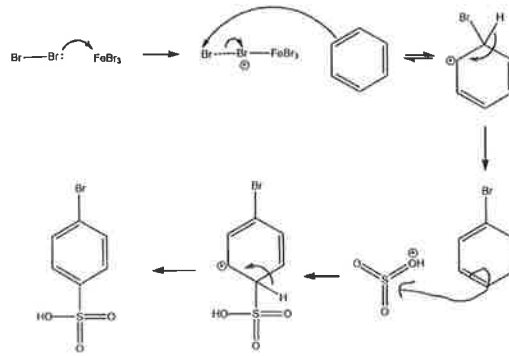


(Mechanismus)

3 a)



3 b)



3 c)

