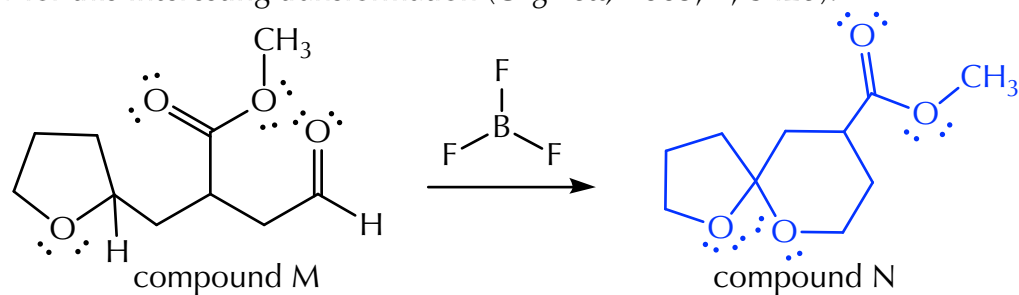
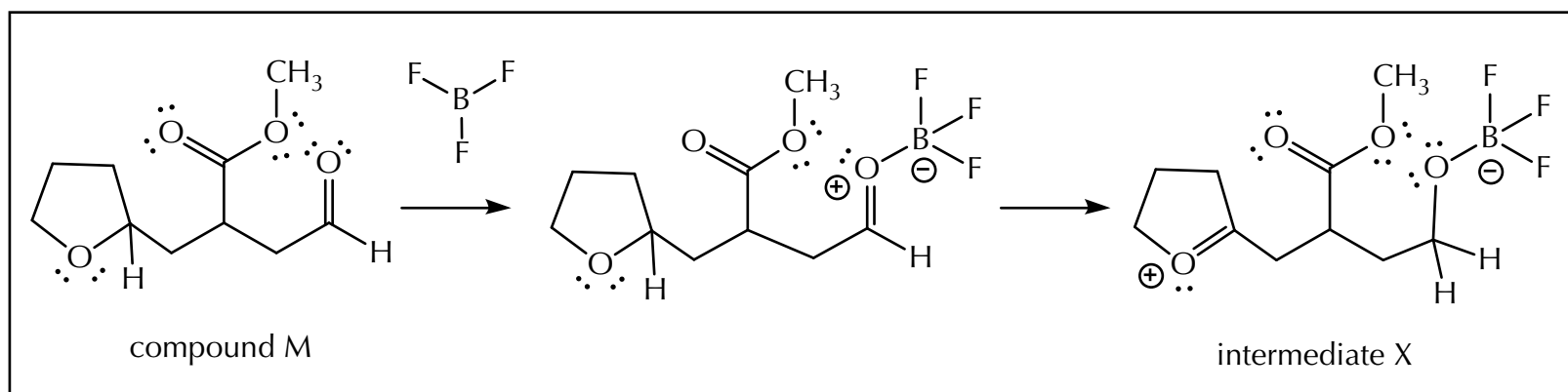


EQ 05.24

The following transformation of compound M to the ketal in compound N uses the strong Lewis acid,  $\text{BF}_3$ . Answer the questions below for this interesting transformation (*Org Lett*, **2005**, 7, 5429).



- (a) The first step of the reaction sequence is the reduction of the aldehyde functional group in compound M to form intermediate X. The hydride used for this reduction comes from within compound M itself, following the formation of after the Lewis acid complex to the aldehyde. For each of the steps of the reaction shown below, draw the curved arrow mechanism.



- (b) After the intramolecular reduction of the aldehyde functional group, intermediate X undergoes a second intramolecular reaction sequence to form the ketal functional group. Provide a stepwise, curved arrow mechanism for this transformation.



- (c) Two of the experimental steps used to prepare compound M are given, below. Complete these reactions.

