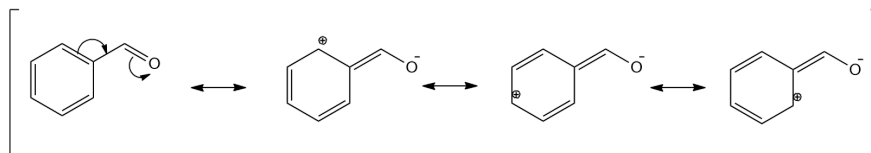
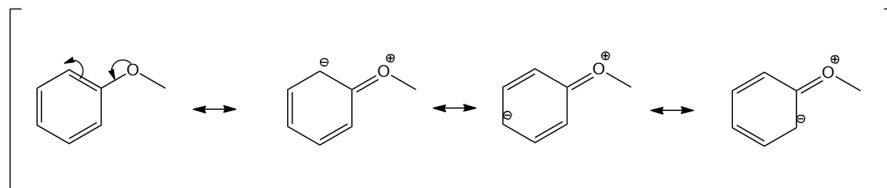


## 18.14: SOLUTIONS TO ADDITIONAL EXERCISES

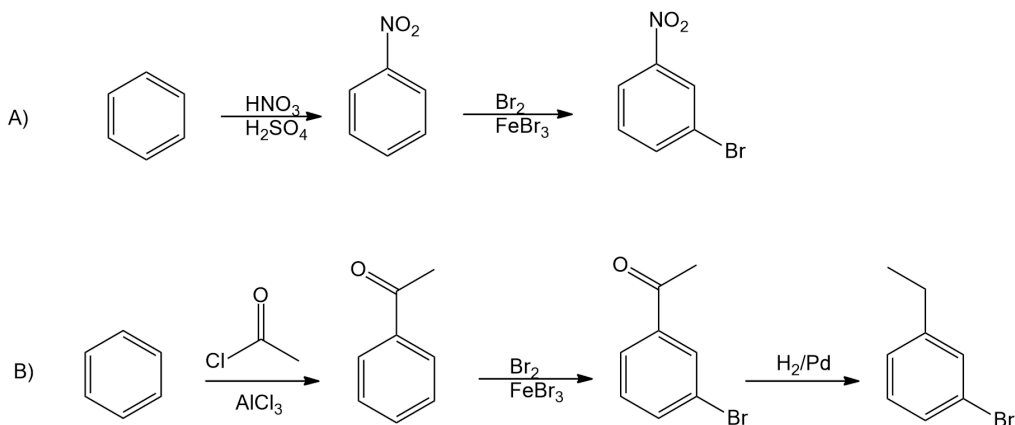
18-1



18-2



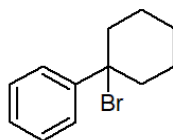
18-3 This is just one possible way to synthesize it.



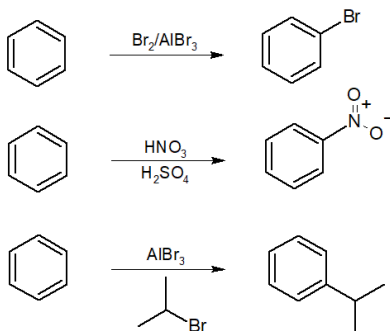
18-4 The bromine should be in the meta position. Right now it is in the ortho position, from perhaps having the ethyl group present first and then the having it substituted there. BUT the ethyl group is last to form, and the aldehyde and nitro groups would both encourage a meta substitution.

18-5 Answer: A

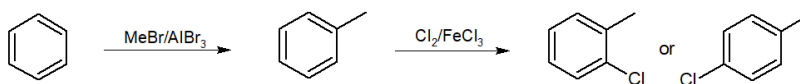
18-6



18-7

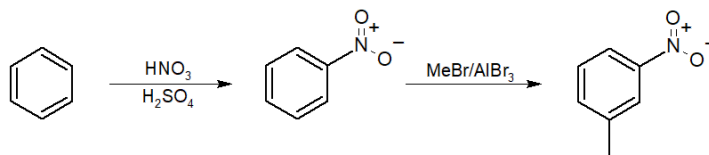


18-8

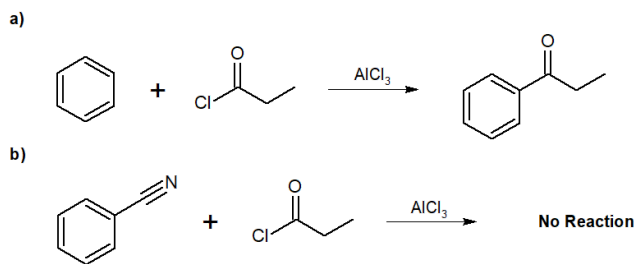


18-9 1-chloro-2-methylbenzene and 1-chloro-4-methylbenzene

18-10

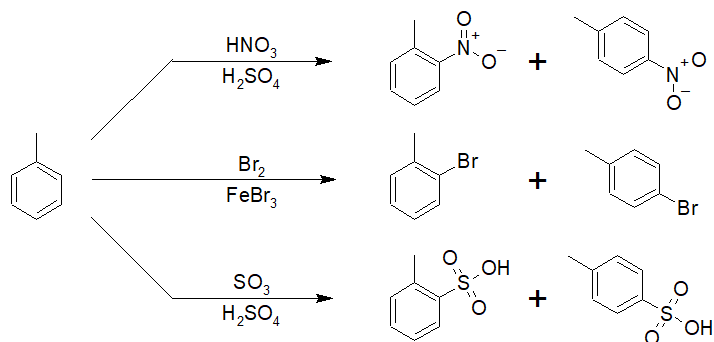


18-11

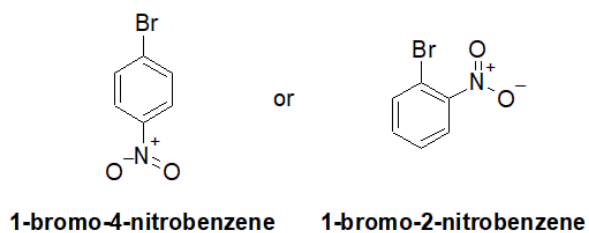


### Halogenation, Nitration, and Sulfonation of Benzene

18-12:



18-13:

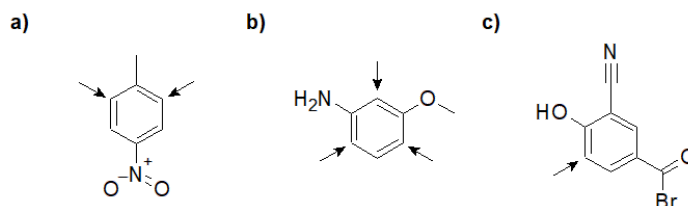


18-14:

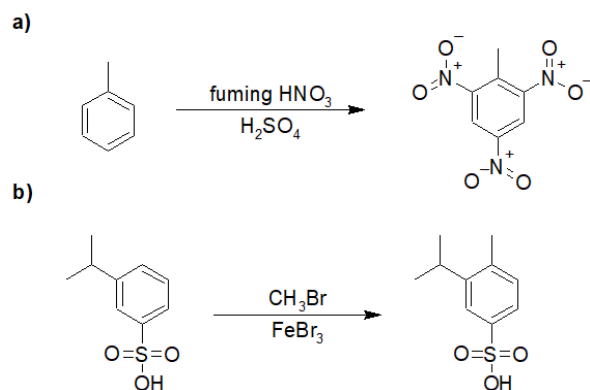
Answer: A

### Activating, Ortho-, Para-Directing Substituents

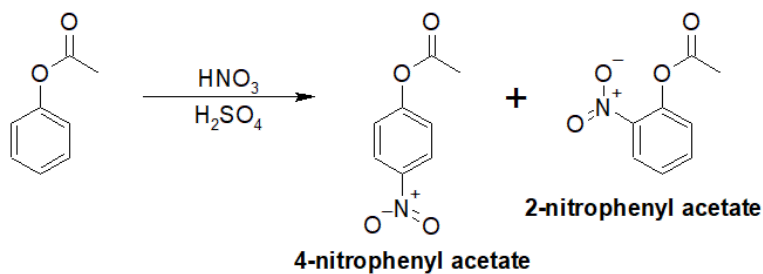
18-15:



18-16:

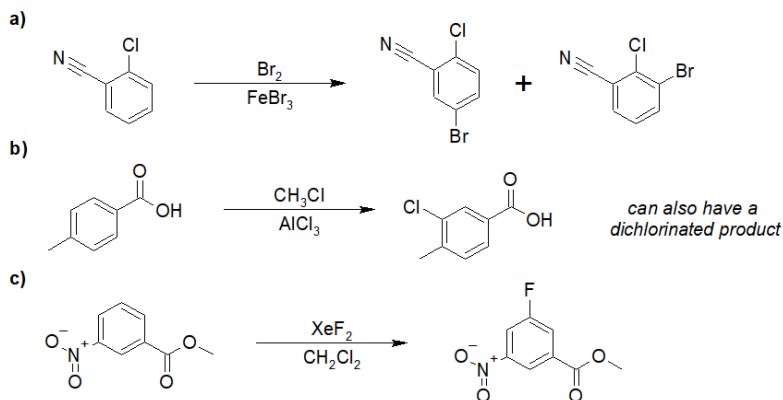


18-17:

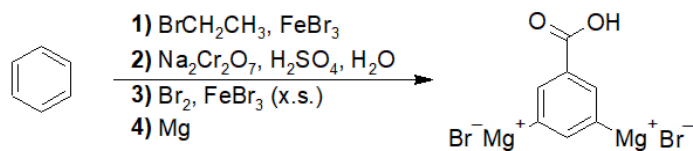


### Deactivating, Meta-Directing Substituents

18-18:



18-19:



18-20:

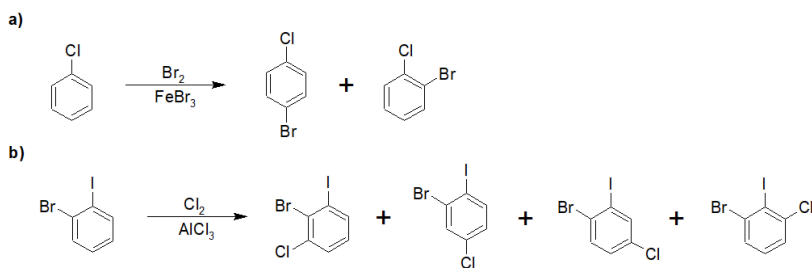
Answer: B

**Halogen Substitutes: Deactivating, but Ortho, Para-Directing**

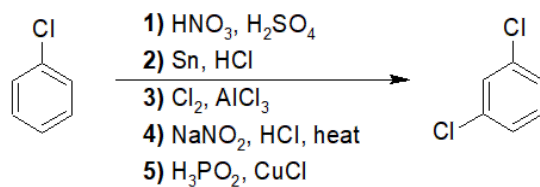
18-21:

Answer: B

18-22:

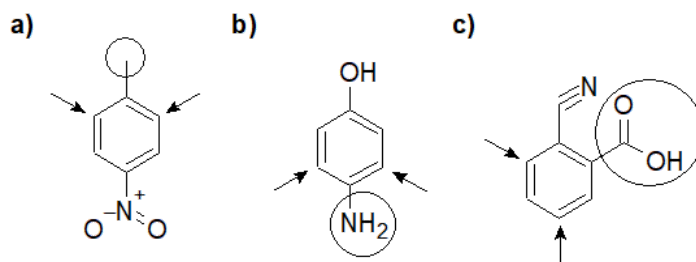


18-23:

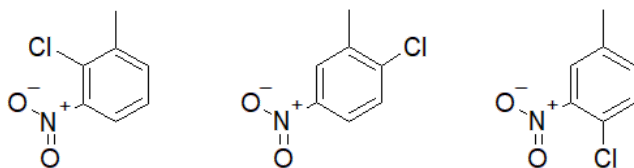


### Effects of Multiple Substituents on Electrophilic Aromatic Substitution

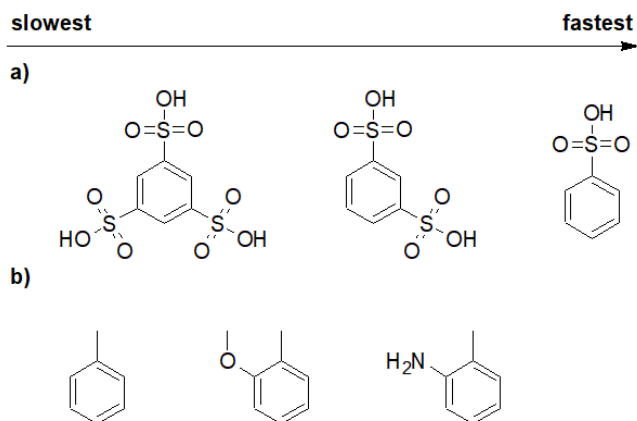
18-24:



18-25:

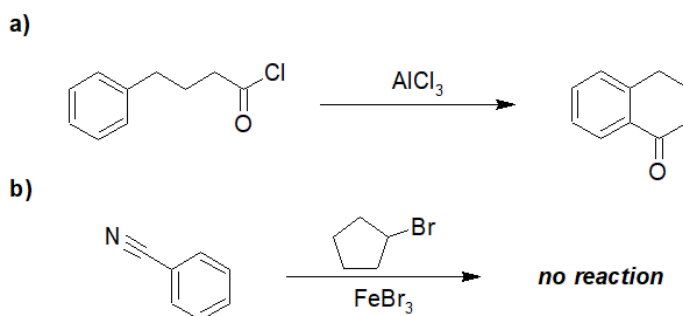


18-26:



### Friedel-Crafts Alkylation/Acylation

18-27:

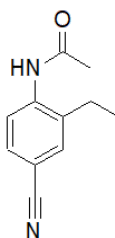


18-28:

Friedel-Crafts alkylation using 1-chloropropane is not the best way to synthesize propylbenzene. You will end up with (propan-2-yl)benzene as your main product due to a hydride shift occurring during an intermediate step. A better route of synthesis may be Friedel-Crafts acylation using propanoyl chloride to make 1-phenylpropan-1-one, followed by a Clemmensen reduction to obtain the final product.

18-29:

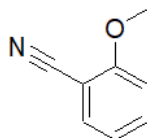
Answer: D



*N*-(4-cyano-2-ethylphenyl)acetamide

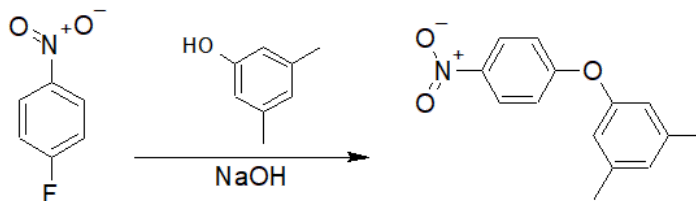
### Nucleophilic Aromatic Substitution

18-30:



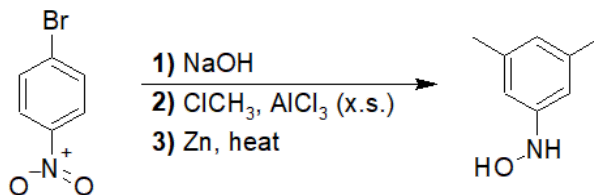
2-methoxybenzonitrile

18-31:



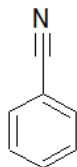
18-32:

Possible route of synthesis:



### Aromatic Substitutions Using Organometallic Reagents

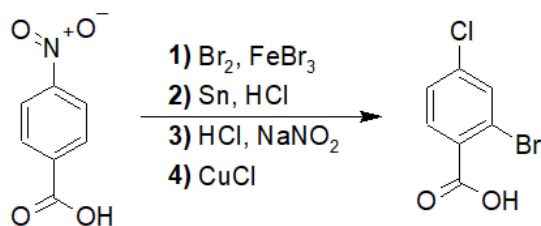
18-33:



benzonitrile

18-34:

Possible route of synthesis:

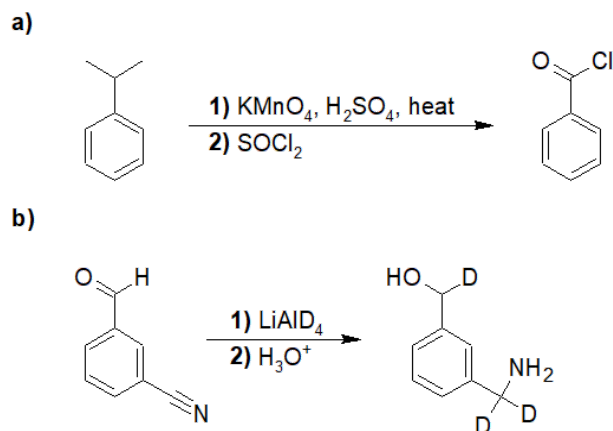


18-35:

Answer: D

### Side-Chain Reactions of Benzene Derivatives

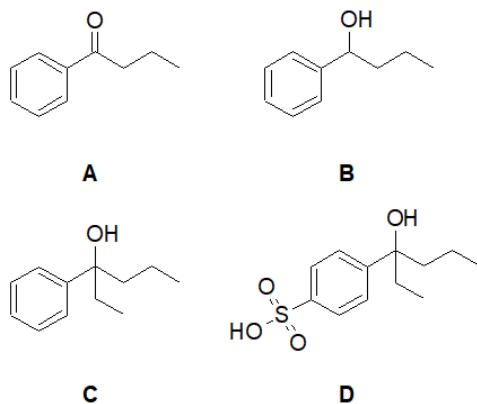
18-36:



18-37:

Answer: A

18-38:



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