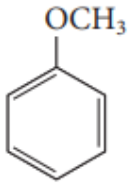
Problems CH-4

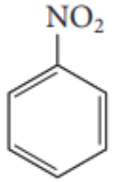
(1) For each of the monosubstituted benzenes shown below:

A. indicate whether the substituent is ortho,para directing or meta directing.

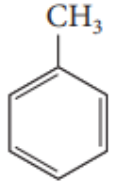
B. draw the structure of the main monosubstitution product for each of the reactions indicated.

a. 

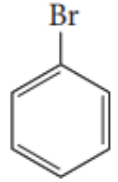
+ chlorine (Fe catalyst)

b. 

+ bromine (Fe catalyst)

c. 

+ bromine (Fe catalyst)

d. 

+ concentrated sulfuric acid (heat) + SO_3

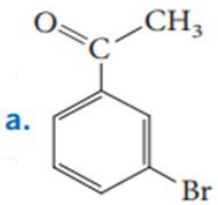
(2) For the compounds named below,

A. draw the structure of each compound.

B. using benzene as the only aromatic starting material, devise a synthesis of each compound.

a. *p*-bromotoluene b. *p*-nitroethylbenzene c. *p*-bromonitrobenzene

(3) Using benzene as the only aromatic organic starting material, devise a synthesis for each of the following compounds. Name the product.

a. 

b. 