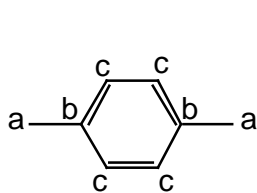
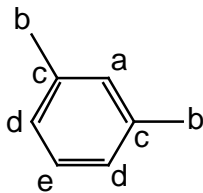


Answers to Problem Set #7  
CH241-2001F

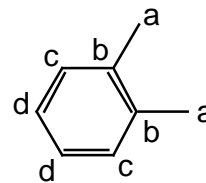
- [1] The number of signals in the  $^{13}\text{C}$  NMR would be different for each compound.



Three kinds of carbons



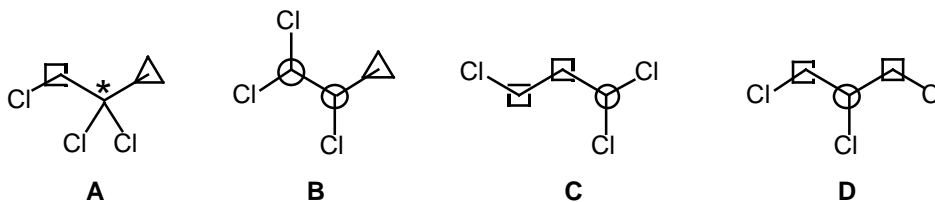
Five kinds of carbons



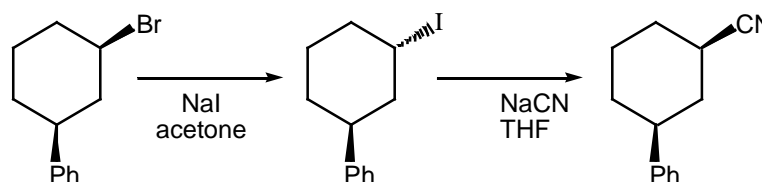
Four kinds of carbons

As for the IR, please refer to the chart that was handed out in class. The C-H bending absorptions will be different for the *ortho*-, *meta*-, and *para*-isomers.

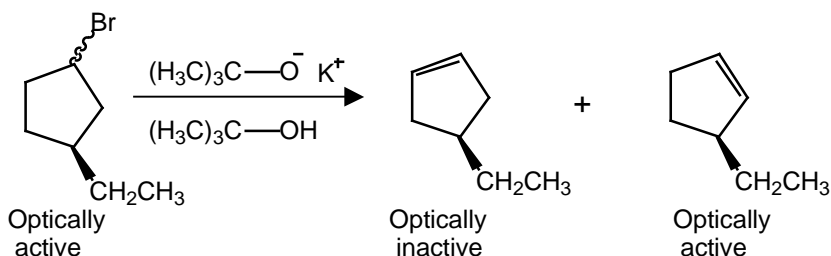
- [2] Each compound will show a distinct pattern. In the drawings below, the asterisk (\*) represents a singlet carbon, circles represent doublet carbons, boxes represent triplet carbons, and triangles represent quartet carbons.



- [3] Two  $\text{S}_{\text{N}}2$  reactions will get the job done.



- [4] The two products and their optical activities are shown below.



- [5]  $K = (0.75)(0.75)/(0.25)(0.25) = 9$ .