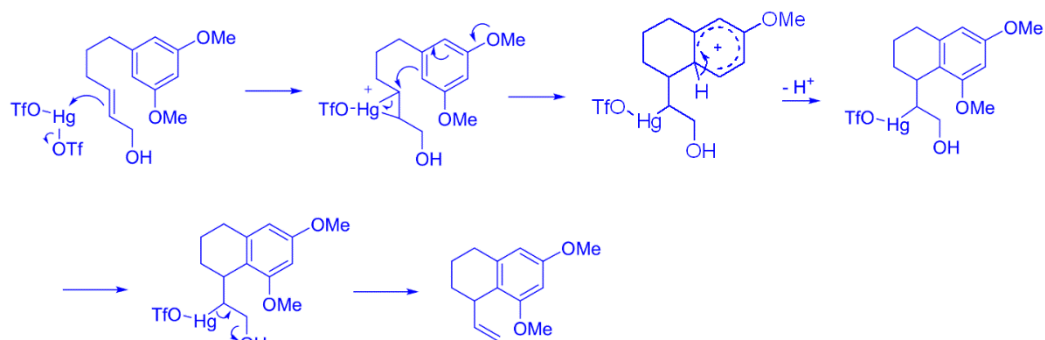
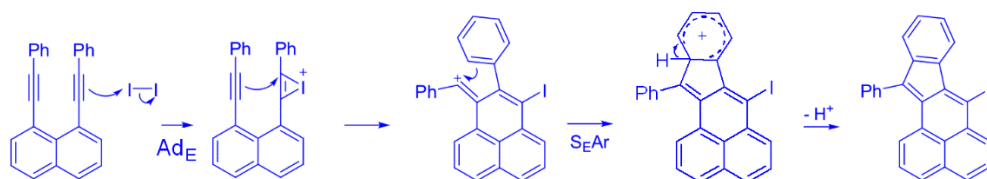


练习四 (S_E Reactions) 参考答案

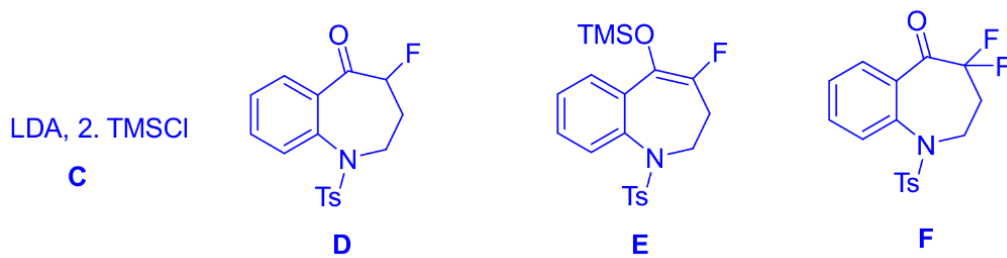
1.



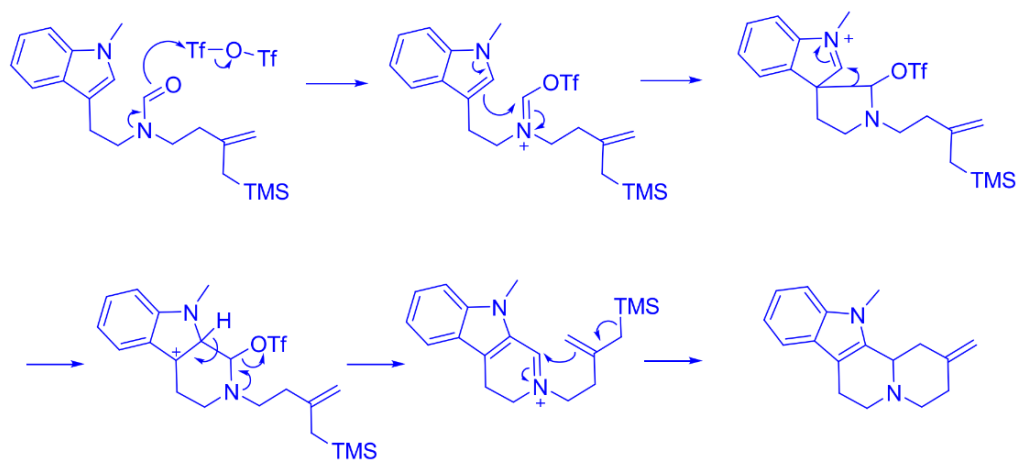
2.



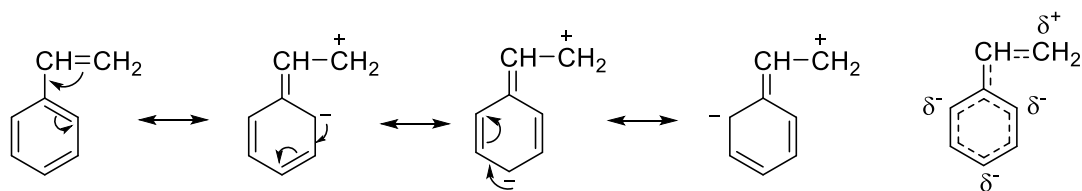
3.



4.

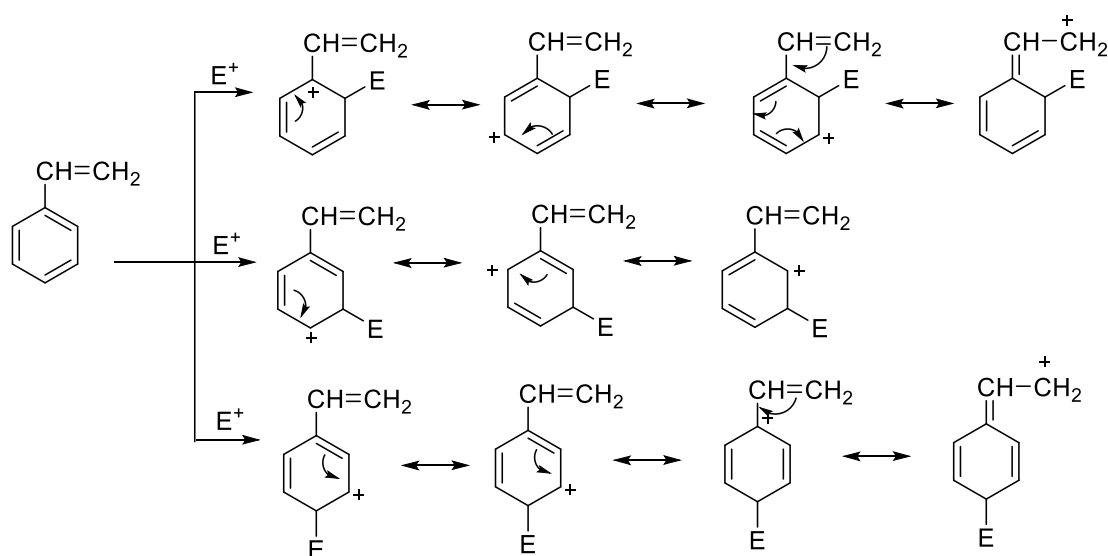


5. (1) from substrate:



The vinyl group activates the benzene ring by providing electrons through resonance. Additionally, the electron density at the ortho- and para-positions of the vinyl group is higher than that at the meta position, resulting in electrophiles mainly attacking the ortho- and para-positions.

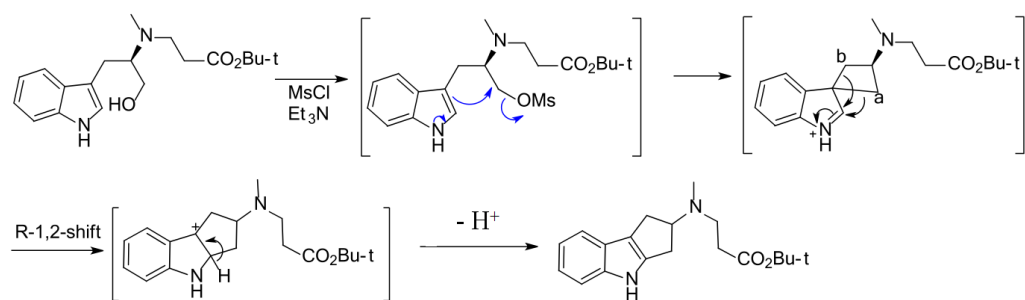
(2) from intermediate:



- ortho and para attacks give intermediates with four resonance forms, respectively, one of which in each case involves the π electrons of the vinyl group.
- In contrast, meta substitution proceeds through a cation described by only three resonance forms, none of which benefits from the participation of the π electrons of the vinyl group.
- Thus, substitution will occur exclusively ortho and para to the directing vinyl substituent in the starting material

6. 参考第 5 题答案。

7.



8.

